## Bidding Document

<table>
<thead>
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<th>SR.#</th>
<th>Document</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Request for Proposal</td>
</tr>
<tr>
<td>2.</td>
<td>Draft Concession Agreement</td>
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<td>3.</td>
<td>Draft Independent Auditor Agreement</td>
</tr>
<tr>
<td>4.</td>
<td>Draft Independent Engineer Agreement</td>
</tr>
<tr>
<td>5.</td>
<td>Draft Project Site License Agreement</td>
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<td>6.</td>
<td>Preliminary Project Drawings</td>
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<td>8.</td>
<td>Hydrology and Hydraulic Study Report</td>
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<td>9.</td>
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<td>10.</td>
<td>Annexures</td>
</tr>
</tbody>
</table>
REQUEST FOR PROPOSAL (RFP)
KORANGI LINK ROAD PROJECT

VOLUME I: INSTRUCTIONS TO BIDDERS

LOCAL GOVERNMENT DEPARTMENT,
HOUSING TOWN PLANNING
GOVERNMENT OF SINDH

DATED

04th October 2021
Reference: Link Road for Korangi

Dear Bidders,

The Local Government & HTP Department, Government of Sindh (the Agency), hereby invites bids from the Bidders for the Project.

Unless expressly specified otherwise, all capitalized terms used herein shall bear the meaning ascribed thereto in the Glossary of this RFP.

This RFP sets out, inter alia, the process for the selection of a private partner that will, pursuant to an agreement entitled ‘Concession Agreement’ (to be entered into between the Agency and the Concessionaire), design, finance, build, operate, maintain and transfer the Project which is described as follows:

The Project having total length of approximately 12.0 km, includes:

- construction of Bridge approximately 1.0 km length over Malir River (between Korangi Causeway and Jam Sadiq Bridge) with all guide bunds,
- construction of new road over Left Bank of Korangi river (to connect Korangi road of approximately 1.5 km length),
- construction of lane interchange / loop ramps at Korangi Bridge / Link road for Korangi Creek, Coastal road with shoulders on either side including revetement and earthwork of approximately 5.9 km length,
- construction of culverts, PRL road to connect Link Korangi to Korangi Creek of approximately 1.0 km length,
- rehabilitation / widening of Existing PRL road of approximately 1.6 km length,
- stormwater drains approximately 1.0 km length,
- realignment of existing Creek Avenue, Roundabout at Creek Avenue to link with Malir Expressway,
- rehabilitation of existing bunds, Street Lights.

The Project (including the ownership of the Project related assets) shall be handed over to the Agency, ten (10) years from the Commencement Date, at the end of the Concession Period.

In order for a Bid to be evaluated by the Technical and Financial Evaluation Committee, the Bidders must meet all of the eligibility requirements stated herein.

The key tentative dates (as may be extended by the Agency at its discretion in accordance with the SPP Rules) in this stage of the selection process are as follows:
<table>
<thead>
<tr>
<th>Event</th>
<th>Date/Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Issuance of the RFP (the <strong>Issuance Date</strong>).</td>
<td>October 04, 2021</td>
</tr>
<tr>
<td>Availability of bidding documents on SPPRA website.</td>
<td>October 04, 2021 to December 02, 2021</td>
</tr>
<tr>
<td>Pre-Bid Meeting (the <strong>Pre-Bid Meeting</strong>).</td>
<td>October 20, 2021</td>
</tr>
<tr>
<td>Submission and opening of Technical Bids and submission of Financial Bids only (the <strong>Bid Submission Date</strong>).</td>
<td>Bid submission deadline DATE/TIME: 15:00 hrs PST Friday, December 03, 2021. (Bid opening shall be at 16:00 hrs PST Friday, December 03, 2021)</td>
</tr>
<tr>
<td>Evaluation of Technical Bids and opening of financial bid (the <strong>Evaluation of Technical Bids</strong>).</td>
<td>December 24, 2021</td>
</tr>
<tr>
<td>Evaluation of Financial Bid (the <strong>Evaluation of Financial Bids</strong>).</td>
<td>January 07, 2022</td>
</tr>
<tr>
<td>Announcing the Preferred Bidder (the <strong>Announcement</strong>).</td>
<td>January 14, 2022</td>
</tr>
<tr>
<td>Concession Agreement signing (the <strong>Signing Date</strong>).</td>
<td>February 14, 2022</td>
</tr>
</tbody>
</table>

**Concession Period**

<table>
<thead>
<tr>
<th>Event</th>
<th>Date/Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial Close.</td>
<td>The date falling the later of:</td>
</tr>
<tr>
<td></td>
<td>(a) one hundred and eighty (180) days after the Signing Date; or</td>
</tr>
<tr>
<td></td>
<td>(b) ninety days (90) days from the approval of physical Hydraulic Model Study from the Irrigation Department of Government of Sindh</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Event</th>
<th>Date/Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anticipated start of design, planning and surveys.</td>
<td>Ten (10) days from Signing Date</td>
</tr>
<tr>
<td>Anticipated end of design, planning and surveys.</td>
<td>The date falling the later of:</td>
</tr>
<tr>
<td></td>
<td>(a) one hundred and eighty (180) days after the Signing Date; or</td>
</tr>
<tr>
<td></td>
<td>(b) ninety days (90) days from the approval of physical Hydraulic Model Study from the Irrigation Department of Government of Sindh</td>
</tr>
</tbody>
</table>
Anticipated start of construction (the Commencement Date)

The date falling the later of:

(c) one hundred and eighty (180) days after the Signing Date; or

(d) ninety days (90) days from the approval of physical Hydraulic Model Study from the Irrigation Department of Government of Sindh

Anticipated end of construction (the Substantial Completion Date)

Twenty-four 24 months from the Commencement Date

Anticipated expiry of Concession Agreement and handover of facilities in respect of the Project

Ten (10) years from the Substantial Completion Date

* In the event of any holiday occurring on the above-mentioned dates, the immediately succeeding Business Day will be considered as the day on which the respective milestone shall take place.

Each Bidder shall submit the Bid including one (01) original and three (3) hard copies, with one soft copy (on CD/DVDs/USB) – and shall submit relevant/additional supporting documents and forms, as identified in this RFP, no later than 15:00 hours Pakistan Standard Time by the Bid Submission Date as per the guidelines given in Section 2 (Data Sheet).

We would like to thank the Bidders for their interest in the Project.

All Bids must be submitted, as per the instructions provided in this RFP, to:

ATTENTION : MR. NAJEEB AHMED

ADDRESS : LOCAL GOVERNMENT DEPARTMENT, GROUND FLOOR, TUGHLAQ HOUSE, SINDH SECRETARIAT, KARACHI, PAKISTAN

TELEPHONE : +92 21 9921 2314

Sincerely,
NAJEEB AHMED
SPECIAL SECRETARY, LOCAL GOVERNMENT DEPARTMENT, GOVERNMENT OF SINDH
IMPORTANT NOTICE/DISCLAIMER

This RFP and the attached documents are provided to the recipient solely for use in preparing and submitting its Bid for participation in the competitive bidding process conducted for the purposes of selection of a private partner to design, finance, build, operate, maintain and transfer (DFBOT) the Project which is described as follows:

Please refer to the location plan more particularly described and indicated in ANNEXURE L (Project Location Plan) of this RFP for further reference. It is to be noted that the length of Project is approximate at this stage.

Unless expressly specified otherwise, all capitalized terms used herein shall bear the meaning ascribed thereto in the Glossary set out in Volume 1 (Instruction To Bidders) of this RFP and, in case not defined in the Glossary, the Volume 2 (Draft Concession Agreement) attached as Volume 2 (Draft Concession Agreement) to this RFP.

The Bids will be reviewed in accordance with the Applicable Laws. None of the Government of Sindh’s entities and its relevant stakeholders in the Project (including, inter alia, the Agency, the PPP Unit, Finance Department, and the TFEC) nor, in each case, their employees, personnel, agents, consultants, advisors, legal advisors and contractors etc., make any representation (expressed or implied) as to the accuracy or completeness of the information contained herein, or in any other document made available to any person in connection with the tender process for the Project and the same shall have no liability for this RFP or for any other written or oral communication transmitted to the recipient in the course of the recipient’s evaluation of the Project. Neither these entities nor their employees, personnel, agents, consultants, advisors, legal advisors and contractors etc., will be liable in any manner whatsoever to reimburse or compensate the recipient for any costs, fees, damages or expenses incurred by the recipient in evaluating or acting upon this RFP or otherwise in connection with the Project. Any Bid submitted in response to this RFP by any of the Bidders shall be upon the full understanding and agreement of any and all terms of this RFP and such submission shall be deemed as an acceptance to all the terms and conditions stated in this RFP.

Any Bid/response to this RFP submitted by a Bidder shall be construed based on the understanding that the Bidder acknowledges that prior to the submission of the Bid in response to this RFP, the Bidder has, after a complete and careful examination, made an independent evaluation of this RFP including, without any limitation, the scope of the Project, the Project Requirements, the Applicable Standards, Applicable Laws, the Project Site, existing structures, local conditions, physical qualities of ground, subsoil and geology, traffic volumes, the Draft Concession Agreement and all information provided by the Agency or obtained, procured or gathered otherwise, and has determined to its complete satisfaction the accuracy or otherwise thereof and the nature and extent of difficulties, risks and hazards as are likely to arise or may be faced by it in the course of performance of its obligations under the requirements of this RFP and the Draft Concession Agreement. The Agency (including its employees, personnel, agents, consultants, advisors and contractors etc.) makes no representation whatsoever, express, implicit or otherwise, regarding the accuracy, adequacy, correctness, reliability and/or completeness of any assessment, assumptions, statement or information provided by it and the Bidder shall have no claim whatsoever of any nature against the Agency in this regard.

This RFP does not constitute a solicitation to invest, or otherwise participate, in the Project, neither shall it constitute a guarantee on part of the Agency that a Concession will be awarded.
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Glossary

Unless expressly specified otherwise, all capitalized terms used in this Volume 1 (Instruction To Bidders) of RFP shall bear the meaning ascribed thereto in this Glossary and, in case not defined below, such terms shall bear the meaning ascribed thereto in Volume 2 (Draft Concession Agreement) attached to this RFP.

<table>
<thead>
<tr>
<th>Term</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>AASHTO</td>
<td>American Association of State Highway and Transportation Officials.</td>
</tr>
<tr>
<td>ACTIVITIES</td>
<td>All activities of the Concessionaire and/or any of its representatives, agents, employees, affiliates, suppliers, contractors, or sub-contractors in the course of performing the Concessionaire’s obligations under the Draft Concession Agreement.</td>
</tr>
<tr>
<td>ACTUAL COST</td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td>ACTUAL SPREAD</td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td>ADDITIONAL FACILITIES</td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td>ADVERTISING PROCEEDS</td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td>AGENCY AGREEMENTS</td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td>AGENCY EQUITY FUNDING AMOUNT</td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td>ANNUITY AMOUNT PAYMENTS</td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td>ANNUITY AMOUNT PAYMENT DATE</td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td>ANNUITY AMOUNT PAYMENT PERIOD</td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td>AGENCY ANNUITY AMOUNT PAYMENT ACCOUNT</td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td>APPLICABLE LAWS</td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td><strong>TERM</strong></td>
<td><strong>MEANING</strong></td>
</tr>
<tr>
<td>------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>APPLICABLE STANDARDS</strong></td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td><strong>BASE CASE FINANCIAL MODEL</strong></td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td><strong>Base Case Spread</strong></td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td><strong>BASE PRICE</strong></td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td><strong>BASE EQUITY FUNDING AMOUNT</strong></td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td><strong>BEST EVALUATED BID</strong></td>
<td>In case of Public Private Partnership projects, a bid, which attains the highest score under criteria laid down in Rule 84, read with respective bidding documents ‘RFP’</td>
</tr>
<tr>
<td><strong>BID(S)</strong></td>
<td>A bid tendered by a person who is eligible under PPP Act to submit a proposal to undertake a project;</td>
</tr>
<tr>
<td><strong>BIDDER</strong></td>
<td>A person or entity; (i) submitting a bid; or (ii) who intends to submit a bid and is able to substantially prove such intention;</td>
</tr>
<tr>
<td><strong>BIDDER’S COLLABORATOR</strong></td>
<td>The Bidder, a Member or Participant of the Bidder, any of their respective authorized officers, directors, managers, employees, supervisors, contractors, sub-contractors, consultants, advisors, representatives, agents, successors, and respective assigns, the Financiers and the Bidder’s Key Individuals.</td>
</tr>
<tr>
<td><strong>BID PRICE</strong></td>
<td>The price of the bid which is calculated as the sum of:</td>
</tr>
<tr>
<td></td>
<td>(i) the Present Value (PV) of the Annuity Amount Payments discounted at the rate of ten percent (10%); and</td>
</tr>
<tr>
<td></td>
<td>(ii) Agency Equity Funding Amount.</td>
</tr>
<tr>
<td><strong>BID SECURITY</strong></td>
<td>The security deposit that a Bidder or Lead Member (in case of a consortium) must provide, in the form of a bank guarantee, pay order, or demand draft, issued by a scheduled commercial bank operating in Pakistan acceptable to the Agency (with a minimum rating of ‘AA-’ by JCR VIS or an equivalent rating by PACRA), in case of a bank guarantee, the same shall be in form and substance as attached hereto as <strong>ANNEXURE C (Form Of Bid Security)</strong> and of an amount, in Pakistani Rupee, equal to at least</td>
</tr>
<tr>
<td><strong>TERM</strong></td>
<td><strong>MEANING</strong></td>
</tr>
<tr>
<td>------------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>BID SUBMISSION DATE</td>
<td>The deadline for the Bidders to submit their Bids, being 03rd December 2021 or any other date specified by the Agency by way of addenda or corrigendum.</td>
</tr>
<tr>
<td>BID SUBMISSION TIME</td>
<td>Shall bear the meaning as stated in Section 2.1.6.</td>
</tr>
<tr>
<td>BID VALIDITY PERIOD</td>
<td>The period of one hundred and twenty (120) days starting from the opening of the Technical Bids.</td>
</tr>
<tr>
<td>BUSINESS DAY</td>
<td>A reference to a day (other than a Sunday) on which banks in Pakistan are generally open for business.</td>
</tr>
<tr>
<td>CHANGE IN CONTROL</td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td>CLASS SHARE(S) A</td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td>CLASS SHARE(S) B</td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td>CLASS B DIVIDENDS</td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td>COMMENCEMENT DATE</td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td>COMMERCIAL OPERATIONS DATE</td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td>COMMITMENT FORM</td>
<td>The commitment form, in form and substance as attached to this RFP as <strong>ANNEXURE E (Commitment Form)</strong>.</td>
</tr>
</tbody>
</table>
| COMPLIANT BID                | Any Bid that:                                                                                                                                                                                                                                                                                                                      
<p>|                              | (i) meets the eligibility requirements specified in this RFP;                                                                                                                                                                                                                                                                     |
|                              | (ii) is bound in hard-book binding form to avoid the possibility of removal or insertion of page(s). All pages of the Bid must be signed and stamped in original by the Bidder's authorized representative. All the pages must be numbered starting from the first page to the last. Any Bid not substantially adhering to these requirements may be rejected by the TFEC; and  |</p>
<table>
<thead>
<tr>
<th>TERM</th>
<th>MEANING</th>
</tr>
</thead>
<tbody>
<tr>
<td>(iii)</td>
<td>in the reasonable opinion of the TFEC, meets or surpasses all of the mandatory requirements for a Bid specified in this RFP, Financial Close is achievable and is meeting all criteria and requirements stipulated in this RFP.</td>
</tr>
<tr>
<td>CONCESSION</td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td>CONCESSIONAIRE</td>
<td>The SPV to be established and incorporated under the Applicable Laws for the purposes of the Project by the winning Bidder that, further to this RFP and the final selection process, is declared the Preferred Bidder and is issued the LOA. The Concessionaire shall be the entity that will enter into the Concession Agreement with the Agency.</td>
</tr>
<tr>
<td>CONCESSIONAIRE MANAGEMENT FEE</td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td>CONCESSIONAIRE ADVERTISING PLAN</td>
<td>Shall bear the meaning as stated in section 4.12.1.</td>
</tr>
<tr>
<td>CONCESSION PERIOD</td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td>CONFLICT OF INTEREST</td>
<td>Has the meaning given to that term in Section 1.13.1.</td>
</tr>
<tr>
<td>CONSORTIUM</td>
<td>A Bidder comprised of a group of two or more enterprises formed to submit a Bid to participate in the bidding process.</td>
</tr>
<tr>
<td>CONSORTIUM POWER OF ATTORNEY</td>
<td>The power of attorney, to be signed by all the members of the Consortium appointing the Lead Member of the Consortium as the authorized representative of the Consortium, in the form attached as <strong>ANNEXURE D (Power Of Attorney)</strong> of this RFP.</td>
</tr>
<tr>
<td>CONSTRUCTION COMPLETION CERTIFICATE</td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td>CONSTRUCTION COMPLETION DATE</td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
</tbody>
</table>
| CONSTRUCTION PERFORMANCE SECURITY       | Means a first demand irrevocable, unconditional and without recourse guarantee, issued by a scheduled commercial bank in Pakistan (with a minimum credit rating of at least ‘AA-‘ as rated
<table>
<thead>
<tr>
<th><strong>TERM</strong></th>
<th><strong>MEANING</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CONSTRUCTION PERFORMANCE SECURITY EXPIRY DATE</strong></td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td><strong>CONSULTATION AND SELECTION PROCESS/COMPETITIVE SELECTION PROCESS</strong></td>
<td>A process that includes this RFP; consultation with Bidders; attendance at Pre-Bid Meeting; issuance of a draft or revised version(s) of the Draft Concession Agreement; receipt and consideration of comments from Bidders and information provided in response to a request from the Agency; evaluation of the proposals submitted in response to this RFP; the selection of a Preferred Bidder; preparation, negotiation, acceptance, or rejection of any proposal; amendment, cancellation, interruption, or termination of the RFP; and execution of the Draft Concession Agreement.</td>
</tr>
<tr>
<td><strong>CONTRACTOR</strong></td>
<td>The engineering, construction and supply contractor engaged by the Concessionaire for the construction of the Project.</td>
</tr>
<tr>
<td><strong>DEBT REPAYMENT DATE</strong></td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td><strong>DEFECTS LIABILITY PERIOD</strong></td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td><strong>DRAFT CONCESSION AGREEMENT</strong></td>
<td>Means the draft concession agreement, in respect of this RFP.</td>
</tr>
<tr>
<td><strong>EFFECTIVE DATE</strong></td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td><strong>EPC CONTRACT(S)</strong></td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td><strong>EPC CONTRACTOR(S)</strong></td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td><strong>EQUITY FUNDING &amp; UTILIZATION AGREEMENT</strong></td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td><strong>FINANCIAL CLOSE</strong></td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
</tbody>
</table>

by JCR VIS or an equivalent rating by PACRA) acceptable to the Agency, in the form of a demand draft, bank guarantee or a pay order, guaranteeing the payment to the Agency of an amount equal to two percent (2%) of the Pre-Estimated Project Cost.
<table>
<thead>
<tr>
<th>Term</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agreement</td>
<td>Agreement.</td>
</tr>
<tr>
<td>Financial Close Date</td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td>Financial Model</td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td>Financial Bid</td>
<td>The financial bid to be submitted by the Bidder with its Bid.</td>
</tr>
<tr>
<td>Financiers</td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td>Financing</td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td>Financial Component</td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td>Financing Instruments</td>
<td>Any instrument which is to be issued to the Financiers for the purposes of acquiring Financing forming part of the Initial Financing of the Project.</td>
</tr>
<tr>
<td>Government of Sindh/Agency</td>
<td>Local Government &amp; HTP Department, Government of Sindh.</td>
</tr>
<tr>
<td>Independent Auditor</td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td>Independent Engineer</td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td>Initial Financing</td>
<td>The financing (consisting of the Base Equity Funding Amount and the Financing) proposed to be injected by the Agency, private partner and the Financiers (as applicable) at the time of the Financial Close, which is sufficient for at least:</td>
</tr>
<tr>
<td></td>
<td>* carrying out all of the design and construction works relating to the Project; and</td>
</tr>
<tr>
<td></td>
<td>* achieving the Substantial Completion Date,</td>
</tr>
<tr>
<td></td>
<td>in each case, in accordance with the terms and conditions set forth in the Draft Concession Agreement.</td>
</tr>
<tr>
<td>Insurance(s)</td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td><strong>TERM</strong></td>
<td><strong>MEANING</strong></td>
</tr>
<tr>
<td>--------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>INTEGRITY PACT</strong></td>
<td>The instrument entitled <em>Integrity Pact</em> as attached to this RFP as Annexure H (<em>Integrity Pact</em>), duly signed by the Agency and the Bidder.</td>
</tr>
<tr>
<td><strong>IFI STANDARDS</strong></td>
<td>Means the International Financial Institutions standards.</td>
</tr>
<tr>
<td><strong>JOINT BIDDING AGREEMENT</strong></td>
<td>In the event a Bidder, for the purposes of this Project, forms a Consortium, an agreement between the members of the Consortium, conveying, <em>inter alia</em>, the intent to form a joint venture SPV with shareholding/ownership equity commitment(s), in terms of Section 3.1.1 (b) of this RFP.</td>
</tr>
<tr>
<td><strong>KEY INDIVIDUAL</strong></td>
<td>An individual who holds one of the following positions for a Bidder:</td>
</tr>
<tr>
<td></td>
<td>- Project Director;</td>
</tr>
<tr>
<td></td>
<td>- Assistant project director;</td>
</tr>
<tr>
<td></td>
<td>- Person in charge of structure design;</td>
</tr>
<tr>
<td></td>
<td>- Person in charge of design;</td>
</tr>
<tr>
<td></td>
<td>- Person in charge of construction;</td>
</tr>
<tr>
<td></td>
<td>- Person in charge of operations and maintenance;</td>
</tr>
<tr>
<td></td>
<td>- Person in charge of design, construction, and operation; and</td>
</tr>
<tr>
<td></td>
<td>- Person in charge of structuring the financing; and any other individual designated as Key Individual by a Bidder.</td>
</tr>
<tr>
<td><strong>LEAD MEMBER</strong></td>
<td>Any member of the Consortium that leads the Consortium, whereby holding at least forty percent (40%) of the Class A Shares, throughout the Project and liaises between the Agency and the Consortium, as appointed pursuant to the Consortium Power of Attorney and the Joint Bidding Agreement.</td>
</tr>
<tr>
<td><strong>LEAD EPC CONTRACTOR</strong></td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td><strong>LETTER OF AWARD (LOA)</strong></td>
<td>Has the meaning given to that term in Section 1.6.6.</td>
</tr>
<tr>
<td><strong>MEMBER</strong></td>
<td>An enterprise that is part of the Bidder on an exclusive basis and that will invest equity in the Concessionaire.</td>
</tr>
<tr>
<td>TERM</td>
<td>MEANING</td>
</tr>
<tr>
<td>---------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>NET ASSETS</strong></td>
<td>Equals to total assets minus (-) total liabilities (excluding any revaluation reserve surplus).</td>
</tr>
<tr>
<td><strong>NON-DISCLOSURE AGREEMENT</strong></td>
<td>An agreement to be executed by the Bidder/Lead Member of the Consortium, in form as attached as <strong>ANNEXURE G</strong> <em>(Non Disclosure Agreement)</em> of this RFP.</td>
</tr>
<tr>
<td>O&amp;M</td>
<td>The operations and maintenance of the Project in accordance with the Applicable Standards.</td>
</tr>
<tr>
<td>O&amp;M COST COMPONENT</td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td>O&amp;M MANUAL</td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td>OPERATIONAL YEAR</td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td>OPERATIONS PERIOD</td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td>OTHER EPC CONTRACTOR</td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td>PARTICIPANT</td>
<td>An enterprise that is part of a Bidder on an exclusive basis and that will not invest Sponsor Equity Funding Amount in the Concessionaire but will be responsible on behalf of a Bidder for at least one of the following elements:</td>
</tr>
<tr>
<td></td>
<td>• twenty five percent (25%) of the Concession’s design work;</td>
</tr>
<tr>
<td></td>
<td>• ten percent (10%) of the Concession’s construction work;  and</td>
</tr>
<tr>
<td></td>
<td>• twenty five percent (25%) of the Concession’s operations and maintenance activities.</td>
</tr>
<tr>
<td>PPP</td>
<td>Public Private Partnership.</td>
</tr>
<tr>
<td>PPP ACT</td>
<td>The Sindh Public Private Partnership Act 2010 <em>(as amended from time to time).</em></td>
</tr>
<tr>
<td>PPP UNIT</td>
<td>The Public Private Partnership Unit of the Finance Department, Government of Sindh.</td>
</tr>
<tr>
<td>PRE-BID MEETING</td>
<td>The meeting relating to the queries raised and clarifications.</td>
</tr>
<tr>
<td>TERM</td>
<td>MEANING</td>
</tr>
<tr>
<td>------</td>
<td>---------</td>
</tr>
<tr>
<td>TERM MEANING</td>
<td>sought by the prospective Bidders that are to be held on [●].</td>
</tr>
<tr>
<td>PREFERRED BIDDER</td>
<td>The Bidder that will be declared successful by the TFEC and be selected by the Agency pursuant to the Competitive Selection Process and in accordance with the terms of this RFP to enter into the Concession Agreement and set up the Project.</td>
</tr>
<tr>
<td>PREFERRED BIDDER’S COLLABORATOR</td>
<td>The Preferred Bidder, a Member or Participant of the Preferred Bidder, any of their respective authorized officers, directors, managers, employees, supervisors, sub-contractors, consultants, advisors, representatives, agents, successors, and respective assigns, the Financiers and the Preferred Bidder's Key Individuals.</td>
</tr>
<tr>
<td>PRE-ESTIMATED PROJECT COST</td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td>PROJECT</td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td>PROJECT FUNDING PERCENTAGE</td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td>PROJECT DIRECTOR/MANAGER</td>
<td>Means the project director/manager of the Project Management/Implementation Unit, appointed by the Agency for purposes of the Project and may be authorized by the Agency to enter into any Agency Agreements (excluding the Draft Concession Agreement) on behalf of Agency;</td>
</tr>
<tr>
<td>PROJECT MILESTONE</td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td>PROJECT REQUIREMENTS</td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td>PROJECT SITE</td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td>REQUEST FOR PROPOSAL/RFP</td>
<td>This request for proposal and all volumes, appendices, and addenda thereto, including:</td>
</tr>
<tr>
<td></td>
<td>• VOLUME 1 – INSTRUCTIONS TO BIDDERS;</td>
</tr>
<tr>
<td></td>
<td>• VOLUME 2 – DRAFT CONCESSION AGREEMENT;</td>
</tr>
<tr>
<td></td>
<td>• VOLUME 3 – TECHNICAL FEASIBILITY; AND</td>
</tr>
<tr>
<td></td>
<td>• VOLUME 4: AGENCY AGREEMENTS.</td>
</tr>
<tr>
<td>TERM</td>
<td>MEANING</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>RETURN ON EQUITY COMPONENT</strong></td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td><strong>SCHEDULED COMMENCEMENT DATE</strong></td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td><strong>SCHEDULED SUBSTANTIAL COMPLETION DATE</strong></td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td><strong>SEPA</strong></td>
<td>Means Sindh Environmental Protection Agency.</td>
</tr>
<tr>
<td><strong>SPONSOR EQUITY FUNDING AMOUNT</strong></td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td><strong>SPONSOR EQUITY SBLC(S)</strong></td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td><strong>SPP RULES</strong></td>
<td>The Sindh Public Procurement Rules, 2010 (as amended from time to time).</td>
</tr>
<tr>
<td><strong>SPPRA</strong></td>
<td>The Sindh Public Procurement Regulatory Authority.</td>
</tr>
<tr>
<td><strong>SPV</strong></td>
<td>Has the meaning given to the term in Section 1.6.6.</td>
</tr>
<tr>
<td><strong>SUBSTANTIAL COMPLETION</strong></td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td><strong>SUBSTANTIAL COMPLETION CERTIFICATE</strong></td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td><strong>SUBSTANTIAL COMPLETION DATE</strong></td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td><strong>TECHNICAL AND FINANCIAL EVALUATION COMMITTEE/TFEC</strong></td>
<td>The technical and financial evaluation committee formed in accordance with the Applicable Laws of Pakistan for the purpose of analysing and evaluating the Bids.</td>
</tr>
<tr>
<td><strong>TECHNICAL BID</strong></td>
<td>The technical bid submitted by the Bidder in response to this RFP.</td>
</tr>
<tr>
<td><strong>TECHNICAL SPECIFICATIONS</strong></td>
<td>All of the features and requirements relating to the Project, as specified in the Draft Concession Agreement and this RFP.</td>
</tr>
<tr>
<td>TERM</td>
<td>MEANING</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>TOTAL PROJECT COST</strong></td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td><strong>TOR</strong></td>
<td>Has the meaning given to that term in Section 1.1.3.</td>
</tr>
<tr>
<td><strong>TRANSFER DATE</strong></td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td><strong>USERS</strong></td>
<td>All commuters using the Project in a road vehicle.</td>
</tr>
<tr>
<td><strong>VACANT POSSESSION</strong></td>
<td>Has the meaning given to that term in the Draft Concession Agreement.</td>
</tr>
<tr>
<td><strong>WORKS</strong></td>
<td>Has the meaning given to the term <em>Project Works</em> in the Draft Concession Agreement.</td>
</tr>
</tbody>
</table>
1. INFORMATION FOR BIDDERS

1.1 INTRODUCTION

1.1.1 The Agency has envisaged the construction of the Project. It is expected that the improved facility would help open these areas for creation of infrastructure such as better services for schools and health sectors as well as increase recreational activities, as these areas would become more accessible.

The Project having total length of approximately 12.0 km, includes:

- construction of Bridge approximately 1.0 km length over Malir River (between Korangi Causeway and Jam Sadiq Bridge) with all guide bunds,

- construction of new road over Left Bank of Korangi river (to connect Korangi road of approximately 1.5 km length),

- construction of lane interchange / loop ramps at Korangi Bridge / Link road for Korangi Creek, Coastal road with shoulders on either side including revetement and earthwork of approximately 5.9 km length,

- construction of culverts, PRL road to connect Link Korangi to Korangi Creek of approximately 1.0 km length,

- rehabilitation / widening of Existing PRL road of approximately 1.6 km length,

- stormwater drains approximately 1.0 km length,

- realignment of existing Creek Avenue, Roundabout at Creek Avenue to link with Malir Expressway,

- rehabilitation of existing bunds, Street Lights.

1.1.2 The recipients of this RFP are hereby invited to submit a Bid in respect of the Project and the services required for the Concession given in Section 2 (Data Sheet).

1.1.3 A brief description of the Project and its objectives are given in Section 2 (Data Sheet). Details are provided in Section 4 (Terms of Reference) (the TOR).

1.1.4 Bidders are encouraged to submit their respective Bids after visiting the Project Site and ascertaining for themselves the site conditions, location, surroundings, climate, availability of power, water and other utilities for construction, access to site, handling and storage of materials, weather data, Applicable Laws and regulations, the general and local conditions associated with implementing the Project and any other matter considered relevant by them. All costs related to the visits to the Project Site shall be borne by the Bidders and, regardless of the Bid and the Competitive Selection Process outcome, the Agency shall not be liable in any manner for any costs incurred as a result of such visit(s).
1.1.5 The Bidders will be given the opportunity to discuss their comments and suggested changes to the Request for Proposal, Draft Concession Agreement and Technical Specifications in the Pre-Bid Meeting, as specified in Section 2 \( (\text{Data Sheet}) \). 

1.1.6 While the information set out, or referred to, or included by reference in this RFP, the Agency gives no representation whatsoever that this RFP (or any instrument/document issued hereunder) is comprehensive or that it has been independently verified. 

1.1.7 The Agency does not make any representation or warranty, express or implied, as to the accuracy or completeness of such information, or any information on which this RFP is based, or any other background or reference information or documents prepared and made available to the Bidders, and any liability related to such information is hereby expressly disclaimed. 

1.1.8 Bidders will make an independent assessment of the accuracy and completeness of such information and will have no claim whatsoever against the Agency with respect to such information. 

1.1.9 Any Bid submitted in response to this RFP is submitted upon a full understanding and agreement of terms of this RFP and, therefore, the submission of Bids in response to this RFP would be deemed as acceptance to the said terms. 

1.2 AWARD OF CONCESSION 

1.2.1 It is anticipated that through the Competitive Selection Process, one \( (1) \) of the Bidders will be selected as the Preferred Bidder, who will then be offered the opportunity to incorporate the SPV in terms of this RFP and the LOA, which SPV shall subsequently enter into the Concession Agreement (as the Concessionaire) for the purposes of the Project. 

1.2.2 The award of Concession shall be made to such Bidder who is compliant with the technical and financial parameters as set out in this RFP. 

1.3 STRUCTURE OF THIS RFP 

1.3.1 This RFP contains the following four \( (4) \) volumes and their respective appendices and schedules: 

(a) VOLUME 1 – INSTRUCTIONS TO BIDDERS. 

(b) VOLUME 2 – THE DRAFT CONCESSION AGREEMENT. 

(c) VOLUME 3 – TECHNICAL FEASIBILITY. 

(d) VOLUME 4 – AGENCY AGREEMENTS. 

1.4 NO OBLIGATION TO SELECT OR PROCEED 

1.4.1 Notwithstanding any other section in this RFP, by submission of a Bid by a Bidder, such Bidder and each firm, corporation or individual member of the same, acknowledges and agrees that:
(a) the Agency may, at its sole discretion, refuse to consider and completely withdraw from the Consultation and Selection Process; or decide to terminate the entire bidding process, prior to the acceptance of a Bid, without justifying the grounds thereof; or decide to proceed with the Project under a new procurement process (including any new PPP procurement process); or decide to proceed with the Project in some manner other than as a PPP; or reject any Bid that, in the sole opinion of the Agency, is incomplete or irregular, contains exceptions or deviations that are unacceptable to the Agency, or contains false or misleading statements, claims, or information, or omits any material information that must be submitted under this RFP by a Bidder or a Bidder's Collaborator, or for any other reason whatsoever as per SPP Rules;

(b) the Agency’s decision with respect to the compliance or non-compliance of a Bid shall be final and binding and that the Agency shall in no way be obliged to consult the Bidder in making its decisions; and

(c) any Bid submitted in response to this RFP is submitted upon a full understanding and agreement of the terms related to the aforementioned points (a) and (b) and therefore the submission of the Bids in response to this RFP would be deemed as an acceptance to the aforesaid terms.

1.5 COSTS AND EXPENSES INCURRED BY THE BIDDERS

1.5.1 All costs, expenses and liabilities incurred by any Bidder (including all its Consortium members, as applicable) in connection with the preparation and submission of the Bids, including the provision of any additional information, attendance at meetings, conducting due diligence, visits to the Project Site, engagement of consultants, advisors and contractors etc., and in discussion with the Agency shall be, in each case, borne by the Bidders (including all its Consortium members, as applicable).

1.6 DOCUMENTS

1.6.1 Bidders must prepare and submit their Bids in full compliance with the requirements of this RFP together with the submission of the documents, forms and instruments required for submission under this RFP.

1.6.2 Bidders requiring any clarification regarding this RFP and/or any documents/forms and instruments to be submitted pursuant to this RFP must notify the Agency, in writing, preferably not later than four (4) business days after to the respective Pre-Bid Meeting relating to this RFP matters, as such time period and number of meetings may be extended or amended at the sole discretion of the Agency. Any request for clarification in writing, or by email, shall be sent to the Agency’s address indicated in Section 2 (Data Sheet). The Agency shall respond in writing or by email to such requests and copies of the response shall be sent to all Bidders.

1.6.3 At any time before the submission of the Bids, the Agency may for any reason, whether at its own initiative or in response to a clarification requested by the Bidders, modify any of the documents listed in Section 2 (Data Sheet) by amendment. The amendment shall be sent in writing or by email to all the Bidders and shall be binding on them. The Agency may, at its sole discretion, extend the deadline for the submission of Bids.
1.6.4 Each Bidder (and in case the Bidder is a Consortium, the Lead Member) shall nominate a representative with whom the Agency should liaise and shall provide such representative’s details including designation and all relevant contact details. Legal documentation (e.g. power of attorney, board resolutions and/or other legally binding authorization) for appointment of the authorized representative of the Bidder (and in case the Bidder is a Consortium, the Lead Member) shall be provided with the Bid.

1.6.5 **SUBMISSION OF THE BIDS**

(a) Each Bidder shall submit only one (1) Bid including one (1) original Technical Bid and one (1) original Financial Bid and three (3) hard copies of each, with one (1) soft copy (on CD/DVDs) of each, as indicated in Section 2 (Data Sheet).

Each Bid shall be in a separate envelope indicating the Bid as original or copy clearly marked as “ORIGINAL” and “COPY”, as appropriate. The Technical Bid shall be placed in a sealed envelope clearly marked TECHNICAL BID and the Financial Bid in the sealed envelope clearly marked FINANCIAL BID. These two envelopes, in turn, shall be sealed in an outer envelope bearing the address and information indicated in the Data Sheet. The envelope shall be clearly marked: **DO NOT OPEN, EXCEPT IN PRESENCE OF THE TECHNICAL AND FINANCIAL EVALUATION COMMITTEE.** Any Bidder who submits or participates in more than one (1) Bid will be disqualified.

(b) The original and each copy of the Bid shall be prepared in indelible ink and shall be signed by an authorized representative of the Bidders. The representative’s authorization shall be confirmed by a written power of attorney accompanying the Bids.

(c) Each Bid should be bound in the hard book binding form. All pages of the Bid must be signed and stamped in original by the Bidder’s authorized representative. All the pages must be numbered starting from the first page to the last.

**ANY BID NOT SUBSTANTIALLY ADHERING TO THESE REQUIREMENTS MAY BE REJECTED BY THE TFEC.**

(d) In case of any discrepancy between the original and the copies of the Bid, the original shall prevail.

(e) The Bid shall contain no interlineations or overwriting except as necessary to correct errors made by the Bidders themselves. Any such corrections shall be initialled by the authorized person or persons signing the Bid.

(f) The Bids shall be delivered on or prior to the Bid Submission Date, and the Bids shall be opened in accordance with Section 2.2 (Opening of Bids).

(g) The Bids shall be valid for the number of days stated in Section 2 (Data Sheet) from the date of opening of Technical Bids. During this period, the Bidders shall keep available the professional staff proposed for the assignment.

(h) In case of a Consortium, a Joint Bidding Agreement shall also be submitted by the Bidders, specifically appointing a Lead Member of the Consortium and
identifying the roles of each Consortium Member. Following the Bid Submission Date, there shall be no change in the Consortium, by addition/withdrawal of a consortium member or change in percentage shareholding of any consortium member, except as may be permitted under the Draft Concession Agreement.

(i) The Integrity Pact, duly signed by the Agency and the Bidders (in case the Bidder is a Consortium, by the Lead Member), shall be submitted.

(j) Either a board resolution or an authority letter, authorising the person(s) signing the Bid on behalf of the Bidder, shall be submitted. In case a Bidder is not a corporate entity, the requisite power of attorney appointing the authorised representative to sign on behalf of the Bidder shall be submitted.

(k) Each Bidder shall provide a Bid Security in a sealed envelope with its Financial Bid and such Bid Security shall be required to be valid for an initial period of one hundred and twenty (120) Days plus twenty-eight (28) Days beyond the original Bid Validity Period making it a total of one hundred and forty-eight (148) days effective from the date of opening of Technical Bids. The Agency may extend such period, at its discretion, in accordance with the Applicable Laws.

(l) The TFEC will evaluate the Bids to select the Preferred Bidder. The Bidder that, *inter alia*, submits a Compliant Bid which meets all the requirements in this RFP required by the Agency for implementing the Project shall be considered, for selection, as the Preferred Bidder.

1.6.6 **FINALIZATION OF THE TRANSACTION**

Following completion of the bidding process under this RFP, once the Preferred Bidder is announced, necessary negotiations will take place to finalise the Draft Concession Agreement, provided that such negotiations shall not amend or vary any financial and/or technical aspects on which the Bids are invited. After the Preferred Bidder is selected, the Agency shall issue a letter of award (the **Letter of Award/LOA**) to the Preferred Bidder, which shall require the Preferred Bidder to accept the LOA in terms of the timelines contemplated in the LOA. Issuance of the LOA shall be subject to the necessary approvals and recommendations of the competent authority(ies).

The Preferred Bidder shall, as a key condition of this RFP and the LOA (subsequent to the issuance of the LOA), procure, *inter alia*, incorporation of a **special purpose vehicle/company** (the **SPV**) that shall be a locally registered company incorporated in accordance with the laws of Pakistan and such SPV shall be the Concessionaire for the purposes of the Project. The SPV shall, upon incorporation and finalization of the Draft Concession Agreement, enter into the Draft Concession Agreement (as the **Concessionaire**) for the purposes of the Project. The Concessionaire shall be obligated to replace the Bid Security (prior to the expiry of the Bid Security) with the Construction Performance Security in terms of the LOA prior to the Effective Date.

The Construction Performance Security shall be submitted by the Concessionaire, subsequent to the issuance of the LOA, which shall be valid from the date of its submission until the twenty-four (24) months following the Substantial Completion Date and must be fully compliant with the format provided in the Draft Concession Agreement.
Should the Bidder refuse to sign the final version of the Draft Concession Agreement with the Agency in the agreed-upon form and content, the Agency shall be entitled to encash the full amount of the Bid Security or the Construction Performance Security (as the case maybe) and retain and use the proceeds at its sole discretion.

In the event that the Preferred Bidder fails to provide the Construction Performance Security to the Agency sixteen (16) days prior to the expiry of the Bid Security, the Agency shall become entitled, fifteen (15) days prior to the expiry of the Bid Security, to encash the Bid Security in full.

In the event the Concessionaire fails to achieve the Commencement Date on or prior to the Scheduled Commencement Date, the Concessionaire shall only be entitled to an extension of the Scheduled Commencement Date till the Financial Close Cure Period Date; provided that the Concessionaire has provided the Agency with a revised Construction Performance Security, for an amount equal to twice the value of the Construction Performance Security, that remains effective and valid till the Construction Performance Security Expiry Date in accordance with the terms of the Draft Concession Agreement.

1.7 POTENTIAL CHANGES TO OR TERMINATION OF THE CONSULTATION AND SELECTION PROCESS

1.7.1 The Agency may, at its sole discretion, at any time, and for any reason whatsoever, without becoming liable to any Bidder or to any other party, by way of addenda, modify, amend, or otherwise change all or any part of the RFP, including by amending the Consultation and Selection Process, by modifying the limits and scope of the Concession of Project, by extending any deadline or time limit (including the deadline for setting up the Concession) specified herein, or by suspending, postponing, or terminating all or any part of the Competitive Selection Process. Any addendum shall be issued by the Agency in writing and the same will be explicitly identified as an addendum to this RFP.

1.7.2 Without limiting the scope of Section 1.7.1 above, even though the Agency intends to name a Preferred Bidder and sign a Concession Agreement, if the Agency fails to receive at least one (1) Compliant Bid for which all government approvals (excluding the environmental approvals required) have been obtained, the Agency reserves the right to terminate the Competitive Selection Process.

1.7.3 If the Agency terminates the Competitive Selection Process, the Agency reserves the right to proceed with all or any part of the Project, including the use of some or all of a Bidder’s ideas and concepts, based on the approach that the Agency considers to be most suitable, which does not exclude the involvement of one or more of the initially selected Preferred Bidder’s collaborators.

1.7.4 In the event that the Agency rejects or annuls all the Bids, it may, at its discretion, restart the Competitive Selection Process.

1.7.5 The Agency reserves the right to terminate the Competitive Selection Process. The Agency shall, upon request by any of the Bidder, communicate to such Bidder, grounds for the cancellation of bidding process, but is not required to justify such grounds.
1.7.6 Any Bid submitted in response to this RFP is submitted upon a full understanding and agreement of terms related to this Section 1.7 (Potential Changes To Or Termination Of The Consultation and Selection Process) and, therefore, the submission of Bid in response to this RFP would be deemed as an acceptance to the said terms.

1.8 **NO CONTRACT**

1.8.1 No contract whatsoever is created by or arises from this RFP (with the exception of the Commitment Form found in **ANNEXURE E (Commitment Form)**), which, under no circumstances, constitutes an offer to enter into a contract with any party whatsoever.

1.8.2 The Agency and/or the TFEC do not have an obligation, responsibility, commitment, or legal liability towards any Bidder or any Bidder’s Collaborators arising from this RFP or any Bid submitted in response to it, or from the Competitive Selection Process.

1.8.3 Any Bid submitted in response to this RFP is submitted upon a full understanding and agreement of terms related to this Section 1.8 (No Contract) and therefore the submission of Bid in response to this RFP would be deemed as an acceptance to the said terms.

1.9 **NO COLLUSION**

1.9.1 By submitting a Bid, the Bidder and each firm, corporation or individual member of the Bidder represents and confirms to Agency with the knowledge and intention that Agency may rely on such representation and confirmation that its Bid has been prepared without collusion or fraud, and is in fair competition with the other Bidders and the Bid of the other Bidders.

1.9.2 The Agency reserves the right to disqualify any Bidder that, in the Agency’s opinion, has engaged in collusion in connection with the Project.

1.10 **PROJECT TEAM**

1.10.1 The Agency is managing and coordinating activities related to the Competitive Selection Process and matters relating to the same.

1.10.2 The Agency has designated a Project Director who has been mandated to oversee the entire work required to be carried out in respect of the Project.

1.10.3 Any other person or enterprise that has a contract with the Agency to work on this Project is ineligible to participate in the Competitive Selection Process, unless specifically exempted by the Agency.

1.11 **NO LOBBYING**

1.11.1 The Bidders and the firm, corporation or individual members of a Bidder, will not attempt to communicate, directly or indirectly, with any representative of the Agency and/or the TFEC at any stage of this RFP process (including during the evaluation process), except as expressly directed or permitted by Agency, or except as may be required and permitted under another procurement competition, project or other assignment, in which event the Bidder will not have any discussions regarding the Project.
1.11.2 The Agency reserves the right to disqualify any Bidder that, in Agency’s opinion, has engaged in lobbying in connection with this Project.

1.12 **NO CLAIMS**

1.12.1 The Agency shall not be liable for any claims, whether for costs, expenses, losses or damages, or loss of anticipated profits, or for any other matter whatsoever, incurred by the Bidder or any firm, corporation or individual member of a Bidder, in preparing and submitting a Bid or participating in negotiations for the Draft Concession Agreement or any other activity related to or arising out of this RFP. In furtherance of the foregoing, the Bidder shall participate in the Competitive Selection Process based on a clear understanding that the Agency, its entities and its relevant stakeholders in the Project (including, *inter alia*, the Local Government Department, PPP Unit, any other department of Government of Sindh and the TFEC) and, in each case, their employees, personnel, agents, consultants, advisors, legal advisors and contractors etc., stand released from such claims. For avoidance of doubt, the afore-stated release and its acceptance by the Bidders is a pre-condition to participation in the Competitive Selection Process.

1.13 **NO CONFLICT**

1.13.1 There shall be no conflict of interest (the *Conflict of Interest*) of any of the Bidders that affects the Competitive Selection Process. In case a Bidder contemplates any Conflict of Interest, till the issuance of the LOA, the Bidder shall immediately notify the Agency in writing of such Conflict of Interest. Moreover, in the event the Agency identifies any Conflict of Interest through its sources, the Agency shall, in its sole discretion, decide whether such conflict constitutes a Conflict of Interest. In case any Bidder is found to have a Conflict of Interest, it shall be disqualified. In the event of disqualification, the Agency shall encash and appropriate the Bid Security (submitted by the Bidder in accordance with the terms of this RFP), as mutually agreed genuine pre-estimated compensation and damages payable to the Agency for, *inter alia*, the time, cost and effort of the Agency, including consideration of such Bidder’s Bid, without prejudice to any other right or remedy that may be available to the Agency hereunder or otherwise. Without limiting the generality of the above, a Bidder shall be considered to have a Conflict of Interest that affects the Competitive Selection Process, if, *inter alia*:

(a) such Bidder (or any constituent thereof) and any other Bidder (or any constituent thereof) have common controlling shareholders or other ownership interest; provided that this qualification shall not apply in cases where the direct or indirect shareholding in a Bidder, or a constituent thereof in the other Bidder(s) (or any of its constituents), is less than five percent (5%) of its paid up and subscribed capital; or

(b) a constituent of such Bidder is also a constituent of another Bidder; or

(c) such Bidder receives or has received any direct or indirect subsidy from any other Bidder, or has provided any such subsidy to any other Bidder (other than the subsidy is made to one Bidder, as allowed in subsection (a) above); or

(d) such Bidder has the same legal representative for purposes of the Bid as any other Bidder; or
such Bidder has a relationship with another Bidder, directly or through common third parties, that puts them in a position to have access to each other’s information about, or to influence the Bidder of either or each of the other Bidder; or

such Bidder has participated as a consultant to the Agency in the preparation of any documents, design or Technical Specifications of the Project.

1.13.2 A Bidder shall be liable for disqualification and forfeiture of its Bid Security if any legal, financial or technical adviser of the Agency in relation to the Project is engaged by the Bidder in any manner for matters related to or incidental to the Project during the Competitive Selection Process. In the event any such adviser is engaged by the Preferred Bidder or the Concessionaire, as the case may be, without prejudice to any other right or remedy of the Agency (including the encashment and appropriation of the Bid Security or the Construction Performance Security, as the case may be) which the Agency may have thereunder or otherwise, the LOA or the Draft Concession Agreement, as the case may be, shall be liable to be terminated without the Agency being liable, in any manner whatsoever, to the Preferred Bidder or Concessionaire for the same.

1.13.3 The Agency reserves the right to disqualify any Bidder that in the Agency’s opinion has a Conflict of Interest, whether such conflict exists now or is likely to arise in the future.

1.13.4 Any Bid submitted in response to this RFP is submitted upon a full understanding and agreement of terms related to this Section 1.13 (No Conflict) and therefore the submission of a Bid in response to this RFP would be deemed as an acceptance to the said terms.

1.14 CONFIDENTIALITY

1.14.1 Information relating to the examination, clarification, evaluation and recommendation for the Bidder shall not be disclosed to any person who is not officially concerned with the process or is not a retained professional advisor advising the Agency in relation to, or matters arising out of, or concerning the Competitive Selection Process. The Agency will endeavour to treat all information, submitted as part of the Bid, in confidence and will require all those who have access to such material to treat the same in confidence. The Agency may not divulge any such information, unless it is directed to do so by any statutory entity that has the power under law to require its disclosure, is required under the Applicable Laws, or it is to enforce or assert any right or privilege of the statutory entity and/or the Agency.

1.14.2 All information supplied by Agency in connection with this RFP, including the documents shared as a part of the data room, shall be treated as a public document. Subject to the provisions of this RFP, the bidding documents shall remain the property of the Agency and are transmitted to the Bidders solely for the purpose of preparation and submission of the Bid in accordance herewith. The Agency will not return any Bid or any information provided along therewith.

1.14.3 This RFP and every part of it and all other information provided by or on behalf of the Agency must be treated as private and confidential. Bidders shall not disclose the fact that they have been invited to submit a Bid or release details of this RFP other than on a
strictly confidential basis to those parties whom they need to consult for the purposes of preparing the Bid.

1.14.4 Bidders shall not at any time release any information concerning this RFP and/or their Bid and/or any related documents and/or any negotiation and/or any discussion with Agency in this connection for publication in the press or on radio, television, screen or any other medium without the prior written approval of the Agency.

1.14.5 Each Bidder undertakes to indemnify Agency and to keep Agency indemnified against all actions, claims, demands, liability, proceedings, damages, costs, charges and expenses whatsoever arising out of or in connection with any breach of the provisions of this Section 1.14 (Confidentiality).

1.14.6 Any Bid submitted in response to this RFP is submitted upon a full understanding and agreement of terms of this Section 1.14 (Confidentiality) and therefore the submission of the Bid in response to this RFP would be deemed as an acceptance to the said terms.

1.15 INSURANCES

1.15.1 If a Bidder is selected as the Preferred Bidder, it understands, undertakes and confirms that it shall be responsible for procuring Insurances in respect of the Project. All fees, costs and other expenditures relating to such Insurances shall be borne by the Concessionaire. Furthermore, the cost for Insurances may be included in the financial plan by the Bidders.
2. **DATA SHEET**

2.1 **INFORMATION FOR BIDDERS**

2.1.1 **THE ASSIGNMENT**

The Project is to design, finance, built, operate, maintain and transfer - DFBOT of the Project which is described in Section 1 (Information for Bidders) above.

2.1.2 **PROJECT DESCRIPTION**

The Project, which will be firmed up at detailed design stage.

Detailed description of start and end points and other information of the Project are provided in Section 1 (Information for Bidders) above.

In addition to the matters set out in this RFP, it is currently envisaged that the term of the Concession will be for the Concession Period. The Agency expects the term to include twenty-four (24) months of construction period and ten (10) years of Operations Period – such Operations Period to commence on the Commercial Operations Date in accordance with the Draft Concession Agreement.

Following the expiry of the Concession Period, ownership of the Project related assets shall be transferred to the Agency. The Project shall be structured pursuant to the Draft Concession Agreement, to be entered into between the Agency and the Concessionaire (being the SPV to be established and incorporated under the laws of Pakistan for the purposes of the Project by the enterprise or the Consortium that, further to this RFP and the final selection process, is declared the Preferred Bidder and is issued the LOA). The Concession will be awarded through a Competitive Selection Process open to local as well as international Bidders.

Any other errors or omissions in a Bid will not result in its automatic rejection. The TFEC reserves the right to ask Bidders to correct any errors or omissions in their Bid, to the TFEC’s satisfaction, within the time limits specified in the request. However, under no circumstances can Bidders amend the Financial Bid as a result of clarifying or rectifying their Bid.

2.1.3 **PRE-BID MEETING**

(a) The Pre-Bid Meeting will be held at:

**VENUE:**“COMMITTEE ROOM, LOCAL GOVERNMENT & HTP DEPARTMENT, GOVERNMENT OF SINDH”

(b) Queries and clarifications relating to the technical matters, matters relating to this RFP and financial matters, shall reach at least four (4) business days after the Pre-Bid Meeting, as such time period and number of meetings may be extended or amended at the sole discretion of the Agency.
(c) All such queries and clarification bearing reference of the Project shall be delivered at:

ATTENTION: MR. NAJEEB AHMED, SPECIAL SECRETARY (TECHNICAL)

ADDRESS: LOCAL GOVERNMENT DEPARTMENT, GROUND FLOOR, TUGHLUQ HOUSE, SINDH SECRETARIAT, KARACHI, PAKISTAN

(d) The Bidders are requested to submit any substantive questions in writing or through fax or email to reach the Agency, unless otherwise permitted by Agency in its sole and absolute discretion, preferably not later than four (4) business days following the Pre-Bid Meeting.

(e) It shall be assumed by the Agency that subsequent to the Pre-Bid Meeting all the queries, comments and concerns of the Bidders have been addressed and answered. Furthermore, any Bid submitted in response to this RFP is submitted upon a full understanding and agreement of terms related to this Section 2.1.3 (Pre-Bid Meeting) and, therefore, the submission of Bids in response to this RFP would be deemed as an acceptance to the said terms.

(f) The Agency, however, reserves the right to call any additional Pre-Bid Meeting, if it so desires to.

2.1.4 PROJECT LIAISON

(a) The contact details for the primary persons designated for this RFP are:

ATTENTION : PROJECT MANAGER, KORANGI LINK ROAD PROJECT

PHONE : +92 21 9921 2314

ADDRESS : LOCAL GOVERNMENT DEPARTMENT, GROUND FLOOR, TUGHLUQ HOUSE, SINDH SECRETARIAT, KARACHI, PAKISTAN

2.1.5 Access to information, or to any modification or update shall be made available to the Bidders subject to submission of the Non-Disclosure Agreement (as attached hereto as ANNEXURE G (Non Disclosure Agreement)) to the Agency, duly signed by the authorized representative of the Bidder.

2.1.6 BID SUBMISSION: TIME AND PLACE OF DELIVERY

All Bids shall be submitted in a sealed envelope no later than 15:00 hours (Pakistan Standard Time) on the Bid Submission Date (the Bid Submission Time) to the following address and marked for the attention of:

ATTENTION : MR. NAJEEB AHMED, SPECIAL SECRETARY (TECHNICAL)

ADDRESS : LOCAL GOVERNMENT DEPARTMENT, GROUND FLOOR, TUGHLUQ HOUSE, SINDH SECRETARIAT, KARACHI, PAKISTAN

TELEPHONE : +92 21 9921 2314
2.1.7 Bids received after the Bid Submission Time shall be returned to the sender unopened. Bidders are responsible for ensuring that their Bids are submitted at the time and place specified in Section 2.1.6 (Bid Submission: Time and Place of Delivery).

2.1.8 The sealed envelope shall include one (1) original Technical Bid and three (3) hard copies, with one soft copy (on CD/DVDs/USB) and shall also include additional relevant supporting documents and forms, as identified in this RFP and as per the guidelines given in Section 2 (Data Sheet).

2.2 OPENING OF THE BIDS

2.2.1 The Agency will open the Bids at the Committee Room of the Planning & Development Board, 2nd Floor, Tughlaq House, Sindh Secretariat, Karachi, in the presence of Bidders or their authorized representatives who choose to attend, at a Bid opening meeting, within one (1) hour after the Bid Submission Date. The Bidder representatives who are present shall sign a register in evidence of their attendance.

2.3 TECHNICAL AND FINANCIAL EVALUATION COMMITTEE (TFEC)

2.3.1 The Bids will be reviewed by a TFEC constituted in accordance with the Applicable Laws and the requirements set out in this RFP. The TFEC will select such Bidder as the Preferred Bidder who has submitted a Compliant Bid, in addition has met the eligibility criteria and the technical evaluation criteria and has offered the Best Evaluated Bid based on the financial evaluation criteria set out in this RFP.

2.4 BID EVALUATION PROCESS

2.4.1 The Bids shall be opened within one (1) hour following the Bid Submission Time. The examination and review of the Bids shall commence one (1) hour following the opening of Bids. The Bids shall be evaluated based on the criteria set out in this RFP.

2.4.2 Any Bid submitted in response to this RFP is submitted upon a full understanding and agreement of terms of this Section 2.4 (Bid Evaluation Process) and, therefore, the submission of Bids in response to this RFP would be deemed as an acceptance to the said terms.

2.5 EVALUATION CRITERIA

2.5.1 The TFEC shall carry out its review and examination of the Bids submitted by Bidders.

2.5.2 The Bid must be submitted at the place and by the deadline specified in Section 2.1.6 (Bid Submission: Time and Place of Delivery).

2.5.3 The Commitment Form, with no amendments or changes thereto, must be signed by the Bidder and its Members.

2.5.4 Duly passed resolutions giving the representative of the Bidders (and each of its Members, in case of a Consortium) signing authority must accompany the Bid. In case a Bidder is not a corporate entity, the requisite power of attorney appointing the authorised representative to sign on behalf of the Bidder shall be provided.
2.5.5 The declaration, in form and substance attached hereto as ANNEXURE F (Declaration), with no amendments or changes thereto, must be signed by the Bidders and their Members.

2.5.6 The Non-Disclosure Agreement, identical in form and substance attached hereto as ANNEXURE G (Non Disclosure Agreement), with no amendments or changes thereto, must be signed by the Bidder and its members, for the access to data room. Further, the Integrity Pact, identical in form and content to the one found in ANNEXURE H (Integrity Pact), with no amendments or changes thereto, must be signed by the Bidder.

2.5.7 COMMERCIAL COMPLIANCE

(a) In case the Bidder is a Consortium, once the Bid is submitted, such Bidder must be bound by a Joint Bidding Agreement.

(b) Participants and Key Individuals who are not employees of the Bidder or of a Member or Participant of the Bidder must complete and sign the Commitment Form, with no amendments or changes thereto. Duly passed resolutions giving the representatives of each Participant of the Bidder signing authority must accompany the Commitment Form.

(c) Bid must not be conditional.

2.5.8 A Bid submitted in response to this RFP by a Bidder shall contain inter alia, the following:

(a) The information specified in Section 3 (Standard Bid Forms).

(b) The review of a Bid’s technical compliance will focus specifically on examining certain key technical items considered by the Agency to be sensitive. The following items will be verified:

(i) Design & construction methodology for road (geometry & pavement).

(ii) Design & construction methodology for the bridges and other structures.

(iii) Design & construction methodology for the interchanges/flyovers.

(iv) Quality management programs.

(v) Quality control programs.

(vi) Environmental and social safeguard requirements.

(vii) Consistency of schedules.

(viii) Design assumptions.

(ix) Construction techniques.

(x) Project management systems.
(xi) O&M program.

(c) This evaluation is neither comprehensive nor a complete verification of technical compliance with the specifications of the Draft Concession Agreement.

(d) The Substantial Completion Date and the Construction Completion Date, as per the Project Milestones given in this RFP and the Draft Concession Agreement, or as may be agreed at the time of entering the Concession Agreement.

(e) The Substantial Completion Date and the Construction Completion Date, as per the Project Milestones given in this RFP and the Draft Concession Agreement, or as may be agreed at the time of entering the Concession Agreement.

(f) A Financial Bid must meet the following requirements in order to be considered compliant:

(i) It must contain complete information requested in Form I - 11 (Financial Bid Form).

(ii) It must contain complete information requested in Form I - 12 (Bid Price Form) on the Bid Submission Date.

(iii) In the opinion of the TFEC, the Bidder continues to have sufficient financial capacity to achieve the Project completion.

(iv) The financing plan indicates that the planned financing is sufficient to cover all of the Project's requirements for the full term of the Concession Agreement (including design, construction, finance, operation, and maintenance).

(v) The Financial Model:

(A) provides a Substantial Completion Date and Construction Completion Date as per the Project Milestones given in this RFP and the Draft Concession Agreement; and

(B) is consistent with the technical bid (design schedule and cost, construction schedule and cost, maintenance schedule and costs, operations cost). Moreover, any and all costs incurred on part of maintenance, during the Defects Liability Period, shall not form part of the Bid Price. Thus, it is highlighted that during the Defects Liability Period (24 months following the Substantial Completion Date), the Concessionaire shall remain be responsible to bear the maintenance cost incurred during such time but shall not include maintenance cost in the O&M Cost Component forming part of the Annuity Amount Payments.

(vi) In the opinion of TFEC, the financing plan is robust in the short, medium and long-term. “ROBUST” means that the contemplated financing is sufficient to support reasonable fluctuations in the main risks of the
Concession (e.g.: inflation, construction costs and schedule, O&M Cost Component, etc.) without triggering the financing documents’ events of default.

(vii) The Financial Model shall include profit and loss statement, balance sheet and cashflow statement with detailed description and workings of all applicable federal, provincial and local taxes, duties, levies and other charges (including initial tax depreciation workings) in a separate sheet as per the Income Tax Ordinance 2001 (as may be amended, modified, supplemented or re-enacted from time to time). These tax workings and calculations will be assessed by the Independent Auditor and if required, the Independent Auditor in consultation with the Preferred Bidder shall adjust the tax workings and calculations in accordance with the Income Tax Ordinance, 2001 (as may be amended, modified, supplemented or re-enacted from time to time).

(viii) For the purposes of consistency, the Bidders shall assume the KIBOR rate at eight percent (8%) and the Bidders will be required to include the expected Base Case Spread over the KIBOR rate for computation of the debt liability. The Base Case Spread should be based on discussions with prospective lenders and/or Bidders likely estimate of the financing cost. In the event the Actual Spread is higher than the Base Case Spread, the financial impact of difference between the Actual Spread and the Base Case Spread shall be solely funded and borne by the Concessionaire. In the event the Concessionaire is able to negotiate a better pricing from Financiers in the form of the Actual Spread being less than the Base Case Spread, the fifty percent (50%) of that relevant saving acquired will be paid to the Concessionaire by the Agency and the resultant tax amount will be borne by the Agency. This will be covered in the Financing Component forming part of the Annuity Amount Payments.

(ix) For the purposes of consistency, the Bidders shall assume an annual escalation rate (CPI) of ten percent (10%) on the O&M Cost Component, forming part of the Annuity Amount Payments, provided that all such amounts shall be paid in accordance with provisions of the Concession Agreement.

(x) In addition, each Bidder is required to provide a copy of the Financial Model relating to its Financial Bid on a Microsoft Excel readable USB memory stick and one (1) hard copy of the same. Such file on the USB stick shall not be protected by a password and shall be in an unlocked format containing, inter alia, a user guide and data book setting out the assumptions of the Financial Model.

(xi) The Financial Model shall also incorporate key financial ratios that highlight the profitability of the Project and bankability of the financing structure proposed by the Bidder.

(xii) The Debt Repayment Date shall not exceed eight (8) years for the purpose of bid evaluation, however, the Concessionaire may extend Debt Repayment Date beyond eight (8) years at Financial Close with prior
approval from the Agency and the Independent Auditor (IA). Moreover, the debt repayment calculation will only be done through the PMT formula whereas, debt sculpting shall not be allowed.

(xiii) The KIBOR and CPI are fixed, for Bid evaluation purpose, at 8% and 10% respectively, however, in case of variation in KIBOR, CPI and/or WPI, either upwards or downwards, the same will be actualized at the prevailing rates and the same will be paid by the Agency in the form of Financing Component and O&M Cost Component forming part of the Annuity Amount Payments. Moreover, the resultant tax amount (delta due to actualization of KIBOR, CPI and/or WPI) will be borne by the Agency. It is abundantly made clear that in case the tax amount asked in the Bid Price by the Concessionaire is incorrect, the Agency shall not be responsible, and the Concessionaire shall solely bear that tax deficit amount/obligation.

2.5.9 SCORING CRITERIA – TECHNICAL EVALUATION OF BID

(a) The Bid of only those Bidders shall be considered who meet the Basic Eligibility Criteria set forth in ANNEXURE A (Basic Eligibility Criteria) of this RFP.

(b) The TFEC shall carry out its evaluation, applying the evaluation criteria and point system specified in this RFP. Each responsive Technical Bid shall be attributed to a score out of a total of one hundred (100) points.

(c) After complete evaluation of the Technical Bids, the Financial Bids of the Bidders, who have been qualified technically, shall be opened and evaluated. This qualification shall be based on the Bidder achieving a technical score, equal or higher than seventy (70) points.

(d) The TFEC will select that Bidder as the Preferred Bidder, who has the Best Evaluated Bid in accordance with the terms of this RFP, provided that such Bidder has technically qualified and that the Bid of such Bidder is a Compliant Bid.

(e) The TFEC shall attribute a technical score to responsive Technical Bids.

(f) Technical Bids scoring less than seventy (70) points shall be rejected. For technical qualification, a Bidder must score seventy (70) or more marks and must score at least fifty percent (50%) in each of the subcategories listed as below as Financial Capability and Technical Capability. The Bids technical score shall be calculated as follows:

<table>
<thead>
<tr>
<th>SERIAL NO.</th>
<th>CRITERIA</th>
<th>WEIGHTAGE/MARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>FINANCIAL CAPABILITY</td>
<td>60</td>
</tr>
<tr>
<td>B.</td>
<td>TECHNICAL CAPABILITY</td>
<td>40</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>100</td>
</tr>
</tbody>
</table>
The detailed evaluation criteria is set out in ANNEXURE B (Technical Evaluation Criteria) below.

COMMERCIAL COMPLIANCE

(a) The Bid must contain a detailed description of the Bidder, as specified in Section 3.1 (Information Concerning the Bidder).

(b) The Preferred Bidder must be an incorporated body or another type of legal entity.

FINANCIAL EVALUATION:

(a) The TFEC will select such technically qualified Bidder as the PREFERRED BIDDER, who has the Best Evaluated Bid Price in accordance with the requirements of this RFP and in accordance with Section 2.7.1.

2.6 OTHER CONSIDERATIONS

2.6.1 The Bids must not be qualified, in any way whatsoever, apart from as allowed under this RFP and must be submitted strictly in accordance with this RFP.

2.6.2 All Bids and other supporting documents shall be typed in the English language and state all monetary amounts in Pakistan Rupees (PKR), provided that the dollar or other currency may be quoted alongside the Pakistan Rupees.

2.6.3 The Bids must be signed by the authorized signatory of each of the Bidders and where applicable, each Consortium member, signing under a power of attorney, substantially in the form specified in ANNEXURE D (Power Of Attorney), a copy of which is to be provided with the Bids.

2.6.4 The Bid submitted in response to this RFP must also accompany a board resolution or an authority letter, authorising the person(s) signing the Bid documents on behalf of the Bidder. In case the Bidder is not a corporate entity, the requisite power of attorney appointing the authorised representative on behalf of the Bidder to sign the Bid documents shall be provided.

2.7 CLARIFICATION OF BIDS

2.7.1 The TFEC may, at its discretion, during the evaluation after the Bid Submission Date, invite a Bidder to provide a presentation and/or clarification of its Bid, either in writing or by meeting directly with the TFEC. The TFEC is not required to invite any such presentation and/or clarification, or to have a meeting with any Bidder, and the TFEC may, at its discretion, invite such presentations or clarifications from only one (1) or some of the Bidders. The TFEC may consider such presentations and clarifications in the evaluation of a Bid.

2.7.2 Except upon invitation and request from the TFEC, no additional information may be submitted after the Bid Submission Date. The TFEC will have no obligation to request a Bidder to provide missing or deficient information.
2.7.3 Any Bids submitted in response to this RFP is submitted upon a full understanding and agreement of terms of this Section 2.7 (Clarification of Bids) and, therefore, the submission of Bids in response to this RFP would be deemed as an acceptance to the said terms.

2.8 SELECTION OF PREFERRED BIDDER

2.8.1 The TFEC will make the selection of the Preferred Bidder in accordance with the terms of this RFP.

2.8.2 Any Bid submitted in response to this RFP is submitted upon a full understanding and agreement of terms of this Section 2.8 (Selection Of Preferred Bidder) and, therefore, the submission of Bids in response to this RFP would be deemed as an acceptance to the aforesaid terms.

2.9 RIGHT TO NEGOTIATE

2.9.1 Subject to the requirement of the Applicable Laws, SPP Rules and the PPP Act, after selection of the Preferred Bidder, the Agency reserves the right to negotiate changes to the Bid or to any of the terms of the Draft Concession Agreement, provided however, the Preferred Bidder will not be entitled to initiate changes to its Bid, or to the Draft Concession Agreement.

2.9.2 Any Bids submitted in response to this RFP is submitted upon a full understanding and agreement of terms of this Section 2.9 (Right to Negotiate), and the terms of this RFP and, therefore, the submission of Bid in response to this RFP would be deemed as an acceptance to the aforesaid terms.

2.9.3 In the event there is a discrepancy between this RFP and the Draft Concession Agreement, this RFP shall prevail.

3. STANDARD BID FORMS

3.1 INFORMATION CONCERNING THE BIDDER

3.1.1 DESCRIPTION OF THE BIDDER

Each Bidder must provide the following information:

(a) A detailed description of the Bidder, including:

(i) legal name;

(ii) complete head office/branch office/subsidiary contact information, including mailing address, telephone and fax numbers, and an e-mail address; and

(iii) incorporation details, including corporate charter, articles of incorporation, and proof of legal authorization to operate in Pakistan. If the Bidder is an
unincorporated legal entity, then the proof of that legal entity’s existence must be provided.

(b) In case of a Consortium, the members of the Consortium shall enter into a binding Joint Bidding Agreement for the purpose of submitting the Bid. The Joint Bidding Agreement to be submitted along with the Bid, shall, *inter alia*:

(i) mention date and place of signing;

(ii) convey the intent to form an SPV (with shareholding/ownership equity commitment(s) in the SPV in accordance with this RFP) which would enter into the Concession Agreement and subsequently perform all the obligations of the Concessionaire in terms of the Draft Concession Agreement, in case the Concession to undertake the Project is awarded to the Consortium;

(iii) clearly outline the proposed roles and responsibilities, if any, of each member (including each Member);

(iv) commit the equity stake, in terms of percentage, to be held by each Member;

(v) commit that all of the Members (whose credentials will be evaluated for the purposes of this RFP) shall subscribe to a cumulative of one hundred percent (100%) of the paid-up Sponsor Equity Funding Amount of the Concessionaire and subscribe to the Sponsor Equity Funding Amount in the Concessionaire. Further, it shall also commit that the members of the Consortium shall neither undertake nor shall they permit (A) a change in the Consortium, by addition/withdrawal of a consortium member or change in percentage shareholding of any consortium member, except as may be permitted under the Draft Concession Agreement; (B) any Change in Control except as permitted under the Draft Concession Agreement. Further, it shall also commit that no member of the Consortium shall, express with the prior written consent of the Agency, sell, transfer, convey or otherwise dispose its direct and/or indirect, legal and/or beneficial ownership in the Sponsor Equity Funding Amount (or any part thereof);

(vi) mention delineation of duties, responsibilities and scope of work to be undertaken by each Member along with resources committed by each partner/member of the Consortium for the proposed services;

(vii) mention duties, responsibilities and powers of the Lead Member;

(viii) provide for the members of the Consortium to undertake that they shall collectively submit/include a statement to the effect that all members of the Consortium shall be liable, jointly and severally, for all obligations of the Concessionaire in relation to the Project until the expiry of the Defects Liability Period; and
except as provided under this RFP, there shall not be any amendment to the Joint Bidding Agreement without the prior written consent of the Agency.

(c) In case of a single Bidder (not being a Consortium), it must provide with an undertaking that it shall be liable for all obligations of the Concessionaire in relation to the Project until the expiry of the Defects Liability Period. Further, in case of a single Bidder, the Bidder shall neither undertake nor shall it permit any Change in Control. Further, in case of a single Bidder (not a Consortium), the Bidder shall not, except with the prior written consent of the Agency, sell, transfer, convey or otherwise dispose its direct and/or indirect, legal and/or beneficial ownership in the Sponsor Equity Funding Amount (or any part thereof).

(d) Annual audited financial statements for the past three (3) years, audited by registered audit firm in the relevant jurisdiction. These financial statements must be provided for each Member and Participant of the Bidder, or for their parent company, if the latter is acting as the Member or Participant’s guarantor.

(e) Complete profile of the Bidder, including all the previous transactions it has undertaken in the similar field, particularly highlighting all such projects involving and/or undertaken for the Agency by the Bidder in any manner whatsoever.

(f) In case, after Bid Submission Date, a Bidder requests the Agency to amend any part of its Bid, including but not limited to, change in Joint Bidding Agreement, which is not accepted by the Agency/TFEC or acceptable by Agency/TFEC according to the RFP and/or the Applicable Laws. In such case, the Bid may be deemed withdrawn by the Agency, within the time period as stipulated in the correspondence between the Agency and such Bidder.

(g) In the event the Bidder requests to amend its Bid after Bid Submission Date, the Agency shall not accept such a request. However, if the Bidder maintains on an amendment to the submitted Bid, the Agency shall consider such request subject to qualifying the requirements as mentioned under clause 7.2 of The Sindh Public Procurement Authority Regulations (Works).

3.1.2 **ROLES OF MEMBERS AND PARTICIPANTS**

Each Bidder must describe in detail the individual roles of their Members and Participants, as well as the nature of their planned legal relationships between them. They must also produce a complete corporate organizational chart depicting interrelationships.

3.1.3 **ROLE OF KEY INDIVIDUALS**

The Bidder must describe in detail the roles of Key Individuals by drawing up one or more organizational charts for the various stages (design, construction, operation, etc.), indicating each person’s function and relationships during these stages, including the roles of Key Individuals.
3.1.4 **INTELLECTUAL PROPERTY RIGHTS**

The Bidder must provide a list of intellectual property rights together with the assignments and transfers and the licenses of intellectual property rights for all concepts, ideas and property developed or incorporated, in any manner, in the Bid, including copyright, inventions and other intellectual property rights and in respect of which it is or is not the owner of the intellectual property rights.

3.1.5 **SUPPORTING INFORMATION & DOCUMENTATION**

Each Bidder may submit any other supporting information or documentation that may assist the TFEC in the evaluation process and the same may be annexed to the Bid.

3.2 **BID SECURITY**

3.2.1 A Bid submitted in response to this RFP, submitted by the Lead Member, must be accompanied by a Bid Security, which shall remain valid for a period of twenty-eight (28) days beyond the Bid Validity Period.

3.2.2 The Bid Security submitted by the Bidders, other than Preferred Bidder, shall be returned upon signing of the Draft Concession Agreement or upon the expiry of the Bid Validity Period.

3.2.3 Any Bid not accompanied by the required Bid Security or accompanied by a Bid Security in any amount less than that required or other than in the form as required by this RFP shall be, in each case, rejected by the Agency as non-responsive. It is further clarified that no Bid Security in the form of insurance guarantee shall be entertained.

3.2.4 The Bid Security/Construction Performance Security (as applicable) may be encashed by the Agency in the following circumstances:

(a) In the case of a Preferred Bidder, if it fails within the specified times to:
   
   (i) comply with the instructions laid down in the Letter of Award within the time period stipulated therein;
   
   (ii) furnish the necessary Construction Performance Security when required;
   
   (iii) sign the Concession Agreement; and
   
   (iv) achieve all the conditions precedents agreed in the signed Draft Concession Agreement including but not limited to achieving Financial Close and the detailed design of the Project.

(b) In the case of a Preferred Bidder, in accordance with the Concession Agreement;

(c) In case a Bidder withdraws its Bid after the Bid Submission Date;

(d) In case of an occurrence of a Concessionaire’s event of default in terms of the Concession Agreement.
3.3 INFORMATION CONCERNING THE DEVELOPMENT OF THE TECHNICAL BID

3.3.1 Bids submitted by a Bidder must contain all of the items specified in this RFP (including Section 3.7 (List Of Standard Bid Technical Forms)) and must adhere to the format described herein. In addition, Bidders must ensure that their Technical Bid is consistent with their Financial Bid.

3.3.2 The Technical Bid will provide the Agency with the means for assessing the Bidder’s ability to comply with the Technical Specifications issued in this RFP.

3.4 INFORMATION CONCERNING THE DEVELOPMENT OF THE FINANCIAL BID

3.4.1 The Financial Bid must be prepared in the format provided in Section 3.5 (Format Of Financial Bid) and shall contain a financing plan and a Financial Model that meets all the requirements stated in FORM I - 11 (Financial Bid Form).

3.4.2 The Bidders shall provide the financing plan that gives a detailed description of the planned financial structure for the purpose of the Project, including a breakdown of the investments by the various types of instruments (e.g. Sponsor Equity Funding Amount, Agency Equity Funding Amount, Financing, etc.) and their terms and conditions, in accordance with Section 4.3.1.

3.4.3 This information must be provided on a term sheet for each Financing Instrument that is used for the Initial Financing. This term sheet shall be submitted by the Concessionaire to the Agency and the Independent Auditor prior to the Financial Close, in terms of the Draft Concession Agreement.

3.4.4 In case the Bidder plans to refinance for the purposes of repaying the Initial Financing till the end of the Operations Period, after the Financial Close, the Bidder must submit the same information for the Financing Instruments contemplated for such refinancing and/or additional financing as for those for the Initial Financing, provided further, in case the Concessionaire is able to obtain refinancing at the rates and terms better than the Initial Financing such refinancing shall be limited to the outstanding principal of the Initial Financing, the savings as a result of the same shall be shared with the Agency in 50:50 (fifty-fifty) ratio. For such refinancing and/or additional financing, the terms, conditions and, as applicable, the requisite consents and the no-objection certificates as laid down in the Draft Concession Agreement shall be applicable. However, the Agency understands that the refinancing information, if applicable, constitutes assumptions that are subject to change.

3.4.5 Notwithstanding anything contained in this RFP, any refinancing and/or additional financing by the Bidder during the Concession Period shall require a written approval of the Agency and the Independent Auditor and such refinancing/additional financing shall not increase any risk and/or liability for the Agency. The Bidder and the Agency shall mitigate any risk involved pursuant to such refinancing.
3.5 **FORMAT OF FINANCIAL BID**

3.5.1 The Financial Bid shall be provided in accordance with the format attached as FORM I - 11 (*Financial Bid Form*) and Form I - 12 (*Bid Price Form*) on the Bid Submission Date.

3.5.2 Under no circumstances shall the Agency consider/accept a conditional Bid.

3.5.3 The Financial Bid shall also include a fully functional, non-restricted, dynamically linked Financial Model in excel spread sheet form on a USB and one (1) hard copy of the same in accordance with requirements of this RFP. Such file on the USB stick shall not be protected by a password and shall be in an unlocked format.

3.6 **SPONSOR EQUITY SBLC(S)**

3.6.1 The Sponsor(s) shall establish the Sponsor Equity SBLC(s) on such terms and conditions and in such manner as stipulated in the Equity Funding & Utilization Agreement and the Draft Concession Agreement. The Sponsor Equity SBLC(s) shall be established at least thirty (30) days prior to the Scheduled Commencement Date as a Condition Precedent and shall secure fifty percent (50%) of the Sponsor Equity Funding Amount. All costs, expenses, fees and other charges of any nature associated with the issuance, maintenance and encashment of the Sponsor Equity SBLC(s) shall be borne solely by the Sponsors without any recourse to the Concessionaire.

3.7 **LIST OF STANDARD BID TECHNICAL FORMS**

The standard forms for the Technical Bid are provided in *Annexure I (Technical Form)*.

**FORM – I-1** BASIC INFORMATION FORM;

**FORM – I-2** HISTORICAL NON-PERFORMANCE, BLACK LISTING AND PENDING LITIGATION;

**FORM – I-3** FINANCIAL SITUATION;

**FORM – I-4** CURRENT CONTRACT COMMITMENTS/WORKS IN PROGRESS;

**FORM – I-5** DETAILS OF CONTRACTS OF SIMILAR NATURE AND COMPLEXITY COMPLETED OVER LAST TEN (10) YEARS;

**FORM – I-6** LIST OF KEY PERSONNEL;

**FORM – I-7** CVS OF PROPOSED EXPERTS;

**FORM – I-8** PLANT & EQUIPMENT;

**FORM – I-9** DETAILED PLAN FOR ACHIEVING FINANCIAL CLOSE;

**FORM – I-10** BASIC INFORMATION FORM – EPC CONTRACTOR;

**FORM – I-11** FINANCIAL BID FORM; and
FORM – I-12  BID PRICE FORM.

Any additional information that may be necessary for the Bid.
4. TERMS OF REFERENCE

4.1 PROJECT TERM AND PARTIES

4.1.1 PARTIES

The Draft Concession Agreement establishes the rights and obligations of both the Agency and the Concessionaire. It will be signed between the Agency and the Concessionaire at the conclusion of the Competitive Selection Process.

4.1.2 TERM

The term of the Draft Concession Agreement will, unless specified otherwise agreed in the Draft Concession Agreement, commence from the Commencement Date and will continue until the Transfer Date (as defined in the Draft Concession Agreement). The Agency expects the term to include approximately twenty-four (24) months of design and construction of the Project and a ten (10) year operating period with the Scheduled Substantial Completion Date falling twenty-four (24) months following the Commencement Date.

4.2 OWNERSHIP

The Concessionaire shall enjoy the right-of-way and the structures designed and built by it for the Concession Period. The Concessionaire shall further enjoy the intellectual property rights to the systems required for traffic maintenance, as described and contemplated by the Draft Concession Agreement. Following the Termination Date, ownership of the Project related assets will be transferred to Agency in accordance with the Draft Concession Agreement.

4.3 PROJECT SCOPE

The Scope of the Work of the Concessionaire is set out in ANNEXURE K (Scope of Work). The map of the proposed location plan is set out in ANNEXURE L (Project Location Plan).

4.3.1 FINANCING

(a) The Bidder that, further to this RFP and the Competitive Selection Process, is declared the Preferred Bidder and is issued the LOA, shall incorporate the SPV for the purposes of being the Concessionaire, which will implement the Project. Such Preferred Bidder, as proposed in the Bid shall maintain its shareholding in the Concessionaire in accordance with the requirements of the Draft Concession Agreement which shall be in accordance with the Bid.

(b) The Concessionaire shall be responsible for developing and implementing the financing structure for the Project including the financing and commercial arrangements for the design, construction, operations and maintenance work in accordance with the requirements of this RFP and the Draft Concessionaire Agreement.
(c) The Project shall be financed through a combination of the Sponsor Equity Funding Amount, the Agency Equity Funding Amount (if any) and the Financing in accordance with the Project Funding Percentage. Any item of the Pre-Estimated Project Cost shall be funded through the Agency Equity Funding Amount, the Sponsor Equity Funding Amount and the Financing on a pro rata basis and the sequence of funding in this regard shall be the Sponsor Equity Funding Amount first, the Agency Equity Funding Amount second and the Financing third, as more particularly detailed in the Equity Funding & Utilization Agreement, provided, that prior to the Financial Close and availability of the Financing, the Preliminary Works shall be financed through the Sponsor Equity Funding Amount; provided, further, that the Agency may, in its discretion, fund the cost of the Preliminary Works based on Agency Equity Funding Amount in respect of the Base Equity Funding Amount as set out in the Base Case Financial Model and the Equity Funding & Utilization Agreement.

(d) In the event a Bidder wishes to get a mobilization advance in respect of the EPC contract price, if awarded the Concession, it shall clearly specify such requirement in the Financial Bid. The mobilization advance shall not exceed ten percent (10%) of the contract price under the EPC Contract(s).

(e) The Project is structured on annuity-based model and the Concessionaire shall be entitled to receive Annuity Amount Payments from the Agency in accordance with the Draft Concession Agreement.

4.3.2 HAND-OVER OF THE STRUCTURE

(a) The Concessionaire will be responsible for handing over the structures to the Agency in a good working condition, as determined by the Independent Engineer, at the end of the Concession Period, as specified in the Draft Concession Agreement without any further compensation, except as contemplated in the Draft Concession Agreement, to the Concessionaire at the time of such transfer. These structures are subject to an inspection and correction process in order to ensure that they are handed over in accordance with the terms and conditions set out in the Draft Concession Agreement.

4.4 ALLOCATION OF RISKS AND RESPONSIBILITIES

4.4.1 All risks and obligations of the Agency and the Concessionaire shall be in accordance with the Draft Concession Agreement and the Bidders shall be deemed to have full and complete understanding of the risks relating to the Project and their allocation, as set out in the Draft Concession Agreement.

4.5 COMPENSATION OF THE CONCESSIONAIRE

4.5.1 The Project is structured on annuity-based model and the Concessionaire shall be entitled to receive Annuity Amount Payments from the Agency as per the Draft Concession Agreement.

4.5.2 The rights and obligations related to other revenue streams including the allocation thereof shall be finalized between the Agency and the Concessionaire in a separate development rights agreement in accordance with Article 29 of the Draft Concession Agreement.
4.5.3 The Annuity Amount Payments shall start from the Substantial Completion Date.

4.6 **ANNUITY AMOUNT PAYMENT AND GOVERNMENT SUPPORT**

4.6.1 In order to enhance the financial viability of the Project, the Agency is willing to offer the following supports:

1) **GOVERNMENT SUPPORT:**

The Agency shall provide upfront Agency support as Agency Equity Funding Amount. This is anticipated to reduce the financing requirements for the Concessionaire and improve bankability.

2) **ANNUITY AMOUNT PAYMENTS:**

Following Substantial Completion Date, the Agency shall offer Annuity Amount Payments on each Annuity Amount Payment Date during the Operations Period.

3) **ANNUITY AMOUNT PAYMENTS MECHANISM:**

Each of the Annuity Amount Payments will be funded by the Agency, on a semi-annual basis, in the Agency Annuity Amount Payment Account (as applicable). The first Annuity Amount Payment will be prefunded six (6) months prior to the Scheduled Substantial Completion Date. Further the Agency may, in its discretion, decide to utilise the interest accrued on the Agency Equity Funding Amount to fund the first Annuity Amount Payments.

4.7 **SPECIFIC TAXATION FRAMEWORK FOR THE CONCESSION**

4.7.1 The Concessionaire shall be liable to pay federal, provincial and local taxes, duties, levies and other charges as they exist twenty-eight (28) days prior to the Bid Submission Date.

4.7.2 By submitting the Bid, the Bidder acknowledges the acceptance of all tax related obligations. For the sake of clarity, the Concessionaire shall be required to pay all the taxes, duties, levies, stamp duties, rents, and other charges payable to any local government, provincial or federal government (as applicable).

4.8 **ENVIRONMENTAL MATTERS**

4.8.1 The Agency is committed to respecting the environment on all of its projects. The Concessionaire will be required to ensure that the Works are carried out in accordance with all Applicable Laws relating to the environment and the IFI Standards.

4.9 **ENVIRONMENTAL REQUIREMENTS AND PROCEDURES**

4.9.1 An Environmental Impact Assessment - EIA Study has been prepared by Agency. The Concessionaire shall be responsible to update the EIA Study and obtain the required approvals from Sindh Environmental Protection Agency (SEPA). The Concessionaire
shall follow the recommendations thereof in the best interest of the environment and safety of the local residents, users, fauna and flora of the area.

4.10 LAND ACQUISITION

4.10.1 The Agency shall deliver Vacant Possession of the Project Site to the Concessionaire in accordance with the Draft Concession Agreement. The Concessionaire shall be required to identify the exact location and length of the land required for the Project following detailed design, setting out on ground the approved centreline and right of way, in each case, in accordance with the requirements of the Draft Concession Agreement.

4.11 RELOCATION OF UTILITIES

4.11.1 The Concessionaire shall be required to identify any utilities in the right of way and provide the re-location plan to the Agency in accordance with the requirements of the Draft Concession Agreement. The Agency shall be required to relocate any such utilities according to the relocation plan.

4.12 ADVERTISING RIGHTS

4.12.1 The Concessionaire shall have a right to propose, from time to time, a plan for various advertising activities to be implemented on the Concession Assets subject to prior approval from the Independent Engineer (on aspects related to the operation of the Project) and the Agency (the Concessionaire Advertising Plan).

4.12.2 The Concessionaire shall be entitled to a management fee which shall be twenty percent (20%) of the Advertising Proceeds (the Concessionaire Management Fee). However, if the advertising rights and management proposal emanates from the Agency then the Concessionaire will not be entitled to a management fee.

4.13 COMMERCIAL RIGHTS

4.13.1 The Concessionaire shall, at any time prior to the expiration of the Concession Period, have a right to propose, from time to time, to establish Additional Facilities along the Project Site with prior approval of the Independent Engineer and provision of a prior to the approval of the Agency, in accordance with the Draft Concession Agreement and the development rights agreement (if any).

4.13.2 The Agency shall, at any time prior to the expiration of the Concession Period, have a right to propose, from time to time, to establish Additional Facilities along the Project Site with prior approval of the Independent Engineer and, in accordance with the Draft Concession Agreement and the development rights agreement (if any).

4.14 PRICE ESCALATION

4.14.1 The Escalation Cost shall be shared between the Concessionaire and the Agency in the manner set out in Section 10.5 (Escalation Cost) of the Draft Concession Agreement.

4.14.2 Each Bidder shall disclose the Escalation Cost of each Escalable Item in its Base Case Financial Model submitted with the Financial Bid and the Base Price shall be locked at the rate prevailing twenty-eight (28) days prior to the Bid Submission Date.
4.15 **KEY PERFORMANCE INDICATORS (KPIs)**

4.15.1 The KPIs related to the operations, maintenance and availability of the Project will be incorporated in the O&M Manual to be prepared by the Concessionaire. Corresponding penalties/liquidated damages amount as applicable which will cascade based on instances of non-compliance including potential events of default scenarios will be included in the O&M Manual. List of major KPIs and corresponding penalties/liquidated damages amount is attached as **ANNEXURE M (Key Performance Indicators)** to this document.
ANNEXURE A – BASIC ELIGIBILITY CRITERIA

BASIC ELIGIBILITY CRITERIA FOR BIDDERS:

A Bid received from a Bidder, shall only be considered if all the following three (3) components of the Basic Eligibility Criteria are satisfied:

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<tr>
<th>S. No</th>
<th>DESCRIPTION</th>
<th>Yes</th>
<th>No</th>
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<tbody>
<tr>
<td>1</td>
<td>ELIGIBILITY CRITERIA FOR BIDDERS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1a</td>
<td>Registration with Pakistan Engineering Council (PEC)</td>
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<td>1b</td>
<td>Registration with Regulatory and Tax Authorities</td>
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<td>1c</td>
<td>Affidavit for Government Owned Legal Entities</td>
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<td>Affidavit for No Conflict of Interest</td>
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<td>1e</td>
<td>Affidavit for Non – Blacklisting</td>
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<td>1f</td>
<td>Affidavit for Litigation History</td>
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<td>1g</td>
<td>Affidavit for Failure to Sign Contracts</td>
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<td>1h</td>
<td>Any member of the Consortium that leads the Consortium, whereby holding at least forty percent (40%) of the Class A Shares, throughout the Project and liaises between the Agency and the Consortium, as appointed pursuant to the Consortium Power of Attorney and the Joint Bidding Agreement.</td>
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In the event the Lead Member is not an EPC Contractor, the Consortium shall be allowed a maximum of two (2) EPC Contractor(s) (the Lead EPC Contractor and the Other EPC Contractor) as part of the Consortium.

Furthermore, in the event the Lead Member is also the Lead EPC Contractor, two (2) Other EPC Contractors, other than the Lead EPC Contractor, shall be allowed to form part of the Consortium.

The Lead EPC Contractor shall perform a minimum of fifty-one percent (51%) of the total construction works in the Project.

The Other EPC Contractor(s) (collectively) shall perform a maximum of forty-nine percent (49%) of the total construction works in the Project.
### ELIGIBILITY CRITERIA FOR BIDDERS (FINANCIAL CAPABILITY)

<table>
<thead>
<tr>
<th>2a</th>
<th><strong>Net Assets (most recent financial statements)</strong></th>
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<tr>
<td>In case of single Bidder, Net Assets (At least PKR 2,000,000,000/- (Pakistani Rupees Two Billion Only) [excluding any surplus on revaluation].</td>
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<tr>
<td>In case of Consortium:</td>
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<tr>
<td>The Net Assets of Lead Member shall have at least PKR 1,000,000,000/- (Pakistani Rupees One Billion Only) [excluding any surplus on revaluation].</td>
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<tr>
<td>In case there is only one (1) other Member, the Net Assets of such other Member shall have at least PKR 1,000,000,000/- (Pakistani Rupees One Billion Only) [excluding any surplus on revaluation].</td>
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<tr>
<td>In case there are two (2) or more other Members, the Net Assets of each of such other Members shall have at least PKR 500,000,000/- (Pakistani Rupees Five Hundred Million Only), individually [excluding any surplus on revaluation].</td>
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<tr>
<th>2b</th>
<th><strong>Average Annual Turnover (last three years financial statements)</strong></th>
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<tbody>
<tr>
<td>In case of the single Bidder, it shall have an average annual turnover of at least PKR 3,000,000,000/- (Pakistani Rupees Three Billion Only).</td>
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<tr>
<td>In case of Consortium:</td>
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<tr>
<td>Average Annual Turnover of Lead Member shall have at least PKR 2,000,000,000/- (Pakistani Rupees Two Billion Only).</td>
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<tr>
<td>In case there is only one (1) other Member, the Average Annual Turnover of such other Member shall have at least PKR 1,000,000,000/- (Pakistani Rupees One Billion Only).</td>
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</tr>
<tr>
<td>In case there are two (2) or more other Members, the Average Annual Turnover of each of such other Members shall have at least PKR 500,000,000/- (Pakistani Rupees Five Hundred Million Only), individually.</td>
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</table>
### GENERAL CONSTRUCTION EXPERIENCE:

**For Single Entity/Lead EPC Contractor that shall be performing at least fifty-one percent (51%) of the total constructions works in the Project:**

- Firms/Contractors having been in the business of construction for at least last ten (10) years.

  (Attach constitutional documents including memorandum and articles of association/partnership deed, certificate of incorporation or other documents of constitution, documents of registration of the entity, etc.)

**For Other EPC Contractor:**

- In case, any one of the ‘Other EPC Contractor’ that has proposed to perform thirty-five percent (35%) or above of the total construction works in the Project then it shall be evaluated based on criteria for ‘Lead EPC Contractor’.

- In case, any one of the ‘Other EPC Contractor’ that has proposed to perform less than thirty-five percent (35%) of the total construction works in the Project then it shall be evaluated based on the following criteria:

  - Firms/Contractors have been in business of construction for at least for last five (5) years.

### SPECIFIC CONSTRUCTION EXPERIENCE:

**In relation to the Lead EPC Contractor:**

The Lead EPC Contractor must have undertaken minimum two (2) projects and have implemented in the role of investor or contractor i.e. Highways/Motorways/Dual Carriageway, including interchange(s) and/or flyover(s) with each cost of at least PKR 4,000,000,000/- (Pakistani Rupees Four Billion only) of at least ten (10) kilometers length,
completed in the past ten (10) years.

In relation of Other EPC Contractor:

In case, any one of the ‘Other EPC Contractor’ that has proposed to perform thirty-five percent (35%) or above of the total construction works in the Project then it shall be evaluated based on criteria for ‘Lead EPC Contractor’.

In case, any one of the ‘Other EPC Contractor’ that has proposed to perform less than thirty-five percent (35%) of the total construction works in the Project then it shall be evaluated based on the following criteria:

Must have completed at least one (1) project i.e. Highways/Motorways/Dual Carriageway, including interchange(s) and/or flyover(s) with cost of at least PKR 2,000,000,000/- (Pakistani Rupees Two Billion only) in the past ten (10) years.

Any of the EPC Contractor(s) must have completed Sea/River/River training works of at least one (1) kilometer in the past ten (10) years.

1) **ELIGIBILITY CRITERIA FOR BIDDERS AND THE EPC CONTRACTOR:**

a. **REGISTRATION WITH PAKISTAN ENGINEERING COUNCIL (PEC)**

   • **FOR CONSTRUCTION EPC CONTRACTOR:**

   For Lead EPC Contractor:

   The Bidder, (in case of Consortium, the Lead EPC Contractor) must possess valid PEC registration certificate in category ‘CA’ and in discipline CE01 & CE02.

   For Other EPC Contractor(s):

   In case, any one of the ‘Other EPC Contractor’ that has proposed to perform thirty-five percent (35%) or above of the total construction works in the Project then it shall be evaluated based on criteria for ‘Lead EPC Contractor’.
In case, any one of the ‘Other EPC Contractor’ that has proposed to perform less than thirty-five percent (35%) of the total construction works in the Project then it shall be evaluated based on the following criteria:

Must have valid PEC registration certificate in category ‘CB’ & above and in discipline CE01 & CE02.

All EPC Contractor(s) must possess and submit valid PEC certification.

(Foreign entities if participating in the bidding process should strictly follow the rules stipulated in PEC bye laws for participation. Moreover, in the event the foreign entities fail to provide evidence of holding a valid PEC license, the Bidder shall be disqualified)

b. **REGISTRATION WITH REGULATORY AND TAX AUTHORITIES**

The Bidder (in case of a Consortium, all of the members) must submit constituent documents, *inter alia*, memorandum and articles of association/partnership deed, certificate of incorporation or other documents of constitution, documents of registration of the entity, etc. in accordance with Applicable Laws.

The Bidder, in case of a Consortium all members of the Consortium, must possess valid registration certificate from income tax authority (i.e., the NTN certificate) and relevant sales tax authority, if applicable.

(Valid NTN certificate and tax returns filed for last three years to be attached and relevant sales tax certificate, if applicable.)

(Foreign entities if participating in the Bidding Process should submit tax certificate of their country duly attested by Pakistani Consulate/Pakistan High Commission of their country).

c. **AFFIDAVIT FOR GOVERNMENT OWNED LEGAL ENTITIES**

In case if the Bidder, or any member of the Consortium is a government owned legal enterprise or institution, such Bidder, any member of its Consortium (as applicable) must establish that it is legally and financially autonomous and operating under commercial law.

(Bidders, or any member of the Consortium, who are government owned legal enterprise or institution shall submit an Affidavit confirming that they are legally and financially autonomous and operating under commercial law).

Relevant Form: **ANNEXURE J (Affidavit)**

d. **AFFIDAVIT FOR NO CONFLICT OF INTEREST**

The Bidder, and any member of the Consortium, shall not have any Conflict of Interest with the Agency.
Conflict of Interest means:

- where the Bidder and/or any member of the Consortium, provides, or could provide, or could be perceived as providing biased professional advice to the Agency to obtain an undue benefit for himself or those affiliated with the Bidder or any member of the Consortium;

- receiving or giving any remuneration directly or indirectly in connection with the Project except as provided in the bidding documents;

- any engagement in consulting or other procurement activities of a Bidder, and any member of the Consortium, that conflicts with his role or relationship with the Agency under the Project; and

- where an official of the Agency engaged in the procurement process has a financial or economic interest in the outcome of the process of procurement, in a direct or an indirect manner.

(Bidders (in case of a consortium, the Lead Member, on behalf of each member) shall submit an Affidavit for non-conflict)

Relevant Form: ANNEXURE J (Affidavit)

e. AFFIDAVIT FOR NON-BLACKLISTING

The Bidder, and any member of the Consortium, shall not be blacklisted by any government entity (including federal government and provincial governments in Pakistan).

Blacklisting means barring a Bidder, and any member of the Consortium, from participating in any future procurement proceedings by the Agency or any governmental entity.

(Bidders (in case of a consortium, the Lead Member, on behalf of each member) shall submit an Affidavit for non-blacklisting)

Relevant Form: ANNEXURE I2 (Historical Non-Performance, Black Listing and Pending Litigation) or ANNEXURE J (Affidavit)

f. AFFIDAVIT FOR LITIGATION HISTORY

All pending litigation against the Bidder and any Member of the Consortium, shall in total not represent more than fifty percent (50%) of the respective Net Assets, nor shall there by any litigation that prevents or materially impedes the Bidder and any Member of the Consortium, from its obligations in respect of the Project and the terms of the Draft Concession Agreement.

(The Bidders (in case of Consortium, all Members of the Consortium) shall provide details of the litigation or the Bidder (in case of Consortium, the Lead Member of the Consortium) shall submit an Affidavit in case of no litigation on PKR 100/- (Pakistani
Rupees One Hundred only) stamp paper attested by Notary Public. Foreign Bidders’ Affidavit should be attested by Pakistani Consulate/Pakistan High Commission of their country).

Relevant Form: **ANNEXURE I2 (Historical Non-Performance, Blacklisting and Pending Litigation)** or **ANNEXURE J (Affidavit)**

g. **AFFIDAVIT FOR FAILURE TO SIGN CONTRACTS**

The Bidder shall not be under execution of a bid securing declaration for last five (5) years.

(The Bidders (including members of a Consortium) shall provide details of such failure to sign contracts or the Bidder (in case of Consortium, the Lead Member of the Consortium) and its EPC Contractor shall submit an Affidavit in case if not applicable PKR 100/- (Pakistani Rupees One Hundred only) stamp paper attested by Notary Public. Foreign Bidders’ Affidavit should be attested by Pakistani Consulate/Pakistan High Commission of their country).

Relevant Form: **ANNEXURE I2 (Historical Non-Performance, Black-Listing and Pending Litigation)** or **ANNEXURE J (Affidavit)**

h. **MINIMUM EQUITY CONTRIBUTION BY LEAD MEMBER**

Any member of the Consortium that leads the Consortium, whereby holding at least forty percent (40%) of the Class A Shares, throughout the Project and liaises between the Agency and the Consortium, as appointed pursuant to the Consortium Power of Attorney and the Joint Bidding Agreement.

In the event the Lead Member is not an EPC Contractor, the Consortium shall be allowed a maximum of two (2) EPC Contractor(s) (the Lead EPC Contractor and the Other EPC Contractor) as part of the Consortium.

Furthermore, in the event the Lead Member is also the Lead EPC Contractor, two (2) Other EPC Contractors, other than the Lead EPC Contractor, shall be allowed to form part of the Consortium.

The Lead EPC Contractor shall perform a minimum of fifty-one percent (51%) of the total construction works in the Project.

The Other EPC Contractor(s) (collectively) shall perform a maximum of forty-nine percent (49%) of the total construction works in the Project.

2) **ELIGIBILITY CRITERIA FOR BIDDERS (FINANCIAL CAPABILITY)**

a) **Net Assets (as per the most recent Financial Statements)**

In case of single Bidder, Net Assets of the Bidder shall be at least PKR 2,000,000,000/- (Pakistani Rupees Two Billion Only) (excluding any surplus on revaluation) as presented in the most recent financial statements either December 2020 or June 2021.
In case of consortium:

Net Assets of the Lead Member shall at least be PKR 1,000,000,000/- (Pakistani Rupees One Billion Only) (excluding any surplus on revaluation) as presented in the most recent financial statements.

In case there is only one (1) other Member, the Net Assets of such other Member shall have at least PKR 1,000,000,000/- (Pakistani Rupees One Billion Only) (excluding any surplus on revaluation) as presented in the most recent financial statements.

In case there are two (2) or more other Members, the Net Assets of each of such other Members shall have at least PKR 500,000,000/- (Pakistani Rupees Five Hundred Million Only), individually, (excluding any surplus on revaluation), as presented in the most recent financial statements.

(the Bidders/all members of a Consortium shall submit Audited Financial Statements to demonstrate their capability for this criteria).

b) Average Annual Turnover (last three years)

In case of single Bidder, it shall have an average annual turnover of at least PKR 3,000,000,000/- (Pakistani Rupees Three Billion Only).

In case of Consortium:

Average Annual Turnover of Lead Member shall have at least PKR 2,000,000,000/- (Pakistani Rupees Two Billion Only).

In case there is only one (1) other Member, the Average Annual Turnover of such other Member shall have at least PKR 1,000,000,000/- (Pakistani Rupees One Billion Only).

In case there are two (2) or more other Members, the Average Annual Turnover of each of such other Members shall have at least PKR 500,000,000/- (Pakistani Rupees Five Hundred Million Only), individually.

(the Bidders or Members of the Consortium shall submit Audited Financial Statements for last three (3) years to demonstrate their capability for this criteria).

In case of a Foreign Bidder, historical exchange rate to be used of the closing date of the respective year of the financial statement date.

In case of a Bidder who is a Consortium, only such members of the Consortium that are proposed to be shareholders as per the Joint Bidding Agreement shall be considered for this criterion, and in the evaluation of the same they must meet the criterion based on the weightage proposed in accordance with the Joint Bidder Agreement.
3) **CONSTRUCTION EXPERIENCE**

a) **GENERAL CONSTRUCTION EXPERIENCE:**

For Single Entity/Lead EPC Contractor:

Firms/Contractors having been in the business of construction for at least last ten (10) years.

(Attach constitutional documents including memorandum and articles of association/partnership deed, certificate of incorporation or other documents of constitution, documents of registration of the entity, etc.)

For Other EPC Contractor:

In case, any one of the ‘Other EPC Contractor’ that has proposed to perform thirty-five percent (35%) or above of the total construction works in the Project then it shall be evaluated based on criteria for ‘Lead EPC Contractor’.

In case, any one of the ‘Other EPC Contractor’ that has proposed to perform less than thirty-five percent (35%) of the total construction works in the Project then it shall be evaluated based on the following criteria:

Firm(s)/Contractor(s) have been in business of construction for at least for last five (5) years.

(Attach constitutional documents including memorandum and articles of association/partnership deed, certificate of incorporation or other documents of constitution, documents of registration of the entity, etc.)

b) **SPECIFIC CONSTRUCTION EXPERIENCE:**

In relation to the Lead EPC Contractor:

The Lead EPC Contractor must have undertaken minimum two (2) projects and have implemented in the role of investor or contractor i.e. Highways/Motorways/Dual Carriageway, including interchange(s) and/or flyover(s) with cost of each at least PKR 4,000,000,000/- ( Pakistani Rupees Four Billion only) of at least ten (10) kilometers length, completed in the past ten (10) years.

In relation to Other EPC Contractor:

In case, any one of the ‘Other EPC Contractor’ that has proposed to perform thirty-five percent (35%) or above of the total construction works in the Project then it shall be evaluated based on criteria for ‘Lead EPC Contractor’.

In case, any one of the ‘Other EPC Contractor’ that has proposed to perform less than thirty-five percent (35%) of the total construction works in the Project then it shall be evaluated based on the following criteria:

Must have completed at least one (1) project i.e.
Highways/Motorways/Dual Carriageway, including interchange(s) and/or flyover(s) with cost of at least PKR 2,000,000,000/- (Pakistani Rupees Two Billion only) in the past ten (10) years.

Any of the EPC Contractor(s) must have completed Sea/River/River training works of at least one (1) kilometer in the past ten (10) years.

(submission of commencement letter and completion certificates are mandatory).
# ANNEXURE B - TECHNICAL EVALUATION CRITERIA

<table>
<thead>
<tr>
<th>A) Financial Capability</th>
<th>Max Points 60</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A-1) Average Annual Turnover for last three (03) years</strong></td>
<td>Max Points 15</td>
</tr>
<tr>
<td>Average annual turnover for last three (03) years as per Form I-3.</td>
<td></td>
</tr>
<tr>
<td>The Bidder shall have an average annual turnover of PKR 3,000,000,000/- (Pakistani Rupees Three Billion only) for last three (03) years ……………………….. 10 Points</td>
<td></td>
</tr>
<tr>
<td>One (01) point for each increment of PKR 400,000,000/- (Pakistani Rupees Four Hundred Million only)</td>
<td></td>
</tr>
<tr>
<td>(the Bidders/all Members of the Consortium, shall submit audited financial statements)</td>
<td></td>
</tr>
<tr>
<td>In case of a Foreign Bidder, historical exchange rate to be used of the closing date of the respective year of the financial statement date.</td>
<td></td>
</tr>
<tr>
<td>In case of a Consortium, only such members of the Consortium that are proposed to be shareholders, as per the Joint Bidding Agreement, shall be considered for this criterion, and in the evaluation of the same must meet the criterion based on the weightage proposed in accordance with the Joint Bidder Agreement.</td>
<td></td>
</tr>
<tr>
<td><strong>A-2) Net Assets (as per the most recent Financial Statements)</strong></td>
<td>Max Points 15</td>
</tr>
<tr>
<td>Net Assets as per Form I-3.</td>
<td></td>
</tr>
<tr>
<td>PKR 2,000,000,000/- (Pakistani Rupees Two Billion only) (excluding any surplus on revaluation) as presented in the most recent financial statements ………… Points 10</td>
<td></td>
</tr>
<tr>
<td>One (01) point for each increment of PKR 200,000,000/- (Pakistani Rupees Two Hundred Million only).</td>
<td></td>
</tr>
<tr>
<td>(the Bidders/all Members of a Consortium, shall submit audited financial statements)</td>
<td></td>
</tr>
<tr>
<td>In case of a Foreign Bidder, historical exchange rate to be used of the closing date of the respective year of the financial statement date.</td>
<td></td>
</tr>
<tr>
<td>In case of a Consortium, only such members of the Consortium that are proposed to be shareholders, as per the Joint Bidding Agreement, shall be considered for this criterion, and in the evaluation of the same must meet the criterion based on the weightage proposed in accordance with the Joint Bidder Agreement.</td>
<td></td>
</tr>
</tbody>
</table>
### A-3) Cash and Funding Lines:

Cash, short term or liquid investments and credit/funding lines of not less than PKR 1,000,000,000/- (Pakistani Rupees One Billion only) .......................... 05 Points

One (01) point for each increment of PKR 100,000,000/- (Pakistani Rupees One Hundred Million only) .............................................................. 10 Points

(the Bidders/all Members of a Consortium, shall submit audited financial statements, moreover the bidders are required to submit letter from the banks/financial institutions corroborating the claim of such credit/funding lines)

In case of a Foreign Bidder, historical exchange rate to be used of the closing date of the respective year of the financial statement date.

In case of a Consortium, only such members of the Consortium that are proposed to be shareholders, as per the Joint Bidding Agreement, shall be considered for this criterion, and in the evaluation of the same must meet the criterion based on the weightage proposed in accordance with the Joint Bidder Agreement.

### A-4) Project financing and implementation capability

The Bidders must have successfully completed project financing of different infrastructure projects during the last ten (10) years. Projects presented by the bidders to qualify in this category shall meet the following requirements.

A single project worth PKR 8,000,000,000 (Pakistani Rupees Eight Billion Only) will achieve the score of three (03) points.

Two (2) projects with a cumulative worth of PKR 8,000,000,000 (Pakistani Rupees Eight Billion Only) will achieve score of two (02) points.

For a single project having cost in excess of PKR 8,000,000,000 (Pakistani Rupees Eight Billion Only), an incremental (01) point will be awarded for every PKR 2 Billion (Pak Rupees Two Billion) increase in project cost, up to a maximum of five (5) points.

Two (2) projects with a cumulative worth of PKR 8,000,000,000 (Pakistani Rupees Eight Billion Only), an incremental (0.5) point will be awarded for every PKR 2 Billion (Pak Rupees Two Billion) increase in such two (2) project cost, up to a maximum of five (5) points.

### A-5) Project Management Structure:

#### A-5a) Project understanding and risk mitigation measure:  ....... Max 05 Points

Demonstrates comprehensive and detailed understanding of risks as well as mitigation measures pertaining to the Project execution, along with a stakeholder coordination plan for execution ................................. 05 Points

Demonstrates sufficiently comprehensive but not detailed understanding of risks as well as mitigation measures pertaining to the Project execution....................... 02 Points
<table>
<thead>
<tr>
<th>A-5b) Concept Plan and Design: ........................................... Max 05 Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Bidder must demonstrate the comprehensive project plan pertaining to the Project which should include the following features:</td>
</tr>
<tr>
<td>1. Project Plan ........................................................................ 02 Points</td>
</tr>
<tr>
<td>2. Innovative Features ............................................................ 1.50 Points</td>
</tr>
<tr>
<td>3. Environmental/Social Consideration ...................................... 1.50 Points</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>B) Construction Capability</th>
</tr>
</thead>
<tbody>
<tr>
<td>In order to assess the construction capability as per the criteria listed below, the credentials of only the EPC Contractor shall be assessed. Bidders are advised to nominate the EPC Contractor(s) as per Form I - 10.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>B-1) Specific Construction Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>Must have undertaken two (02) projects and have implemented in the role of investor or contractor of i.e., Highways/Motorways/Dual Carriageway, including interchange(s) and/or flyover(s) with cost of each at least PKR 4,000,000,000/- (Pakistani Rupees Four Billion only) of at least ten (10) kilometers length, completed in last ten (10) years. ...................................................... 15 Points</td>
</tr>
<tr>
<td>One (01) additional point for each increment of cost of PKR 500,000,000 (Pakistan Rupees Five Hundred Million Only).</td>
</tr>
<tr>
<td>In case there is more than one (01) EPC Contractor, all EPC Contractors must meet the criterion.</td>
</tr>
<tr>
<td><em>Note: Only those projects will be considered whose work order or completion certificate, clearly indicating the name of the applicant as contractor and the cost of the works is attached.</em></td>
</tr>
<tr>
<td>Max Points 25</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>B-2) Personnel for Contracting Firms</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Bidder must demonstrate that it has the personnel for the key positions that meet the following requirements.</td>
</tr>
<tr>
<td>(All engineers must have valid registration with PEC, it is mandatory).</td>
</tr>
<tr>
<td>(For all Engineers, the Bidders are required to submit PEC registration certificate and the signed CVs of personnel be attached as per Form I - 7 CVs of Proposed Experts provided hereunder).</td>
</tr>
<tr>
<td>(List of Key Personnel to be attached as per Form I - 6 List of Key Personnel)</td>
</tr>
<tr>
<td>Max Points 10</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bridge Design Engineer</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Masters in Structures, with minimum ten (10) years relevant experience)</td>
</tr>
</tbody>
</table>
Twelve (12) or more years’ experience …………………………………….. 01 Points

More than eleven (11) years’ and less than twelve (12) years’ experience ……………………………… 0.75 Points

More than ten (10) years’ and less than fifteen (15) years’ experience ……………………………………… 0.5 Points.

**Highway Design Engineer**

(Masters in Transportation, with minimum ten (10) years relevant experience)

Twelve (12) or more years’ experience …………………………………….. 01 Points

More than eleven (11) years’ and less than twelve (12) years’ experience ……………………………… 0.75 Points

More than ten (10) years’ and less than fifteen (15) years’ experience ……………………………………… 0.5 Points

**Financial Specialist**

(CA/ACCA/MBA/MSc (Preferably Major in Finance)/or equivalent), with minimum five (5) years’ experience)

Ten (10) or more years’ experience…………………………………………. 01 Points

More than eight (08) years’ and less than ten (10) years’ experience ……… 0.75 Points

More than five (05) years’ and less than eight (08) years’ experience ………. 0.5 Points

**Legal Specialist**

(LLB, with minimum five (5) years’ experience)

Ten (10) or more years’ experience…………………………………………. 01 Points

More than eight (08) years’ and less than ten (10) years’ experience ……… 0.75 Points

More than five (05) years’ and less than eight (08) years’ experience ………. 0.5 Points

**Project Manager/Resident Engineer**

(bachelor’s in civil engineering, with minimum fifteen (15) years’ relevant experience)
<table>
<thead>
<tr>
<th>Occupation</th>
<th>Experience Requirements</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operation and Maintenance Engineer</strong></td>
<td>Twenty (20) or more years’ experience ........................................................................ 1.0 Points</td>
<td></td>
</tr>
<tr>
<td>(bachelor’s in civil engineering, with minimum ten (10) years’ relevant experience)</td>
<td>More than twenty (20) years’ and less than Twenty-five (25) years’ experience .................. 0.75 Points</td>
<td></td>
</tr>
<tr>
<td></td>
<td>More than fifteen (15) years’ and less than twenty (20) years’ experience ...................... 0.50 Points</td>
<td></td>
</tr>
<tr>
<td></td>
<td>More than ten (10) years’ and less than fifteen (15) years’ experience ............................ 0.25 Points</td>
<td></td>
</tr>
<tr>
<td><strong>Road/Highway Engineer Construction</strong></td>
<td>Fifteen (15) or more years’ experience ........................................................................... 1.0 Points</td>
<td></td>
</tr>
<tr>
<td>(bachelor’s in civil engineering, with minimum ten (10) years’ relevant experience)</td>
<td>More than ten (10) years’ and less than fifteen (15) years’ experience ............................ 0.50 Points</td>
<td></td>
</tr>
<tr>
<td><strong>Structural Engineer Construction</strong></td>
<td>Fifteen (15) or more years’ experience ........................................................................... 0.50 Points</td>
<td></td>
</tr>
<tr>
<td>(bachelor’s in civil engineering, with minimum ten (10) years’ relevant experience)</td>
<td>More than ten (10) years’ and less than fifteen (15) years’ experience ............................ 0.25 Points</td>
<td></td>
</tr>
<tr>
<td><strong>Material Engineer Construction</strong></td>
<td>Twenty-five (25) or more years’ experience ...................................................................... 1.0 Points</td>
<td></td>
</tr>
<tr>
<td>(Bachelors in Geology, with minimum twenty (20) years’ relevant experience)</td>
<td>More than twenty (20) years’ and less than twenty-five (25) years’ experience .................. 0.50 Points</td>
<td></td>
</tr>
<tr>
<td><strong>Planning Engineer</strong></td>
<td>(bachelor’s in civil engineering, with minimum ten (10) years’ relevant experience)</td>
<td></td>
</tr>
</tbody>
</table>
Fifteen (15) or more years’ experience ............................................. 01 Points

More than ten (10) years’ and less than fifteen (15) years’ experience ........................................... 0.5 Points

**B-4) Plant & Equipment**
The Bidder must demonstrate that it has the key equipment listed hereafter

<table>
<thead>
<tr>
<th>S. No.</th>
<th>DESCRIPTION OF EQUIPMENT</th>
<th>CAPACITY &amp; HORSEPOWER</th>
<th>MINIMUM REQUIREMENT (QTY. IN NO.)</th>
<th>MAX. POINTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>DUMP TRUCKS</td>
<td>5M3</td>
<td>12</td>
<td>0.25</td>
</tr>
<tr>
<td>2</td>
<td>LOADERS</td>
<td>2.5 m3</td>
<td>8</td>
<td>0.25</td>
</tr>
<tr>
<td>3</td>
<td>EXCAVATORS</td>
<td>120 HP</td>
<td>4</td>
<td>0.25</td>
</tr>
<tr>
<td>4</td>
<td>CONCRETE BATCHING PLANT</td>
<td>30 m3</td>
<td>4</td>
<td>0.50</td>
</tr>
<tr>
<td>5</td>
<td>GRADER</td>
<td>140 HP</td>
<td>8</td>
<td>0.25</td>
</tr>
<tr>
<td>6</td>
<td>ROLLERS (VIBRATORY/TAND EM)</td>
<td>8-12 TON</td>
<td>4</td>
<td>0.25</td>
</tr>
<tr>
<td>7</td>
<td>CONCRETE TRANSIT MIXER</td>
<td>6M3</td>
<td>4</td>
<td>0.50</td>
</tr>
<tr>
<td>8</td>
<td>PRE-STRESSING EQUIPMENT/JACKS</td>
<td>4</td>
<td></td>
<td>0.50</td>
</tr>
<tr>
<td>9</td>
<td>PILLING EQUIPMENT RIGS</td>
<td></td>
<td>4</td>
<td>0.25</td>
</tr>
<tr>
<td>10</td>
<td>CRANE</td>
<td>150 TON</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>CONCRETE MOBILE PUMP</td>
<td></td>
<td>2</td>
<td>1.00</td>
</tr>
<tr>
<td>12</td>
<td>STEEL SHUTTERING SCAFFOLDING</td>
<td>2000 SQM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>ASPHALT PLANT</td>
<td>120 TON/HR</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>ASPHALT PAVER</td>
<td>145 HP (3-6M WIDE)</td>
<td>4</td>
<td>0.50</td>
</tr>
<tr>
<td>15</td>
<td>GENERATORS</td>
<td>15 KVA</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>BULLDOZER</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>WATER BOWSERS</td>
<td></td>
<td>2</td>
<td>0.50</td>
</tr>
</tbody>
</table>

*Note: Total equipment available with the applicant is to be listed along with its current mobilization on on-going projects.*
**DESIGN REQUIREMENT**

The Concessionaire shall appoint such designer for the Project who can demonstrate the following criteria:

**FOR DESIGN**

(i) The designer must possess valid PEC registration certificate in Project Profile Code 1205 & 1215.

(ii) Similar work i.e. designs of at least two (2) highways/expressways/motorways projects with interchanges and/or flyover(s), embankments / Bunds having construction worth of PKR 2,000,000,000/- (Pakistani Rupees Two Billion only) completed in the last ten (10) years.

(iii) Have an average annual turnover of PKR 120,000,000/- (Pakistani Rupees One Hundred and Twenty Million only) for the last three (3) years.

(iv) Have following permanent staff on their payroll for last two (2) years:

   (a) Structural Design Engineer MS in Structure with twenty (20) years design experience;

   (b) Transportation/Highway Design Engineer MS in Transportation with twenty (20) years design experience; and

   (c) Civil Engineers 5 No. BE/BSc Civil having twelve (12) years design experience.

(v) In case of a joint venture of designers, all such joint venture members must comply with the aforesaid criteria.

(vi) Such above stated criteria shall be verified by the Independent Engineer at the time of the appointment of the designer.

**O&M REQUIREMENTS**

(i) The O&M Must be registered with PEC in category O-A with specialization in codes CE11(III), O6(11) and C6(11)

(ii) Must have Similar operational work experience i.e. of operating and
maintaining at least one (1) highways/expressways/motorways projects with interchanges and/or flyover(s), embankments / Bunds having construction worth of PKR 2,000,000,000/- (Pakistan Rupees Two Billion only) or above completed in the last ten (10) years.

(iii) Have following permanent staff on their payroll for last two (2) years:

(a) QA/QC Engineers with ten (10) years’ experience;

(b) Concrete Repair and Maintenance Engineer having Masters in Structural Engineering with ten (10) years design experience and similar experience; and

(c) Site/Maintenance Civil Engineers 2 No. BE/BSc Civil having ten (10) years of similar experience.

(iv) Such above stated criteria shall be verified by the Independent Engineer at the time of the appointment of the O&M.

Please note that the O&M Requirements outlined in the Annexure B – (Technical Evaluation Criteria) of the RFP do not carry any points. Moreover, it is clarified that the O&M Requirements in the RFP are not mandatory but indicative in nature only.
ANNEXURE C – FORM OF BID SECURITY

To:

The Project Director – Korangi Link Road Project,
Local Government Department, Government of Sindh,
Ground Floor, Tughlaq House,
Sindh Secretariat, Karachi, Pakistan (the Beneficiary).

Guarantee No: ________________________________ (the Guarantee)
Date of Issue: ________________________________
Date of Expiry: ________________________________
Guarantee Amount: ________________________________
Name of Guarantor: ________________________________
Name of Principal: ________________________________

We, [●], being the Guarantee issuing bank (the Issuing Bank) understand that the following party/parties have responded to the “Request for Proposal” issued by the Government of Sindh, dated [●] in relation to the “Project (as amended and/or supplemented from time to time) (the RFP), by submitting their respective formal proposals/bids:

[Name of the Bidder], a [Insert legal status] existing under the laws of [Insert Country] having its [registered office OR place of business] located at [Insert address], (the Bidder, which expression includes its successors, assignees and transferees).

Further, We, the Issuing Bank, understand that pursuant to the RFP, the Bidder is required to provide the Beneficiary, a bid security in the form of a bank guarantee, pay order, or demand draft equal to PKR [●] and issued by a scheduled commercial bank operating in Pakistan (with a minimum credit rating of at least ‘AA-’ as rated by JCR VIS or an equivalent rating by PACRA).

The above premised, we (the Issuing Bank) hereby undertake irrevocably and unconditionally on demand to pay to the Beneficiary, without any notice, reference, recourse, evidence, document in support of the demand, the validity, propriety or legality of the said demand to the Bidder or to any other entity or without any recourse or reference to the RFP or any other document, agreement, instrument or deed, any sum or sums (or any part thereof) equivalent in aggregate up to but not exceeding a maximum amount of:

1Insert name of issuing Bank;
PKR [●]/- (Pakistani Rupees [●])
(the Guaranteed Amount)

at sight and immediately, provided however not later than one (1) business day from the date of receipt of the Beneficiary’s first written demand (the Demand) at the Issuing Bank’s offices located at [●], such Demand referring to this Guarantee and stating the amounts demanded.

We, the Issuing Bank, shall unconditionally honour a Demand hereunder made in compliance with this Guarantee at sight and immediately on the date of receipt of your Demand, as stated earlier, and shall transfer the amount specified in the Demand to the bank account, as notified in the Demand, in immediately available and freely transferable funds in the currency of this Guarantee, free and clear of and without any set-off or deduction for or on account of any present or future taxes, levies, imposts, duties, charges, fees, deductions or withholdings of any nature whatsoever and by whomsoever imposed.

This Guarantee shall come into force and shall become automatically effective upon the submission of the Bid by the Guarantor to the Beneficiary in response to the RFP.

After having come into force, this Guarantee and our obligations hereunder will expire on the earlier of:

(i) The date of opening of Technical Bids plus [148 days] (the Guarantee Original Expiry Date) provided that, in the event the Issuing Bank has receipt of the Demand on or immediately prior to the Guarantee Original Expiry Date, the Issuing Bank shall honour that Demand; or

(ii) when the aggregate of all payments made by us under this Guarantee equals the Guaranteed Amount.

Upon expiry, this Guarantee shall be returned to the Guarantor in terms of the conditions stipulated under the RFP. Multiple Demands may be made by the Beneficiary under this Guarantee, but our aggregate liability will be restricted up to the Guaranteed Amount.

We hereby agree that any amendment, renewal, extension, modification, compromise, release or discharge by mutual agreement by the Beneficiary, the Bidder or any other entity of any document, agreement, instrument or deed shall not in any way impair or affect our liabilities hereunder and maybe undertaken without notice to us and without the necessity for any additional endorsement, consent or guarantee by us.

This Guarantee for its validity period shall not be prejudiced or affected in any manner by any change in our constitution or of the Bidder’s constitution or of their successors and assigns and this Guarantee shall be legally valid, enforceable and binding on each of their successors and permitted assignees.

All references to any contract, agreement, deed or other instruments or documents are by way of reference only and shall not affect our obligations to make payment under the terms of this Guarantee.
The Beneficiary may not assign/transfer or cause or permit to be assigned or transferred any of their rights, interests and benefits of this Guarantee without our prior written consent, which consent shall not be unreasonably withheld or delayed.

If one or more of the provisions of this Guarantee are held or found to be invalid, illegal, or unenforceable for any reason whatsoever, in any respect, any such invalidity, illegality, or unenforceability of any provision shall not affect the validity of the remaining provisions of this Guarantee.

We hereby declare and confirm that under our constitution and Applicable Law(s) and regulations, we have the necessary power and authority, and all necessary authorizations, approvals and consents thereunder to enter into, execute, deliver and perform the obligations we have undertaken under this Guarantee, which obligations are valid and legally binding on and enforceable against us under the Pakistani law and under the laws of the jurisdiction where this Guarantee is issued. Further, that the signatory(ies) to this Guarantee is/are our duly authorized officer(s) to execute this Guarantee.

This Guarantee and all rights and obligations arising from this Guarantee shall be governed and construed in all respects in accordance with the laws of Pakistan. The courts of Pakistan shall have exclusive jurisdiction in respect of any dispute relating to any matter contained herein.

The issuance of this Guarantee is permitted according to the Pakistani law and the laws of the jurisdiction where this Guarantee is issued.

AUTHORIZED SIGNATORY __________________________________________
DATE __________________________________________________________
PLACE __________________________________________________________

AUTHORIZED SIGNATORY __________________________________________
DATE __________________________________________________________
PLACE __________________________________________________________
ANNEXURE D – POWER OF ATTORNEY

A. POWER OF ATTORNEY TO AUTHORIZE A PERSON TO SUBMIT THE BID

NOTES FOR EXECUTION OF POWER OF ATTORNEY

• The mode of execution of the Power of Attorney should be in accordance with the procedure, if any, laid down by the Applicable Law and the charter documents of the executant(s) and when it is so required, the same should be under common seal affixed in accordance with the required procedure.

• Also, wherever required, the Bidder (and in case of the Consortium, each member of the Consortium, wherever required) should submit for verification the extract of the charter documents and documents such as a resolution/power of attorney in favour of the person executing this Power of Attorney for the delegation of power hereunder on behalf of the Bidder.

• This Power of Attorney shall be notarised with the Notary Public.

• For a Power of Attorney executed and issued overseas, the document will also have to be legalised by the Pakistani Embassy and notarised in the jurisdiction where the Power of Attorney is being issued.

• Please find below the form and substance of the Power of Attorney.

“FORM OF POWER OF ATTORNEY FOR SIGNING OF TECHNICAL BID”

KNOW ALL MEN BY THESE PRESENTS, WE, _________________________ (name of the firm and address of the registered office) do hereby irrevocably constitute, nominate, appoint and authorise Mr./Ms (Name), son/daughter/wife of _________________________ holding [CNIC/Passport] Number ______________________ and presently residing at ______________________, who is presently employed with [us OR the Lead Member of our Consortium] and holding the position of ______________________, as our true and lawful attorney (hereinafter referred to as the Attorney) to do in our name and on our behalf, all such acts, deeds and things as are necessary or required in connection with or incidental to submission of our Bid for design, finance, build, operate, maintain and transfer the Project which means the SCHEDULE F (Project Site) of the Draft Concession Agreement. It is to be noted that the length of the Project is tentative at this stage and the exact length shall be determined at the detailed design stage.

Project that is being developed by the LOCAL GOVERNMENT DEPARTMENT, GOVERNMENT OF SINDH (the Agency), in accordance with the Request for Proposal issued by the Agency (as amended from time to time) including but not limited to signing and submission of all applications, bids and other documents and writings, participate in bidders’ and other conferences and providing information/responses to the Agency, representing us in all matters before the Agency, signing and execution of all contracts including the Draft Concession Agreement and undertakings consequent to acceptance of our bid, and generally dealing with the Agency in all matters in connection with or relating to or arising out of our bid for the said Project and/or upon award thereof to us and/or till the entering into of the Draft Concession Agreement with the Agency.
AND We hereby agree to ratify and confirm and do hereby ratify and confirm all acts, deeds and things lawfully done or caused to be done by our said Attorney pursuant to and in exercise of the powers conferred by this Power of Attorney and that all acts, deeds and things done by our said Attorney in exercise of the powers hereby conferred shall and shall always be deemed to have been done by us.

IN WITNESS WHEREOF WE, ________________________, THE ABOVE NAMED PRINCIPAL HAVE EXECUTED THIS POWER OF ATTORNEY ON THIS _________ DAY OF ____________, 20[•].

FOR & ON BEHALF OF:

________________________________ (NAME OF THE FIRM)
BY ITS DULY AUTHORIZED SIGNATORY

....................................................
(SIGNATURE)
(NAME, TITLE AND ADDRESS)

WITNESSES:

WITNESS 1: .......................................................... WITNESS 2: ..........................................................

....................................................
(NAME)
(CNIC/Passport Number)
(ADDRESS)

....................................................
(SIGNATURE)
(NAME)
(CNIC/Passport Number)
(ADDRESS)

SIGNATURE OF ATTORNEY ..........................................................
[NOTARISED]

....................................................
(SIGNATURE)
(NAME)

B. POWER OF ATTORNEY TO AUTHORIZE THE LEAD MEMBER OF THE CONSORTIUM

NOTES FOR EXECUTION OF POWER OF ATTORNEY

• The mode of execution of the Power of Attorney should be in accordance with the procedure, if any, laid down by the Applicable Law and the charter documents of the executant(s) and when it is so required, the same should be under common seal affixed in accordance with the required procedure.
Also, wherever required, the Bidder (and in case of the Consortium, each member of the Consortium, wherever required) should submit for verification the extract of the charter documents and documents such as a resolution/power of attorney in favour of the person executing this Power of Attorney for the delegation of power hereunder on behalf of the Bidder.

This Power of Attorney shall be notarised with the Notary Public.

For a Power of Attorney executed and issued overseas, the document will also have to be legalised by the Pakistani Embassy and notarised in the jurisdiction where the Power of Attorney is being issued.

Please find below the form and substance of the Power of Attorney.
“FORM OF POWER OF ATTORNEY FOR LEAD MEMBER OF CONSORTIUM”

WHEREAS, the GOVERNMENT OF SINDH, through its LOCAL GOVERNMENT DEPARTMENT (the Agency) has invited bids from bidders for the ‘PROJECT’ (the Project) pursuant to the Request For Proposal issued by the Agency (as amended from time to time) and other related documents relating to the Project (the RFP);

WHEREAS, ____________, ____________ and ____________ (each hereinafter referred to individually as a Consortium Member and collectively as Consortium Members) have formed a consortium (the Consortium) pursuant to a Joint Bidding Agreement dated ____________________ [Insert date of the Joint Bidding Agreement, as is required for each Consortium that bids for the Project] for bidding for the Project in accordance with the terms and conditions of the RFP;

AND WHEREAS, it is necessary for the Consortium Members to designate one of them as the ‘Lead Member’ with all necessary power and authority to do for and on behalf of the Consortium, all acts, deeds and things as may be necessary in connection with the Consortium’s bid for the Project and its execution.

NOW, THEREFORE, KNOW ALL MEN BY THESE PRESENTS

WE, ____________, having our registered office at ____________, M/s. ____________, having our registered office at ____________, and M/s. ____________, having our registered office at ____________, [the respective names and addresses of the registered office] (hereinafter collectively referred to as the Principals) do hereby irrevocably designate, nominate, constitute, appoint and authorise M/s ____________, having its registered office at ____________, being one of the Members of the Consortium, as the Lead Member and true and lawful attorney of the Consortium (hereinafter referred to as the Attorney) and hereby irrevocably authorise the Attorney (with power to sub-delegate) to conduct all business for and on behalf of the Consortium and any one of us during the ‘Competitive Selection Process’ and, in the event the Consortium is awarded the Concession, during the execution of the Project, and in this regard, to do on our behalf and on behalf of the Consortium, all or any of such acts, deeds or things as are necessary or required or incidental to the submission of its bid for the Project, including but not limited to signing and submission of all applications, bids and other documents and writings, participate in bidders’ and other conferences, respond to queries, submit information/documents, sign and execute contracts and undertakings consequent to acceptance of the bid of the Consortium and generally to represent the Consortium in all its dealings with the Agency, and/or any other governmental agency or any person, in all matters in connection with or relating to or arising out of the Consortium’s bid for the Project and/or upon award thereof till the Draft Concession Agreement is entered into with the Agency.

AND hereby agree to ratify and confirm and do hereby ratify and confirm all acts, deeds and things lawfully done or caused to be done by our said Attorney pursuant to and in exercise of the powers conferred by this Power of Attorney and that all acts, deeds and things done by our said Attorney in exercise of the powers hereby conferred shall and shall always be deemed to have been done by us/Consortium.

IN WITNESS WHEREOF WE THE PRINCIPALS ABOVE NAMED HAVE EXECUTED THIS POWER OF ATTORNEY ON THIS ____________ DAY OF ____________ 20**.
FOR: __________________________________________
(SIGNATURE)
(NAME, TITLE AND ADDRESS)

FOR: __________________________________________
(SIGNATURE)
(NAME, TITLE AND ADDRESS)

FOR: __________________________________________
(SIGNATURE)
(NAME, TITLE AND ADDRESS)

WITNESSES:
1.

2.

(EXECUTANTS)
(TO BE EXECUTED BY ALL THE MEMBERS OF THE CONSORTIUM)
ANNEXURE E – COMMITMENT FORM

REQUEST FOR PROPOSALS
for the design, finance, operate, maintain and transfer of Project

[Date To Be Provided]

COMMITMENT FORM

| A COMMITMENT FORM MUST BE COMPLETED BY THE BIDDER AND BY EACH OF ITS MEMBERS AND PARTICIPANTS, AND BY KEY INDIVIDUALS WHO ARE NOT EMPLOYEES OF THE BIDDER, A MEMBER, OR A PARTICIPANT. |

TO: GOVERNMENT OF SINDH (AGENCY)

For sufficient good and valuable consideration, receipt of which is hereby acknowledged, we hereby agree to the following:

1. DEFINITIONS

Unless the context indicates otherwise, all capitalized terms and expressions used herein and, in our Bid, have the meaning given to them in the RFP (as defined herein below).

2. GENERAL

We, the undersigned, acknowledge, confirm, and agree that:

A) we have examined, read, and understood the Draft Concession Agreement (including its schedules) and Volume 1 (Instruction To Bidders) (including its schedules) respectively dated [date to be provided] and [date to be provided] as it relates to the Concession, as amended by way of addenda (collectively, the RFP); and

B) we have satisfied ourselves that we have a full and complete understanding of the nature and location of the Project, as well as of the general and local conditions and the other conditions under which the Draft Concession Agreement will be carried out.

3. PRICING

We confirm that all prices appearing in our Bid are expressed in PKR and represent aggregate prices that include all taxes, duties, levies and other charges (federal, provincial and local).

4. GUARANTEES REQUIRED BY THE FINANCIERS

We declare that we will be able to provide the guarantees required by the Financiers, as set out in the term sheet for each of the Financing Instruments.
5. **REvised and Final Partnership Agreement**

We declare and confirm that we are prepared to execute the revised and final Draft Concession Agreement, as modified by addendums, without any negotiation or amendment thereof, with the exception of minor changes to include features that are specific to the Bid of the Preferred Bidder.

6. **Firm and Irrevocable Bid**

Our Bid constitutes a firm offer to the Agency, that is irrevocable and binding upon us, and that it cannot be withdrawn or extended until the Bid Validity Period indicated in the RFP or as extended by the Agency.

7. **Bid Compliant with Submission Requirements**

We declare and confirm that our Bid satisfies and complies with the submission requirements indicated in the RFP, specifically including:

- the eligibility criteria;
- the commercial compliance evaluation criteria;
- the technical bid compliance evaluation criteria;
- the financial bid compliance evaluation criteria.

8. **RFP**

We acknowledge, confirm, and agree that our Bid is subject to the terms and conditions of the RFP, including all disclaimer clauses and all limitation of liability clauses in favour of the Agency or any other party mentioned therein. In particular, we acknowledge, confirm, and agree that we are bound by the terms and conditions of the RFP.

9. **No Material Deterioration**

We hereby declare and warrant that:

- with the exception of what is indicated in detail in a written document attached to this Commitment Letter, our financial situation and our business operations have undergone no adverse material change since the date of the most recent financial statements submitted along with the Bid;

- with the exception of what is indicated in detail in a schedule attached to this Commitment Letter, there is no action, suit, or proceeding pending against us, or, to our knowledge, after satisfactory investigation, imminent against us or legally concerning us, brought before or by any organization, tribunal, commission, board, agency, or federal, provincial, municipal, or other office, domestic or foreign, or brought before or by any arbitrator or arbitration board, that could, in the event of an unfavourable decision, have a material adverse effect on our solvency, liquidity, or financial situation; and

- with the exception of what is indicated in detail in a schedule attached to this Commitment Letter, we are not aware of any reason for which an action, suit, or proceeding could be brought against us.
10. **NO COLLUSION OR CONFLICT**

In preparing and submitting our Bid, we declare, warrant, and confirm that we have not discussed or communicated, either directly or indirectly, with any other Bidder, or with any officer, director, employee, consultant, advisor, agent, or representative of any other Bidder (including any Member, Participant, or Key Individual of the team of a Bidder), regarding the content, preparation, or presentation of its Bid. Our Bid has been submitted without any relation (including a relation solely in the form of a shareholding or other interest in the ownership of a Bidder or of a Member, Participant, or Key Individual of the team of the Bidder, with the exception of a holding of less than [●]% percent of the voting shares of any company whose shares are traded on a recognized stock exchange), knowledge, exchange, or comparison of information, or any arrangement with any Bidder or any director, officer, employee, consultant, advisor, agent, or representative of any Bidder (including any Member, Participant, or Key Individual of the team of a Bidder).

We hereby declare, warrant, and confirm that we do not have any knowledge, either direct or indirect, of any Bid of any other Bidder, and that we do not have any interest in any such Bid, and that we have not concluded any agreement or understanding or any formal or informal arrangement that could result in our having such knowledge or interest prior to the submission of our Bid.

With the exception of what is indicated in detail in a schedule attached to this Commitment Letter, we hereby declare, warrant, and confirm that, to our knowledge, no real or apparent Conflict of Interest has arisen, exists, or is reasonably likely to arise in the future in connection with the submission of our Bid in response to the RFP, or in connection with the delivery of the services required of the Concessionaire.

We hereby declare, warrant, and confirm that we have no access to any confidential information belonging to the Agency, and that we are not in a position to take advantage of any right of access to such information (other than confidential information that the Agency may communicate to all Bidders).

11. **FURTHER WARRANTIES**

We hereby represent and warrant that all information, data and materials of any nature whatsoever provided by us in the Bid is true and accurate and not misleading in any nature.

We have made a complete and careful examination of the RFP and have received all the relevant information from the Agency, as required for the purposes of submission of the Bid. We further warrant that we have verified and understand all the information received from the Agency in connection with the RFP.

12. **EVIDENCE OF AUTHORITY**

We acknowledge that the Agency requires that each of the undersigned (other than a Key Individual) provides evidence, in the form of a resolution in a form deemed acceptable by the Agency, that the person signing this Commitment Form on behalf of the undersigned has the authority required to do so and to bind the undersigned.
13. **Copies**

This Commitment Form may be signed in multiple copies, each of which is deemed to be an original, and these copies together shall constitute a single instrument.

**In witness whereof** we have signed this Commitment Form on [date to be provided].

**Bidder:**

_________________________________
(NAME)

(STREET ADDRESS OR POSTAL BOX NUMBER)

_________________________________
(CITY, PROVINCE, AND POSTAL CODE)

Authorized Signatory: ________________________________

**Name and title:** ________________________________
(Please type or print)

If the Bidder is a consortium or other entity:

**Executed and delivered by:** ________________________________

["Name of the consortium or other entity] by its duly authorized representative, and by [provide particulars on the signature]:

________________________
(NAME OF BIDDER *)

________________________
(AUTHORIZED SIGNATORY)

________________________
(AUTHORIZED SIGNATORY)

Each of the undersigned hereby:

- acknowledges that the Bidder has signed the above-mentioned Commitment Form;
- acknowledges and confirms that he has read, reviewed, and understood each of the provisions of the Bid, that he accepts them, and that the Bid has been submitted with its consent;
confirms and agrees that the provisions of Sections 2, 8, 9, 10, 11, and 12 apply to it, with such modifications as the circumstances require.

EXECUTED ON ________________________________.

MEMBER: ____________________________________________
(NAME)

NAME AND TITLE: ____________________________________________
(PLEASE TYPE OR PRINT)

AUTHORIZED SIGNATORY: ____________________________________________
(NAME)

NAME AND TITLE: ____________________________________________
(PLEASE TYPE OR PRINT)

PARTICIPANT: ____________________________________________
(NAME)

NAME AND TITLE: ____________________________________________
(PLEASE TYPE OR PRINT)

AUTHORIZED SIGNATORY: ____________________________________________
(NAME)

NAME AND TITLE: ____________________________________________
(PLEASE TYPE OR PRINT)

KEY INDIVIDUAL*: ____________________________________________
(NAME)

NAME AND TITLE: ____________________________________________
(PLEASE TYPE OR PRINT)

* APPLICABLE TO KEY INDIVIDUALS WHO ARE NOT EMPLOYEES OF THE BIDDER, A MEMBER, OR A PARTICIPANT.
We the undersigned return this RFP submission, the Bid and its appendices and acknowledge that we are bound by its content.

We confirm that we are fully conversant with the requirements of the Agency and the subject matter of the procurement exercise as set out in the RFP.

By submitting a bid, we represent and warrant to the Agency that our bid has been prepared, relies and has been submitted solely on investigations, examinations, knowledge, analyses, interpretation, information, opinions, conclusions, judgments, and assessments independently undertaken, formulated, obtained, and verified by us and our team members and not in any way upon any action or omission, the scope, timeliness, accuracy, completeness, relevance, or suitability of any Information. We further warrant that we understand all aspects of the RFP and its governing rules including but not limited to the evaluation criteria laid down in the RFP and that the same is in line with the Sindh Public Procurement Rules, 2010.

We warrant that the details of this submission in response to the RFP have not been communicated to any other person or adjusted in accordance with any agreement or arrangement with any other person or organization.

We acknowledge that the Agency is not bound to proceed with the procurement exercise and reserves the right at its absolute discretion to accept or not accept any bid submitted and thereafter invite any Preferred Bidder to enter into a Draft Concession Agreement for the delivery of the Project.

We certify that we have full power and authority to submit this response to the RFP and that this is a bona fide submission in response to the RFP.

Unless expressly specified otherwise, all capitalized terms used herein shall bear the meaning ascribed thereto in the RFP.

Signed for and on behalf of (Bidder/consortium member)

__________________________
Signature:

__________________________
Position:

__________________________
Name:

__________________________
Address:

POWER OF ATTORNEY ATTACHED: (YES/NO)

__________________________
Date:
(Please return this declaration on your company’s letterhead.)

WITNESSES

WITNESS I          WITNESS II

NAME: ........................................ NAME: ........................................
CNIC No.: .................... CNIC No.: ....................
ANNEXURE G - NON-DISCLOSURE AGREEMENT

[To be printed on Company letterhead of the Bidder or, in case of the Consortium, the Lead Consortium Member]

STRICTLY PRIVATE & CONFIDENTIAL

[Insert Date]

To:
THE PROJECT MANAGER,
[●],
Project Implementation Unit, Project
Address: [●].

From:
M/s __________________ [Insert legal name of Bidder]
_________________ [Insert Address of Bidder],
(the Bidder).

RE: NO-DISCLOSURE AGREEMENT

Dear Sir,

This Non-Disclosure Agreement (this Agreement) sets out the terms and conditions governing disclosure and exchange of Confidential Information (defined below) (including proprietary information) between the Government of Sindh (the Agency) and the Bidder whereby Bidder intends to explore the possibility of entering into a Draft Concession Agreement for the build, finance, operate, maintain and transfer of the Project which means the [●] as more particularly described and indicated in the SCHEDULE F (Project Site) of the Draft Concession Agreement (Volume II). It is to be noted that the length of Project (including the length of proposed bridge) is tentative at this stage and the exact length shall be determined at the detailed design stage.

Confidential Information means all documents, software, reports, data, records, forms and other materials provided to the Bidder by the Agency or their advisors pursuant to this Agreement:

- that have been marked as confidential;
- whose confidential nature has been made known; or
- that due to their character and nature, a reasonable person under like circumstances would treat as confidential.

Confidential Information shall not include information that:

- is or becomes publicly known through no wrongful or unlawful act of the Bidder;
- is already in the Bidder’s possession prior to its disclosure by the Agency;
- is independently developed by the Bidder without the benefit of Confidential Information provided by the Agency; or
is received by the Bidder from a third party not known to the Agency to be under any restriction or an obligation of confidentiality.

In consideration of being provided with the Confidential Information, the Bidder hereby agrees with the Agency on the following terms:

1. The Confidential Information will be used by the Bidder solely to explore the possibility of entering into a Draft Concession Agreement with the Agency for the Project (the Stated Purpose) and will be kept confidential and will not be disclosed, in whole or in part to any other person, except that the Confidential Information or portions thereof may be disclosed to those of the partners, directors, officers and employees (collectively, the Representatives) of the Bidder who need to know such information for the Stated Purpose (it being understood that those Representatives will be informed of the confidential nature of the information.).

2. The Bidder shall not be deemed to be in breach of this Agreement for any disclosure of information in confidence to its professional advisers or insurers or as may be required by law or any regulatory authority or professional practice requirements.

3. This Agreement shall continue for three (3) years from the date of this Agreement unless and to the extent that the Agency may release it in writing.

4. This Agreement shall be governed by and construed in accordance with the Pakistani law and both parties to this Agreement submit to the exclusive jurisdiction of the Pakistani courts.

Please indicate your acceptance of the terms of this Agreement by signing this Agreement in the space indicated at the end.

FOR & ON BEHALF OF

[INSERT NAME OF BIDDER]

.......................................................
(SIGNATURE)
Name: [Insert name of Authorized Representative of Bidder or, in case of Consortium, of the of Authorized Representative of the Lead Member]
Designation:

WITNESSES

WITNESS I

.......................................................
NAME: .......................................................
CNIC NO.: .......................................................

WITNESS II

.......................................................
NAME: .......................................................
CNIC NO.: .......................................................

WE HAVE READ THIS AGREEMENT FULLY AND CONFIRM OUR AGREEMENT WITH ITS TERMS.
FOR AND ON BEHALF OF
GOVERNMENT OF SINDH

Name: ...................................................
DESIGNATION: PROJECT MANAGER, GOVERNMENT OF SINDH,
LOCAL GOVERNMENT DEPARTMENT, PROJECT
ADDRESS: [●].

WITNESSES

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<th>WITNESS I</th>
<th>WITNESS II</th>
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ANNEXURE H – INTEGRITY PACT

DECLARATION OF FEES, COMMISSION AND BROKERAGE ETC., PAYABLE BY THE BIDDERS

CONTRACT NUMBER: ___________________________  DATED: ___________________________, [●]

CONTRACT TITLE: CONSTRUCTION AND OPERATIONAL SERVICES FOR BUILD, FINANCE, OPERATE, MAINTAIN AND TRANSFER THE PROJECT UNDER PPP MODE

[Bidder] hereby declares that it has not obtained or induced the procurement of any contract, right, interest, privilege or other obligation or benefit from Government of Sindh (the Agency) or any administrative subdivision or agency thereof or any other entity owned or controlled by it (i.e., the Agency) through any corrupt business practice.

Without limiting the generality of the foregoing, [Bidder] represents and warrants that it has fully declared the brokerage, commission, fees etc., paid or payable to anyone and not given or agreed to give and shall not give or agree to give to anyone within or outside Pakistan either directly or indirectly through any natural or juridical person, including its affiliate, agent, associate, broker, consultant, director, promoter, shareholder, sponsor or subsidiary, any commission, gratification, bribe, finder’s fee or kickback, whether described as consultation fee or otherwise, with the object of obtaining or inducing the procurement of a contract, right, interest, privilege or other obligation or benefit, in whatsoever form, from the Agency, except that which has been expressly declared pursuant hereto.

[Bidder] certifies that it has made and will make full disclosure of all agreements and arrangements with all persons in respect of or related to the transaction with the Agency and has not taken any action or will not take any action to circumvent the above declaration, representation or warranty. [Bidder] accepts full responsibility and strict liability for making any false declaration, not making full disclosure, misrepresenting facts or taking any action likely to defeat the purpose of this declaration, representation and warranty.

[Bidder] agrees that any contract, right, interest, privilege or other obligation or benefit obtained or procured as aforesaid shall, without prejudice to any other right and remedies available to the Agency under any law, contract or other instrument, be voidable at the option of the Agency.

Notwithstanding any rights and remedies exercised by the Agency in this regard, the [Bidder] agrees to indemnify the Agency for any loss or damage incurred by it on account of its corrupt business practices and further pay compensation to the Agency in an amount equivalent to ten times the sum of any commission, gratification, bribe, finder’s fee or kickback given by [Bidder] as aforesaid for the purpose of obtaining or inducing the procurement of any contract, right, interest, privilege or other obligation or benefit, in whatsoever form, from the Agency.

ACKNOWLEDGED, ACCEPTED & AGREED FOR & ON BEHALF OF:

LOCAL GOVERNMENT DEPARTMENT, GOVERNMENT OF SINDH, THROUGH ITS DULY AUTHORIZED SIGNATORY

ACKNOWLEDGED, ACCEPTED & AGREED FOR & ON BEHALF OF:

[INSERT NAME OF BIDDER], THROUGH ITS DULY AUTHORIZED SIGNATORY
(Signature)  (Signature)

NAME:

DESIGNATION:

NAME:

DESIGNATION:
Each firm or member of a JV must fill in this form

Basic Information Form (Company Profile)

All individual firms and each partner of a joint venture applying for prequalification are requested to complete the information in this form.

<table>
<thead>
<tr>
<th></th>
<th>Name of firm (legal): (In case of Joint Venture (JV), legal name of each member)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Nature of Business: (Whether the firm is a Corporation, Partnership, Trust etc.) (In case of Consortium; whether the Lead Consortium Member is a Corporation, Partnership, Trust etc.)</td>
</tr>
<tr>
<td>3</td>
<td>Head Office address:</td>
</tr>
<tr>
<td>4</td>
<td>Telephone:</td>
</tr>
<tr>
<td></td>
<td>Fax Number:</td>
</tr>
<tr>
<td></td>
<td>E-mail address:</td>
</tr>
<tr>
<td>5</td>
<td>Place of Incorporation/Registration:</td>
</tr>
<tr>
<td></td>
<td>Year of Incorporation/Registration:</td>
</tr>
<tr>
<td>6</td>
<td>Applicant’s authorized representative:</td>
</tr>
<tr>
<td></td>
<td>Telephone:</td>
</tr>
<tr>
<td></td>
<td>Fax numbers:</td>
</tr>
<tr>
<td></td>
<td>E-mail address:</td>
</tr>
<tr>
<td>7</td>
<td>NATIONALITY OF OWNERS</td>
</tr>
<tr>
<td></td>
<td>Name:</td>
</tr>
<tr>
<td></td>
<td>Country:</td>
</tr>
</tbody>
</table>
## Non-Performing Contracts

- Contract non-performance did not occur within the last five (5) years prior to the deadline for bid submission based on all information on fully settled disputes or litigation (Affidavit to be provided)
- Contract non-performance during the stipulated period,

<table>
<thead>
<tr>
<th>Year</th>
<th>Outcome as Percent of Total Assets</th>
<th>Contract Identification</th>
<th>Total Contract Amount (current value, PKR)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contract Identification:</th>
<th>Name of Employer:</th>
<th>Address of Employer:</th>
<th>Matter in dispute:</th>
</tr>
</thead>
</table>

## Black Listing

- Bidder shall not be black listed by government/semi government/autonomous/private organizations (Affidavit to be provided)

## Failure to Sign Contract

## Bid Security Declaration

- Bidder shall not be under execution of a Bid–Securing Declaration (Affidavit to be provided)

## Pending Litigation

- No pending litigation (A fully settled dispute or litigation is one that has been resolved in accordance with the Dispute Resolution Mechanism under the respective contract and where all appeal instances available to the Bidder have been exhausted) (Affidavit to be provided)
- Pending litigation (All pending litigation shall in total not represent more than 50% of the Bidder’s Net Assets and shall be treated as resolved against the Bidder)

<table>
<thead>
<tr>
<th>Year</th>
<th>Outcome as Percent of Total Assets</th>
<th>Outcome as Percent of Total Assets</th>
<th>Total Contract Amount (PKR)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contract Identification:</th>
<th>Name of Employer:</th>
<th>Address of Employer:</th>
<th>Matter in dispute:</th>
</tr>
</thead>
</table>
### FORM I - 3
**FINANCIAL SITUATION**

#### Financial Data for Previous 3 Years

<table>
<thead>
<tr>
<th>Information from Balance Sheet</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Assets</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Liabilities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current Assets</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current Liabilities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net Assets</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Information from Income Statement

<table>
<thead>
<tr>
<th>Total Revenues</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Revenues of Construction</td>
<td></td>
</tr>
</tbody>
</table>

- Attached are copies of financial statements (balance sheets including all related notes, and income statements) for the last three (3) years, as indicated above, complying with the following conditions:
  - All such documents reflect the financial situation of the Bidder or partner to a JV, and not sister or parent companies.
  - Historic financial statements must be audited by a certified accountant.
  - Historic financial statements must be complete, including all notes to the financial statements.
  - Historic financial statements must correspond to accounting periods already completed and audited (no statements for partial periods shall be accepted).
  - NTN certificate must be attached.
  - Tax return filed must be provided.
  - Foreign firms if participating in the bidding process should submit NTN Certificate of their country duly attested by Consulate of their country.

### CASH AND FUNDING LINES – FINANCIAL DATA

#### Information From Balance Sheet

<table>
<thead>
<tr>
<th></th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cash and Bank Balances</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------------</td>
<td>------------------------</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Short term Investments</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Funding Lines</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Proof of funding lines such as term sheets, commitment letters etc. with financial institutions (if applicable) must be attached. The Bidders must provide such proof by way of confirmation of the respective financial institution(s) which has provided such funding lines.
Bidders and each member to a JV should provide information on their current commitments on all contracts that have been awarded, or for which a letter of award or acceptance has been received, or for contracts approaching completion, but for which an unqualified, full completion certificate has yet to be issued.

## Current Contract Commitments

<table>
<thead>
<tr>
<th>No.</th>
<th>Name of Contract</th>
<th>Employer’s Contact Address, Tel, Fax</th>
<th>Total Estimated value [PKR]</th>
<th>Value of Outstanding Work [PKR]</th>
<th>Estimated Completion Date</th>
<th>Average Monthly Invoicing Over Last Six Months [PKR/month]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
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<td>2</td>
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</tr>
</tbody>
</table>
**FORM I - 5**
**DETAILS OF CONTRACTS OF SIMILAR NATURE AND COMPLEXITY COMPLETED OVER LAST 10 YEARS**

(A) **FOR CONSTRUCTION**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name of Contractor:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Country:</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Province &amp; Location</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Name of Procuring Agency with Address, Tele, Fax.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nature of works and special features relevant to the contract for which applied:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contractor Role (Mention: Sole, Sub Contractor or Partner in a Joint Venture).</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Value of the total contract in Pak/Rs:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Date of Award:</td>
<td></td>
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<tr>
<td>Date of Completion:</td>
<td></td>
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</tbody>
</table>

(B) **FOR DESIGN**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name of Consultant:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Country:</td>
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<tr>
<td>Province &amp; Location</td>
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<tr>
<td>Name of Procuring Agency with Address, Tele, Fax.</td>
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</tr>
<tr>
<td>Nature of works and special features relevant to the contract for which applied:</td>
<td></td>
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</tr>
<tr>
<td>Consultant Role (Mention: Sole, Sub Consultant or Partner in a Joint Venture).</td>
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<tr>
<td>Value of the total contract in Pak/Rs:</td>
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<td></td>
</tr>
<tr>
<td>Description</td>
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<tr>
<td>contract in Pak/Rs:</td>
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<tr>
<td>Date of Award:</td>
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<tr>
<td>Date of Completion:</td>
<td></td>
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</tbody>
</table>
Bidders should provide the names of suitably qualified personnel to meet the specified requirements stated in technical evaluation criteria.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Title of Position</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
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<tr>
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<td></td>
<td></td>
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<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
CURRICULUM VITAE (CV) OF PROPOSED EXPERTS

1. Proposed Position: ________________________________

2. Name of Expert & PEC Registration no. (if applicable): __________________________

3. Name of Firm: ________________________________

4. Current Residential address: ________________________________

   Telephone No: __________________ Fax No: __________________

   E-Mail Address: ____________________

5. Date of Birth: ______________ Citizenship: ____________________________

6. Qualification: ________________________________

7. Work Experience: Summarize professional experience in reverse chronological order.

   Indicate particular technical and managerial experience relevant to the Project.

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Company/Project/Position/Relevant technical and management experience</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tbody>
</table>

Certification:

I, the undersigned, certify that to the best of my knowledge and belief, this CV correctly describes my qualifications, my experience, and myself. I understand that any wilful misstatement described herein may lead to my disqualification or dismissal, if engaged.

I certify that I have been informed by the Bidder that it is including my CV in the Proposal for the [insert name of project and contract]. I confirm that I will be available to carry out the assignment for which my CV has been submitted in accordance with the implementation arrangements and schedule set out in the Proposal.

Signature of the Candidate:

Place:

Date: __________________________

---

2 If the undersigned is not a present employee of the Bidder, then this paragraph is to form part of the CV:
Bidder shall provide adequate information to demonstrate clearly that it has the capability to meet the requirements for the key equipment whether owned/leased/rented listed in evaluation and qualification criteria.

A. Equipment Capabilities (owned by the contractor/firm)

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Name of Equipment</th>
<th>Name of Manufacturer</th>
<th>Model and power rating</th>
<th>Capacity</th>
<th>Year of Manufacture</th>
<th>Current Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

Note: Provide copies of ownership of Equipment

B. Equipment Capabilities (leased/rented by the contractor/firm)

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Name of Equipment</th>
<th>Mention whether leased or rented</th>
<th>Name of Owner</th>
<th>Address of owner</th>
<th>Contact name and title with Telephone Fax &amp; Email of the owner</th>
<th>Agreements Details of rental/lease/manufacture agreements specific to the Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

Note: Provide copies of lease agreement/rent agreement
FORM I - 9
DETAILED PLAN FOR ACHIEVING FINANCIAL CLOSE

In response to this RFP, the Bidders are instructed to provide a detailed plan for achieving the financial close as per the requirements of this RFP.
Basic Information Form (Company Profile of EPC Contractor)

All individual firms participating in the Bid as EPC Contractor are requested to complete the information in this form.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Name of firm (legal):</td>
</tr>
<tr>
<td></td>
<td>(In case of Joint Venture (JV), legal name of each member)</td>
</tr>
<tr>
<td>2.</td>
<td>Nature of Business:</td>
</tr>
<tr>
<td></td>
<td>(Whether the firm is a Corporation, Partnership, Trust etc.)</td>
</tr>
<tr>
<td></td>
<td>(In case of Consortium; whether the Lead Consortium Member is a</td>
</tr>
<tr>
<td></td>
<td>Corporation, Partnership, Trust etc.)</td>
</tr>
<tr>
<td>3.</td>
<td>Head Office address:</td>
</tr>
<tr>
<td>4.</td>
<td>Telephone:</td>
</tr>
<tr>
<td></td>
<td>Fax Number:</td>
</tr>
<tr>
<td></td>
<td>E-mail address:</td>
</tr>
<tr>
<td>5.</td>
<td>Place of Incorporation/Registration:</td>
</tr>
<tr>
<td></td>
<td>Year of Incorporation/Registration:</td>
</tr>
<tr>
<td>6.</td>
<td>Applicant’s authorized representative:</td>
</tr>
<tr>
<td></td>
<td>Telephone:</td>
</tr>
<tr>
<td></td>
<td>Fax numbers:</td>
</tr>
<tr>
<td></td>
<td>E-mail address:</td>
</tr>
<tr>
<td>7.</td>
<td>NATIONALITY OF OWNERS</td>
</tr>
<tr>
<td></td>
<td>Name:</td>
</tr>
<tr>
<td></td>
<td>Country:</td>
</tr>
</tbody>
</table>

All the information required for the purposes of the evaluation and are contemplated under **ANNEXURE A (Basic Eligibility Criteria)** and **ANNEXURE B (Technical Evaluation)** shall be provided in orderly manner, no extra/additional information is required so as to facilitate efficient evaluation.
Key Financial Indicators

<table>
<thead>
<tr>
<th>YEAR (AFTER PROJECT CONSTRUCTION COMPLETION) (ALL AMOUNTS IN PKR)</th>
<th>1</th>
<th>2</th>
<th>…</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Debt - Principal Payment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Debt - Interest</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operations; and Maintenance costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Return on Equity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Taxes (in accordance with Income Tax Ordinance 2001)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. **PRE-ESTIMATED PROJECT COST BREAKUP**

<table>
<thead>
<tr>
<th>ITEM</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction cost excluding taxes</td>
<td>In PKR</td>
</tr>
<tr>
<td>Taxes on construction cost (in accordance with Income Tax Ordinance 2001)</td>
<td></td>
</tr>
<tr>
<td>Sindh Sales Tax</td>
<td>In PKR</td>
</tr>
<tr>
<td>Engineering/design costs</td>
<td>In PKR</td>
</tr>
<tr>
<td>Interest During Construction cost</td>
<td>In PKR</td>
</tr>
<tr>
<td>Insurance Cost (PKR)</td>
<td>In PKR</td>
</tr>
<tr>
<td>Other Project Costs items</td>
<td>In PKR</td>
</tr>
<tr>
<td>Other Taxes</td>
<td>In PKR</td>
</tr>
<tr>
<td><strong>Total cost before contingency</strong></td>
<td>In PKR</td>
</tr>
<tr>
<td>Contingency</td>
<td>In PKR</td>
</tr>
<tr>
<td>Pre-Estimated Project Cost</td>
<td>In PKR</td>
</tr>
</tbody>
</table>

b. **CAPITAL STRUCTURE**

<table>
<thead>
<tr>
<th>Total Pre-Estimated Project Cost</th>
<th>In %</th>
<th>In PKR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Private partner Equity</td>
<td>In %</td>
<td>In PKR</td>
</tr>
<tr>
<td>Agency Equity</td>
<td>In %</td>
<td>In PKR</td>
</tr>
<tr>
<td>Debt (Commercial)</td>
<td>In %</td>
<td>In PKR</td>
</tr>
</tbody>
</table>

c. **DEBT ASSUMPTIONS**

<table>
<thead>
<tr>
<th>Interest Rate</th>
<th>In %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quoted Margin (Spread) on base rate</td>
<td></td>
</tr>
</tbody>
</table>
SIGNATURE OF AUTHORIZED SIGNATORY: [●]

NAME AND TITLE OF SIGNATORY: [●]

NAME OF FIRM: [●]

ADDRESS: [●]
The price of the bid which is calculated as per the Financial Model:

<table>
<thead>
<tr>
<th>S. No</th>
<th>Description</th>
<th>Amount in PKR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Present Value (PV) of the Annuity Amount Payments discounted at the rate of ten percent (10%) during the Operations Period</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Agency Equity Funding Amount</td>
<td></td>
</tr>
</tbody>
</table>

**Total Bid Price**
NOTES FOR EXECUTION OF AFFIDAVIT

• The mode of execution of the Affidavit should be in accordance with the procedure, if any, laid down by the Applicable Laws and the same should be under common seal affixed in accordance with the required procedure.

• Also, wherever required, the Bidder (and in case of the Consortium, each member of the Consortium, wherever required) should submit for verification the extract of the charter documents and documents such as a resolution/power of attorney in favour of the person executing this Affidavit for the delegation of power hereunder on behalf of the Bidder.

• This Affidavit shall be notarised with the Notary Public.

• For an Affidavit executed and issued overseas, the document will also have to be legalised by the Pakistani Embassy and notarised in the jurisdiction where the Affidavit is being issued.

In case of Consortium, every consortium member firm should provide affidavit separately

Please find below the form and substance of the Affidavit.

AFFIDAVIT

[●] [●]
[Address]

We, [insert name of Bidder] hereby represent and warrant that, as of the date of this Affidavit [name of Bidder/lead member of consortium/JV], and each member of our consortium/JV (if applicable):

a. are not in bankruptcy or liquidation proceedings;

b. are not blacklisted by any governmental or non-governmental department/agency;

c. have not been convicted of, fraud, corruption, collusion or money laundering;

d. are not aware of any conflict of interest or potential conflict of interest arising from prior or existing contracts or relationships which could materially affect our capability to comply with the obligations under the Draft Concession Agreement;
e. [are legally and financially autonomous and operate under commercial law];

f. [there is no pending litigation which represents more than fifty percent (50%) of our Net Assets];

g. [are not under any non-performance of a contract within last two (2) years of the Bid Submission Date]; and

h. [have not failed to sign a contract with any procuring authority following award].

We have also attached proof of registration of each member, if applicable, from the relevant statutory authority.

Yours sincerely,

SIGNATURE OF AUTHORIZED SIGNATORY: [●]

NAME AND TITLE OF SIGNATORY: [●]

NAME OF FIRM: [●]

ADDRESS: [●]

______________________________

3 Only relevant for the government owned legal enterprise or institution.
4 If applicable;
5 If applicable;
6 If applicable;
1. **Detailed Project Scope**

The scope of the project mainly includes the construction of Korangi Bridge to replace the existing Korangi causeway, Link Road to Korangi Creek and Link Road to PRL.

2. **General**

Korangi Crossing Road is the main entrance to Korangi creek and the adjoining residential and industrial areas for the traffic from Qayyumabad, DHA and beyond. An Irish causeway across Malir River serves the traffic to/from this densely populated built up area. Several important educational institutions like the College of Business Management (CBM), Ilma University (Formerly Institute of Business Technology), National Textile University and major health care facilities like Indus Hospital, Chiniot General Hospital, LRBT Eye Hospital, Fazle Elahi Hospital for Heart Diseases, etc. are located in close vicinity.

The existing road also provides access to Korangi Creek Industrial Park (KCIP), Pakistan Refinery Ltd. (PRL) and other industries located in the vicinity. The fishing village / Jetty of Ibrahim Hyderi is also served by this causeway besides the commercial area, hardware tiles and ceramics shops, and the housing colonies including Bhitai Colony, Dar us Salam Cooperative Housing Society, Gilgit Colony, PAF Colony and Airmen Golf Club located along this road.

During rainy season, existing causeway gets under water and traffic across the river gets disrupted and is rerouted to other longer routes. In addition to a lot of inconvenience to people of this area and those coming here from other areas, this also causes traffic congestion on the other exits from Korangi and on Main Korangi Industrial Area road. Patients visiting major health care facilities, especially Indus Hospital, LRBT Eye Hospital, the Fazle Elahi Hospital for Heart Diseases and the Chiniot General Hospital, etc., and the students and staff of the above mentioned well-known educational institutions like the CBM, IBT, are stuck for hours when the causeway is closed due to heavy flow of water in Malir River.

Similarly access to many factories, mills and industries and the Korangi Creek Industrial Park (KCIP), Pakistan Refinery Ltd. (PRL) also gets blocked and the industrial activity suffers causing huge loss to the national and regional economy. Unnecessary delays and travel cost are incurred by the road users besides disturbance to the industrial activity as their supply line is badly affected.

Link road to Korangi creek starts at proposed Korangi bridge and runs parallel to the left bank of Malir river. Since Korangi road is often congested, Link road to Korangi creek will serve as an alternate route for traffic coming to and going from, National Industrial park, proposed sewerage treatment plant, airmen golf club and airmen academy. Initially it was proposed on the existing left bank of Malir river but after comprehensive hydraulic study it was decided to shift the left bank of Malir river to utilize the available land. interchange is provided between Korangi Bridge and link road to Korangi creek road for uninterrupted flow of traffic.
Link road to Pakistan refinery limited will widen the already existing 1x1 lane road into 2x2 road and will complete the link by connecting it to link road to Korangi creek which will enable the traffic generating from this area to utilize the alternate routes. Link road is also provided to connect brooks Chowragonzi road via shah Muhammad road to access Korangi bridge and link road to Korangi creek. The project location and proposed alignment is shown in following figures:

Figure 1: Project Location Map – Expressway from Mauripur Road to Y-Junction

Figure 2: Project Location Map
Figure 3: Project Alignment
3. **PROJECT COMPONENTS**

Project Components include detailed design, construction, operation and maintenance of following listed items:

1. 3 + 3 Lane Bridge approximately 1.0 km length over Malir River (between Korangi Causeway and Jam Sadiq Bridge) with all guide (upstream and downstream) bunds, spurs, river training works, culvette, spurs etc. will be constructed (considering the recommendations of Hydraulic/Physical Model study report of Malir River provided by the Agency).

2. To conduct Hydraulic/Physical model study for shifting of Malir Left Bund and proposed bridge considering above mentioned report, river topography, rainfall pattern, catchment area, invert levels of outfall drain(s) of adjacent areas and subsoil conditions and take approval from the relevant department (Sindh Irrigation Department) with the due support from the Agency.

3. 2 lane Flyover over Korangi Bridge

4. Construction of road over Left Bank of Korangi river to connect Korangi road of approximately 1.5 km length

5. Construction of 2 + 2 lane interchange / loop ramps at Korangi Bridge / Link road to Korangi Creek

6. 2+2 Lane coastal/river road (Link Road to Korangi Creek) with shoulders on either side including revetement and earthwork for embankment / bund of approximately 5.9 km length

7. Construction of Culverts

8. New Construction of PRL road to connect Link Road to Korangi Creek of approximately 1.0 km length

9. Rehabilitation / Widening of Existing PRL road of approximately 1.6 km length

10. Construction of stormwater drain approximately 1.0 km length

11. Realignment of existing Creek Avenue

12. Construction of Roundabout at creek avenue to link with Malir Expressway

13. Rehabilitation of existing bunds.

14. Earthwork for embankment of recreational/commercial area (around 450m x 40m) with entrance and exit lanes and pavement works for car parking areas of 600 to 650 vehicles

15. Street Lights

16. Procure, operate and maintain 1 crane for stranded vehicle

17. Stormwater drainage chamber/pit with its disposal line for pumping stormwater near Attock Petrol Pump

18. Plantation using Miyawaki technique at all available land pockets (but not limited to the areas mentioned below) with in the project area with the approval of the Horticulture Department.
a. landside embankment slopes of right and left bund of the Malir River
b. South west side of creek avenue / Korangi causeway road (green belt area near start point),
c. Rotary area of right turn flyover,
d. Landside embankment slope of new bund
e. U turn rotary near Airman Gold course

4. **Detailed Design of the Project**
   Detailed design shall be based on the requirements of preliminary design and the relevant parameters as mentioned in RFP.

4.1 **Construction of the Project Components**
   a. The Concessionaire shall be responsible for all aspects of construction in conformity with AASHTO Design standards, the NHA General Specifications, 1998, ASTM, MUTCD, AASHTO-LRFW, WPHC-1967 and in accordance with the requirements set-out in the Concession Agreement, including the Construction Requirements;
   b. During construction, the Concessionaire will be required to comply with the traffic management requirements to minimize the impact of construction on other roads and provide certainty for Users; and
   c. The Concessionaire must plan for the Substantial Completion Date.

4.2 **The Concessionaire shall need to:**
   - Construct the Project within estimated time and the Construction Time for Completion
   - Carry-out all quality control tests as per NHA General Specifications, 1998 (AASHTO recommendations) (see SCHEDULE G- List of Tests & Completion Tests of the Concession Agreement as per AASHTO and ASTM references). Records of tests will be signed-off by the Independent Engineer
   - Submit Constructions Program of the Project
   - Submit road safety plan and issues diversion plan during construction to obtain control of traffic and minimum hindrance to traffic and make proper liaison with the local police and other relevant civil and district administration/authorities of the area before commencement of work
   - Construction material will be used from approved sources with appropriate tests and certification
   - The Concessionaire has to make sure that the Project Site is clean from any debris, construction material and-machinery during Operation Period
   - International and local safety standards and best practice procedure should be followed during Construction Period
• The Concessionaire has to submit the ‘As-built drawings’ at completion of Works in accordance with the Concession Agreement

4.3 **FACILITIES TO BE PROVIDED BY CONCESSIONAIRE:**
The Concessionaire shall be responsible for providing facilities as mentioned in SCHEDULE - D

5. **CONSTRUCTION REQUIREMENTS**
The Construction should be carried out using NHA General Specifications 1998, project specifications established for the project and all other standards mentioned in the RFP.
All construction activities will be supervised by the Independent Engineer for which standard procedure of check request forms shall be developed by the Concessionaire for the approval by the Independent Engineer.

6. **OTHER ROLES OF CONCESSIONAIRE**

6.1 **TEMPORARY ROAD, TRAFFIC MANAGEMENT AND CONTROL, GENERAL PROTECTION**
   a. Layout plans showing the detailed proposals of temporary diversions and/or access roads to be carried out by the Concessionaire/its Contractor(s) shall be submitted to the Independent Engineer and to concerned district police, civil agencies and local administration for their written approval 10 days before the implantation date;
   b. Diversions must be constructed in advance of any interference within the right of way/ existing carriage way and shall be maintained in accordance to traffic load in a condition satisfactory to the Independent Engineer

6.2 **LOCATION OF UTILITY SERVICES**
   a. Location and identification of all services, in consultation with relevant utility service provider(s) or company, whether above ground or below the ground shall be Concessionaire’s and its Contractor(s)’ responsibility following transfer of Project Site by Agency to the Concessionaire, free from any encumbrances

6.3 **OPERATION AND MAINTENANCE**
The Concessionaire is required to carry out the Operation and Maintenance in respect of the Project in conformity with AASHTO standards and in accordance with the Concession Agreement. The Operation and Maintenance - O&M Requirements are set out in the Main Body of the Concession Agreement and SCHEDULE H of the Concession Agreement.

7. **FINANCING**
   a. The Concessionaire is responsible for developing and implementing the financing structure for the Concession including the financing and commercial arrangements for the design, construction, operations and maintenance work in accordance with the Concession Agreement;
b. The Concessionaire shall get incorporated a company exclusively for the purpose of implementing the Project (“Project Company” and/or “SPV”). The Concessionaire shall not undertake or permit and hereby undertakes to procure that the Sponsors do not undertake or permit any Change in Ownership and/or Control during the Concession Period, except as may be permitted pursuant to the Concession Agreement.

8. **HAND-OVER OF THE STRUCTURE**

   The Concessionaire is responsible for handing over the structures to the Agency in a good working condition at the end of the Concession Period as specified in the Concession Agreement without any further compensation to the Concessionaire at the time of such transfer. These structures are subject to an inspection and correction process in order to ensure that they are handed over in accordance with established terms and conditions.
ANNEXURE L – PROJECT LOCATION PLAN

ANNEXURE M – KEY PERFORMANCE INDICATORS
Annuity Amount Payment Damages Events means the following events (as certified in writing by the Independent Engineer); provided, that the same shall not constitute an Annuity Amount Payment Damages Event in case the same results from the Permitted Events (excluding the Non Political Events):

(a) non compliance of any one or more of the key performance indicators as mentioned in the table above; and/or

(b) the Project (or any part thereof) is closed to traffic; or

(c) the Independent Engineer determines that:

(i) the riding quality of the Project (or any part thereof) has deteriorated to a level which is below the acceptable levels prescribed by the Applicable Standards; and

(ii) the Project (or any part thereof) is not safe for operation, irrespective of whether the Project (or any part thereof) has been closed to traffic or not.

provided, that in order to constitute as the Annuity Amount Payment Damages Event, the aforesaid events must occur in relation to a stretch of a lane of the Project of at least five (5) meters.

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Key Performance Indicators</th>
<th>SLAB A</th>
<th>SLAB B</th>
<th>SLAB C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Damages in Pak. Rupees</td>
<td>Response Time (days)</td>
<td>Damages in Pak. Rupees</td>
<td>Response Time (days)</td>
</tr>
<tr>
<td>1</td>
<td>Pothole on paved roads</td>
<td>25,000/day/pothole 1&lt;=t&lt;4</td>
<td>50,000/day/pothole 4&lt;t&lt;8</td>
<td>100,000/day/pothole t&gt;8</td>
</tr>
<tr>
<td>2</td>
<td>Edge failure on paved roads</td>
<td>18,000/day/failure 1&lt;=t&lt;4</td>
<td>36,000/day/failure 4&lt;t&lt;8</td>
<td>72,000/day/failure t&gt;8</td>
</tr>
<tr>
<td>3</td>
<td>Rutting more than 20m long and 10mm deep on paved road</td>
<td>9,000/day/rut 1&lt;=t&lt;7</td>
<td>18,000/day/rut 7&lt;t&lt;14</td>
<td>36,000/day/rut t&gt;14</td>
</tr>
<tr>
<td>4</td>
<td>Drains, ditches, and other drainage structures to be cleaned</td>
<td>3,000/day/culvert or drain 1&lt;=t&lt;12</td>
<td>6,000/day/culvert or drain 12&lt;t&lt;24</td>
<td>12,000/day/culvert or drain t&gt;24</td>
</tr>
<tr>
<td></td>
<td>Description</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>------------------------------------------------------------------------------</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>5</td>
<td>Bridge parapets/barriers, expansion joints to be maintained</td>
<td>18,000/day/joint</td>
<td>1≤t&lt;5</td>
<td>36,000/day/joint</td>
</tr>
<tr>
<td>6</td>
<td>Vertical signs to be well-placed, cleaned and visible day and night</td>
<td>6,000/day/Sign</td>
<td>1≤t&lt;7</td>
<td>12,000/day/Sign</td>
</tr>
<tr>
<td>7</td>
<td>Horizontal lane markings to be well maintained</td>
<td>3,000/m/day</td>
<td>1≤t&lt;7</td>
<td>6,000/m/day</td>
</tr>
<tr>
<td>8</td>
<td>Safety Barrier/Project Corridor to be cleaned, well maintained and visible during day and night</td>
<td>1,500/day/km or part</td>
<td>1≤t&lt;3</td>
<td>3,000/day/km or part</td>
</tr>
<tr>
<td>9</td>
<td>Litter or residues on or around pavement</td>
<td>1,500/day of delay</td>
<td>1≤t&lt;3</td>
<td>3,000/day of delay</td>
</tr>
<tr>
<td>10</td>
<td>Failure to maintain trees/plants</td>
<td>1,000/month/tree or plant</td>
<td>1≤t&lt;30</td>
<td>2,000/month/tree or plant</td>
</tr>
<tr>
<td>11</td>
<td>Failure to achieve the Project Construction Completion by the Scheduled Project Construction Completion Date (max upto 10% of Bid Price)</td>
<td>1,000,000/day/delay</td>
<td>1≤t&lt;7</td>
<td>1,500,000/day/delay</td>
</tr>
</tbody>
</table>
Where \( t \) denotes the non-rectification period in days.

**Illustration of Annuity Amount Payment Damages**

If the Annuity Amount Payment Damages Event occurs on a single day in relation to a stretch of a lane of the Project of fifty (50) meters, the damages shall be calculated as follows:

**Damages: \( A \times B \)**

WHERE:

A: the length of the stretch of a lane of the Project;

B: per lane meter rate of damages.

**Damages: 50 \times 5,000: PKR 250,000/-**

Note:

The aforesaid damages shall become payable after expiry of the relevant cure period set out in the Concession Agreement and/or the O&M Manual in respect of the underlying performance failure set out in the table above, the Concessionaire having failed to cure the same during the said cure period.

The aforementioned rate of damages (other than rates applicable in relation to Annuity Amount Payment Damages Event) would be applicable on slab basis and on the entirety of the non-rectification period, based on each performance indicator. Furthermore, these rates are applicable for:

(a) the first (1st) Operational Year and will be indexed each subsequent Operational Year; and
Provided that (a) above shall be based on the prevailing Wholesale Price Index (WPI) rate.

The KPIs stated above are non-exhaustive. Additional KPIs may be added in the O&M Manual.
Urban Road Projects in Karachi

Shifting of Existing Bund Along Left Bank of

Malir River at Korangi Causeway

(KPT Interchange to PAF Airmen Academy)

1. General and Background

Jam Sadiq Bridge (JS Bridge) is the only bridge, connecting both banks of the Malir River in the vicinity of Korangi Industrial Area. The bridge observes heavy traffic jams during flood season as both causeways (English Biscuit Manufacturers (EMB) & Korangi) upstream and downstream of Jam Sadiq Bridge submerge due to high flood depths in Malir river. Local Government Department, Government of Sindh intends to reduce traffic load on the existing JS Bridge by constructing a new bridge on Malir River, approximately 600 m downstream of the existing bridge. For the newly proposed bridge, reduced waterway / length of bridge, almost similar to JS Bridge, has been adopted. The proposed bridge will run parallel to the existing JS Bridge as it traverse the shortest route to connect both banks of the river. Existing left bund downstream of JS Bridge will be extended up to the newly proposed bridge. Thereafter, the left bund will be re-aligned through the flood plain area up to the existing PARCO Elevated Oil Pipeline.

2. Proposed Project Works

Given below the proposed works and brief description of the proposed project components and are shown in Figure 1 below.

i. Proposed Korangi Bridge, about 600 m downstream of JS Bridge, just upstream of Existing Korangi Road Causeway.

ii. The upstream Right Guide Bank (RGB) and upstream Left Guide Bank (LGB) for the proposed Korangi Bridge have been proposed as the straight continuation of the d/s LGB and d/s RGB for JS Bridge.

iii. The downstream LGB for the proposed Korangi Bridge has been assumed as the straight continuation of the d/s LGB for JS bridge upto the Parco Oil Pipeline. Due to this layout, the existing left flood bund on the d/s of proposed Korangi Bridge comes under the shadow of d/s LGB; and the land
between the existing left flood bund and the newly proposed LGB may be used for the development purposes (about 84 ha).

iv. The d/s RGB is proposed as a small straight portion initially, which then curves rightward to meet the existing right flood bank.

3. Proposed Korangi Road Bridge
Jam Sadiq Bridge (JS Bridge) is the only bridge, connecting both banks of the Malir River in the vicinity of Korangi Industrial Area. The bridge observes heavy traffic jams during flood season as both causeways (English Biscuit Manufacturers (EMB) & Korangi) upstream and downstream of Jam Sadiq Bridge submerge due to high flood depths in Malir River. Local Government Department, Government of Sindh intends to reduce traffic load on the existing JS Bridge by constructing a new bridge on Malir River, approximately 600 m downstream of the existing bridge and just upstream of existing Korangi Road Causeway. For the newly proposed bridge, reduced waterway / length of bridge, almost similar to JS Bridge, has been adopted. The proposed bridge will run parallel to the existing JS Bridge as it traverse the shortest route to connect both banks of the river. Existing left bund downstream of JS Bridge will be extended up to the newly proposed bridge. Thereafter, the left bund will be re-aligned through the flood plain area up to the existing PARCO Elevated Oil Pipeline.

4. Design of Flood Protection Embankments / Bunds / Guide Banks
Flood protection embankments/ bunds are man-made structures. These are constructed in the flood plains of a river and run parallel to the river bank along its length. The aim of providing these embankments is to confine the river flood water within the cross section available between the embankments. The designed to contain the flood waters, so as to provide protection against inundation or thus not allowed to spill over to the flood plains. Flood bunds provide a considerable reduction in the risk of flooding, but cannot be expected to provide a total protection with zero flood risk. Therefore, flood bunds provide protection with some risk due to many factors; including deferred maintenance, rodents, parallel flow erosion, growth of herbaceous plants, poor quality of compaction & soil type, etc. The extent of risk varies with the prevailing site conditions.

a. Design Flood
While analysis and selection of design discharge for a new structure along a stream, it is considered necessary to get maximum discharge carrying capacity of existing structures located upstream/ downstream of newly proposed
location. This information is required to avoid bottleneck corresponding to design flood magnitude in the stream. The design capacity of existing Jam Sadiq Bridge is 409,000 ft\(^3\)/s (11,580 m\(^3\)/s).

Climate change projections of the area indicate higher frequencies as well as higher magnitude of extreme events (rainfall, floods, etc.). Recent flood events of August 2020 may be considered as the impact of climate change. In view of the uncertainties associated with the rainfall data and the likelihood of higher rainfall intensities and magnitude under future climate change scenarios, it is highly recommended that 100-year flood estimate by HEPO-1990 (table below), as more conservative estimate, may be adopted as design flood for providing flood protection structures in the study reach. The recommended flood magnitude has already been adopted at existing bridge and flood embankments.

#### Peak Discharges of Malir River

<table>
<thead>
<tr>
<th>Return Period</th>
<th>Discharge (ft(^3)/s)</th>
<th>Discharge (m(^3)/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100-Year</td>
<td>409,000</td>
<td>11,580</td>
</tr>
<tr>
<td>75-Year</td>
<td>372,000</td>
<td>10,500</td>
</tr>
<tr>
<td>50-Year</td>
<td>240,000</td>
<td>7,000</td>
</tr>
<tr>
<td>20-Year</td>
<td>193,000</td>
<td>5,460</td>
</tr>
</tbody>
</table>

b. Water Surface Profiles With Proposed Works

Water surface profiles have been simulated by incorporating all existing and proposed interventions/features into HEC-RAS Model (Discharge of 409,000 cusecs). Following structures (Existing/Proposed) have been incorporated in model, which is shown in Figure 2 and Figure 3:

i.  **Jam Sadiq Bridge (Existing)**

ii. **Korangi Road (KR) Bridge (Proposed)**
    Detailed already given above and also consult the Nespak Karachi Office.

iii. **Relocated Left Bund/Embankment (Proposed)**
    The downstream Relocated Left Bund about 3 km long from the proposed KR Bridge has been assumed as the straight continuation up to the Parco Oil Pipeline. Due to this layout, the existing left flood bund on the d/s of proposed Korangi Bridge comes under the shadow of d/s LGB; and the land between the existing left flood bund and the newly proposed LGB may be used for the development purposes (about 105 ha).

iv. **Upstream and Downstream of Right Guide Bank (Proposed)**
About 810 m long RGB has been proposed as the straight continuation from JS Bridge to proposed KR Bridge d/s, which then curves rightward to meet the existing right flood bank.

v. Upstream Left Guide Bank (Proposed)
About 400 m long LGB has been proposed as the straight continuation from JS Bridge to proposed KR Bridge.

c. **Design Parameters**

1.6.6 **Top Width and Side Slope of Bunds**

The geometry of the section i.e., the river side and country side slopes, top width etc. are fixed to ensure a stability of section under all flow conditions. Top width of the proposed bund varies from 25 m to 35 m mentioned in the Drawing (Annexure C). Slope of inner side (facing water) is fixed as 3H:1V and for outer side, it is 2H:1V. The proposed typical cross section of the embankment is shown in **Figure 4**.

![Figure 4: Proposed Typical Cross Section of Embankment](image)

**Design of Stone Protection Works**

Stone protection works of the proposed embankment comprise of the following two components:

- Stone Pitching along slope of embankments / bunds.
- Horizontal Launching Apron at the toe of embankments / bunds.

In order to design protection works, it is necessary to calculate the scour depth long proposed guide bund.

**DETERMINATION OF SCOUR DEPTH**

If the provided water way is less than the Lacey’s regime width, the potential scour depth depends on the discharge intensity “q” (discharge per unit width),
silt factor “f” (function of d_{50}), and scour factor “X” (as per the vulnerability of location).

\[ XR = 1.34 \times \left(\frac{q^2}{f}\right)^{1/3} \text{ (in metric units)} \]

where:
- q = Design discharge per unit width in m^3/sec.
- f = Lacey’s silt factor depending upon bed material.
- R = Scour depth below FSL or HFL in meter.
- X = Scour Factor.

General values of X are as follows:
- In a straight reach = 1.5 R
- At right angle bend = 2.0 R
- At nose of Pier = 2.0 R

When the provided water way is greater than the Lacey’s regime width (present case), the potential scour depends on the total discharge, silt factor, and the scour factor.

\[ XR = 0.475 \times \left(\frac{Q}{f}\right)^{1/3} \text{ (in metric units)} \]

The value of silt factor “f” has been adopted as 1, which has been taken from the report “Feasibility Study and Design for Realignment of Bund from Northern Side of Malir River, NESPAK, June 2013. If the geotechnical report updates the value of d_{50}, the design may be modified accordingly.

The scour level for piers and guide banks has been worked out to 15.0 m and 6.8 m, respectively. The actual scour depth depends on the bed level at the point of interest.

**STONE PITCHING**

Side slopes of protection bund have been proposed to be protected against river water action by providing stone pitching. Thickness of pitching is provided against the predominant flow characteristics (i.e., discharge intensity and velocity), which affect the stability of pitching.

The thickness of stone pitching is proposed as 0.8 times the thickness of horizontal apron in launched position; which works out to be 1.0 m (3.3 ft).

**SIZE OF STONE**

Size of the stone depends on the flow velocity, specific gravity, and the type of turbulence. ISBASH curve or its equation is usually adopted for recommending
the stone size. The size (dia) of stone size has been worked out as 0.64 m (approx. 2ft) using ISBASH curve and base filter layer under stone pitching on the level and on slope shall comprise of graded spall/ bajri of size 1/8 inch to 2 inches

**LAUNCHING APRON**

Launching apron is the horizontal extension of slope pitching on the river bed to guard against undermining and collapse of stone pitching and progressive slipping of the protection bund material into the scour hole, caused at the toe during floods. The launching apron is usually laid in a width of 1.5 times the scour depth below bed.

The scour depth below bed (D) is computed as the difference of potential/factored scour depth and flow depth computed by HEC-RAS (XR-Y). The launching angle is taken as the saturated angle of repose (θ), and the length of finally launched apron (along hypotenuse) is computed as D/Sin θ.

The volume of stone per foot run is computed as the product of hypotenuse length and the desired thickness “t” (1.2 m = 4 ft). This volume of stone (t*D/Sin θ) has been distributed on a length of 1.5 D (15 m) along guide banks, and the thickness of apron in horizontal position “t” is worked out to be t / 1.5 Sin θ (1.6 m = 5.25 ft).

5. **ESTIMATE OF QUANTITIES**

**Proposed Works**

Design of proposed flood embankments to confine the river by shifting the southern left protection bund into the flood plain from downstream of Jam Sadiq Bridge till drain/ PARCO Oil Pipeline, include the following:

- a) Design of relocated left flood protection embankment
- b) Design of proposed guide banks of Korangi Bridge

**Unit Rates**

The cost estimate has been based on Composite Schedule of Rates (CSR) of NHA. However the rates for non-schedule items are based on prevailing market rates.

**BOQ of Civil Works**

The estimated quantity cost of the proposed project works has been summarized in Table 1 and Table 2.
Table 1: Relocated About 3-Km Long Left Embankment

Abstract of Cost

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Code</th>
<th>Description of Items</th>
<th>Quantity</th>
<th>Unit</th>
<th>Rate (Rs)</th>
<th>Amount (Rs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>101</td>
<td>Clearing and Grubbing</td>
<td>-</td>
<td>L.S.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>108c</td>
<td>Formation of embankment from borrow excavation in common material</td>
<td>848100</td>
<td>CM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>509e</td>
<td>Grouted Riprap, Class B, 1.0m Thick Stone Pitching</td>
<td>99180</td>
<td>CM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>509h</td>
<td>Filter layer of granular material, 0.3 Thick Filter</td>
<td>24845</td>
<td>CM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>509c</td>
<td>Riprap, Class C, 1.6m Thick Stone Apron</td>
<td>86415</td>
<td>CM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>107b</td>
<td>Structural excavation in common material</td>
<td>86415</td>
<td>CM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>201</td>
<td>Granular Sub Base Material 0.5m Thick Preparation Under the Embankment</td>
<td>98480</td>
<td>CM</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total Cost

Table 2: Right Guide Bank U/S and D/S of the Proposed Korangi Road Bridge Abstract of Cost

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Code</th>
<th>Description of Items</th>
<th>Quantity</th>
<th>Unit</th>
<th>Rate (Rs)</th>
<th>Amount (Rs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>101</td>
<td>Clearing and Grubbing</td>
<td>-</td>
<td>L.S.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>108c</td>
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<td>268939</td>
<td>CM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>509e</td>
<td>Grouted Riprap, Class B, 1.0m Thick Stone Pitching</td>
<td>31434</td>
<td>CM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>509h</td>
<td>Filter layer of granular material, 0.3 Thick Filter</td>
<td>7868</td>
<td>CM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>509c</td>
<td>Riprap, Class C, 1.6m Thick Stone Apron</td>
<td>21348</td>
<td>CM</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Structural excavation in common material</td>
<td>21348</td>
<td>CM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>-----------------------------------------</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>201</td>
<td>Granular Sub-Base Material 0.5m Thick Preparation Under the Embankment</td>
<td>31630</td>
<td>CM</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total Cost
Figure 1: Layout of Existing and Proposed Bunds
Figure 2: - Water Level Profile for Discharge of 409,000 Cusecs with Proposed Works
Existing N.S. Bund

Existing S.S.
Figure 3: Layout Plan Showing Proposed Arrangements
CONCESSION AGREEMENT

BY & BETWEEN

GOVERNOR OF SINDH
(THROUGH THE SECRETARY, LOCAL GOVERNMENT & HOUSING TOWN PLANNING DEPARTMENT)

AND

[●]
(AS THE CONCESSIONAIRE)

IN RESPECT OF
THE CONCESSION FOR DESIGN, FINANCE, BUILD, OPERATE AND TRANSFER OF

KORANGI LINK ROAD PROJECT

DATED: AS OF ____________________
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CONCESSION AGREEMENT

This CONCESSION AGREEMENT (this Agreement) is entered into on this ______ day of ______________, 2021 at Karachi, Pakistan:

BY AND BETWEEN

THE GOVERNOR OF SINDH (THROUGH SECRETARY, LOCAL GOVERNMENT & HOUSING TOWN PLANNING DEPARTMENT) having his offices at Local Government Department, Ground Floor, Tughlaq House, Sindh Secretariat, Karachi, Pakistan for and on behalf of the Government of Sindh (the Agency);

AND

[●], a company incorporated under the Applicable Laws of Pakistan, having its registered office located at [●] (the Concessionaire, which expression shall, where the context so permits, be deemed to mean and include its successors-in-interest and permitted assigns);

(the Agency and the Concessionaire are hereinafter collectively referred to as the Parties and each individually as a Party).
RECITALS

A. The Agency being desirous to implement the Project on a Public Private Partnership basis, on [●] issued a Request for Proposals (together with the related advertisements) (the RFP) to prospective bidders for, inter alia, inviting submission of bids for grant of the Concession for the implementation of the Project and subsequently, upon conclusion of the bidding process pursuant to the RFP (the Bidding Process), the Sponsor was/were selected by the Agency for such purposes. The letter of award was issued to the Sponsor by the Agency on [●].

B. In accordance with the requirements of the RFP and the terms of the Bid submitted by the Sponsor, the Sponsor incorporated the Concessionaire as a special purpose vehicle to implement the Project and the Agency has agreed to grant to the Concessionaire the right and obligation to implement the Project on the terms and conditions contained in this Agreement and the Concessionaire hereby accepts the same.

C. The Concessionaire acknowledges and confirms that it has, based on the RFP, undertaken a thorough due diligence (including technical, financial and legal due diligence) of the Project and its requirements, and on the basis of its independent satisfaction is entering into this Agreement for the purpose of accepting the Concession for the implementation of the Project in accordance with the terms and conditions of this Agreement.

D. The Parties are now entering into this Agreement to set out the terms and conditions applicable to, inter alia, the Concession and the implementation of the Project and the relationship of the Agency and the Concessionaire and their rights and obligations.

NOW, THIS AGREEMENT WITNESSETH, and it is hereby agreed to by and between the Parties as follows:
1. **DEFINITIONS & INTERPRETATION**

1.1 **DEFINITIONS**

In this Agreement (including the Recitals), unless the context shall otherwise require:

**AASHTO Standards** means the standards applicable to roads and highways published in the relevant publication of the American Association of State Highway and Transportation Officials;

**Abandonment** or **Abandoned** means the voluntary cessation of the implementation of the Project (including (without limitation) construction or Operation and Maintenance of the Concession Assets by the Concessionaire in accordance with the terms of this Agreement and/or the withdrawal of all, or substantially all, personnel by the Concessionaire from the Project Site for reasons other than a Permitted Event;

**Accounting Firms** means the list of firms, as notified by the State Bank of Pakistan, as Category A firm;

**Accounting Standards** means the accounting standards adopted from time to time by the Institute of Chartered Accountants of Pakistan;

**Accounting Year** means in respect of the Concessionaire, the financial year commencing from first (1st) day of July of any calendar year and ending on thirtieth (30th) day of June of the next calendar year;

**Actual Availability** means the difference between:

(a) the Assured Availability; and

(b) the Non Availability;

**Actual Cost** means the actual cost of any Escalable Item(s), at the time of procurement of the same;

**Actual Spread** means the spread/margin of the rate of mark-up in respect of the Financing, as set out in the Financing Documents.

**Additional Cost** means the additional capital expenditure, the additional operating cost, any adverse financial impact on the Concessionaire, additional taxes and/or one or more of the above as the case may be, which the Concessionaire has or would be required to incur or suffer and which has/have arisen as a consequence of Change of Scope or Change in Law; provided, that the Additional Costs shall be paid directly to the Concessionaire by the Agency in terms of this Agreement and shall not form part of Total Project Cost (unless otherwise agreed with the Agency);

provided, that the Independent Engineer and Independent Auditor shall determine such Additional Cost;
provided, further, that for the purposes of determining such Additional Cost, information contained in the Financial Model shall be relied upon by the Independent Engineer and the Independent Auditor;

**Additional Development Rights** means such additional rights, property or assets that are not part of and are not anticipated to be part of the Project as on the Effective Date but are available to the Agency in accordance with Section 29.2 *(Commercial Rights & Additional Facilities)* and may include, without in any manner limited to, provision of Additional Facilities;

**Additional Development Rights Agreement** means the agreement (in the form and substance agreed between the Parties) to be entered into, *inter alios*, between the Agency and the Concessionaire in relation to the Additional Development Rights;

**Additional Facilities** means the facilities including, but not limited to, service stations, restaurants, motels and other facilities provided or procured to be provided for the benefit of the Users, and that are in addition to (and not part of) the Concession Assets, in each case, pursuant to the terms of the Additional Development Rights Agreement;

**Additional Facilities Proceeds** shall bear the meaning as ascribed thereto in Section 29.2.7;

**Advertising Proceeds** shall bear the meaning as ascribed thereto in Section 29.1.5;

**Affected Party** shall bear the meaning as ascribed thereto in Section 21.1.1 *(Force Majeure Event)*;

**Agency** shall bear the meaning as ascribed thereto in the Preamble;

**Agency Advertising Plan** shall bear the meaning as ascribed thereto in Section 29.1.1;

**Agency Agreements** means:

(a) this Agreement;

(b) the Independent Auditor Agreement;

(c) the Independent Engineer Agreement;

(d) the Equity Funding & Utilization Agreement;

(e) the Project Site Licence Agreement;

(f) the Annuity Amount Payment Agreement;

(g) the Price Escalation Agreement;

(h) the Concession Direct Agreement;

(i) the Additional Development Rights Agreement;
(j) any other agreement entered into in respect of the Project between the

(i) Agency; and

(ii) Concessionaire and/or the Financiers and/or the Sponsor

in respect of the Project and designated as a “Agency Agreement” with the written consent of the Agency;

**Agency Annuity Amount Payment Account** means the bank account to be established by the Agency and Notified to the Concessionaire as an Agency Condition Precedent, to be utilized for the purposes as mentioned in this Agreement;

**Agency Annuity Amount Payment Account Bank** means the financial institution mutually agreed between the Parties for the purposes of establishing and maintaining the Agency Annuity Amount Payment Account;

**Agency Annuity Amount Payment Account Standing Instructions** shall bear the meaning ascribed thereto in the Annuity Amount Payment Agreement;

**Agency Conditions Precedent** means the conditions precedent, to be fulfilled by the Agency in accordance with the satisfaction of the Concessionaire, as set out in part 2 of **SCHEDULE Y (Conditions Precedent and Conditions Subsequent)**;

**Agency Conditions Subsequent** means the conditions subsequent, to be fulfilled by the Agency in accordance with the satisfaction of the Concessionaire, as set out in part 4 of **SCHEDULE Y (Conditions Precedent and Conditions Subsequent)**;

**Agency Escalation Cost Share** has the meaning ascribed thereto in Section 10.5.2;

**Agency Default Termination Amount** shall bear the meaning as ascribed thereto in **SCHEDULE T (Termination Payments)**;

**Agency Event of Default** shall bear the meaning ascribed thereto in Section 22.2.1;

**Agency Financial Instrument** means the First Agency Financial Instrument and/or each Extended Agency Financial Instrument;

**Agency Financial Instrument Extension Amount** shall bear the meaning as ascribed thereto in Section 17.3.3(a)(ii);

**Agency Financial Instrument Extension Certificate** shall bear the meaning as ascribed thereto in Section 17.3.3(a)(ii);

**Agency Financial Instrument Extension Period** shall bear the meaning as ascribed thereto in Section 17.3.3(a)(iii);
**Agency Financial Instrument Issuing Bank** means a scheduled bank in Pakistan (with a minimum credit rating of at least ‘AA-’ as rated by JCR VIS or an equivalent rating by PACRA);

**Agency Equity Funding Amount** means an amount not exceeding 49% of the Base Equity Funding Amount, as requested by the Sponsor from Agency, in its Bid, as set out in the Base Case Financial Model and to be funded in accordance with the Equity Funding & Utilization Agreement;

**Agency Indemnified Persons** shall bear the meaning as ascribed thereto in Section 9.1.1;

**Agency Overriding Power Event** shall bear the meaning as ascribed thereto in Section 8.8.1;

**Agency Remedy Amount** shall bear the meaning as ascribed thereto in Section 18.2.3;

**Agency Remedy Invoice** shall bear the meaning as ascribed thereto in Section 18.2.3;

**Agreement** means this ‘Concession Agreement’ including the Recitals, Main Body and all Schedules attached hereto;

**Annuity Amount Payments** means the semi-annual payments that the Agency shall make to the Concessionaire on a semi-annual basis during the Operations Period in accordance with this Agreement and the Annuity Amount Payment Agreement and it shall constitute of:

(a) the Financing Component;

(b) the O&M Cost Component;

(c) the Return on Equity Component; and

(d) the Taxes Component;

in each case, as further described in the Annuity Amount Payment Agreement;

**Annuity Amount Payment Damages** means, in relation to an Annuity Amount Payment Date, the adjustment of the damages (being an amount in Pakistani Rupees) to be made in respect of the relevant Annuity Amount Payment relating to such Annuity Amount Payment Date (excluding the first Annuity Amount Payment Date), as calculated in accordance with the mechanism provided in SCHEDULE Z (Key Performance Indicators);

**Annuity Amount Payment Damages Events** shall bear the meaning ascribed thereto in SCHEDULE Z (Key Performance Indicators);

**Annuity Amount Payment Agreement** means the agreement (in the form and substance agreed and substance agreed between the Parties in accordance with Applicable Laws) to be entered into between the Agency and the Concessionaire for the
purposes of, inter alia, payment of the Annuity Amount Payments by the Agency to the Concessionaire;

**Annuity Amount Payment Date** means each such date on which the Annuity Amount Payments shall be paid by the Agency to the Concessionaire, being the dates set out in the Annuity Amount Payment Schedule and in the Annuity Amount Payment Agreement;

**Annuity Amount Payment Evaluation Period** shall bear the meaning ascribed thereto in the Annuity Amount Payment Agreement;

**Annuity Amount Payment Period** means each semi-annual period with the first such period commencing on the day immediately following the Substantial Completion Date and continuing till the Final Expiry Date or the Termination Date, whichever may occur earlier, as further detailed in Annuity Amount Payment Agreement;

**Annuity Amount Payments Reserve Amount** means an amount equivalent to the Annuity Amount Payment payable in the relevant upcoming Annuity Amount Payment Period;¹

**Annuity Amount Payment Schedule** means the schedule setting out, inter alia, the Annuity Amount Payment Dates, as to be set out in the Annuity Amount Payment Agreement, provided that the Annuity Amount Payment Schedule shall be based on the Annuity Amount Payment Schedule set out herein in SCHEDULE R (Annuity Amount Payment Schedule);

**Applicable Laws** means all applicable federal, provincial and local laws, promulgated or brought into force and effect in Pakistan, as the case may be, including regulations and rules made thereunder, and judgments, decrees, injunctions, writs and orders of any court of record, as may be in force and effect during the subsistence of this Agreement;

**Applicable Standards** means the standards, specifications, requirements and criterion (as applicable) set out in relation to and applicable to:

(a) the Project Works;

(b) the Project and its implementation;

(c) the Concession Assets; and

(d) the performance by the Concessionaire and the Sponsor (as applicable) of their respective obligations under the Agency Agreements;

in each case above, as contained and set out in (as applicable):

(i) this Agreement (including all Schedules attached hereto);

¹ Subject to the approval of PPP Policy Board
(ii) the Agency Agreements;

(iii) the Applicable Laws;

(iv) the Concessionaire Permits;

(v) the Environmental Standards;

(vi) the Specific Requirements; and

(vii) any other standards, requirements and criterion (as applicable), mutually agreed between the Parties from time to time,

provided, however, that in the event of any discrepancy in the standards, requirements and criterion (as applicable) set out in the abovementioned, the standards, requirements and criterion in accordance with nationally and internationally accepted standards as per Good Industry Practice (as applicable), shall apply (unless otherwise mutually agreed between the Parties);

provided further, that in the event there is any deficiency in the technical standards and requirements (as applicable) the AASHTO Standards, the ASTM Standards and the NHA Standards (as certified by the Independent Engineer) shall apply;

Approved Detailed Engineering Design means the Detailed Engineering Design approved by the Independent Engineer in accordance with the Applicable Standards subject to (including (without limitation) Section 12.5 (Approval of the Detailed Engineering Design);

Arbitration Act means the Arbitration Act, 1940 and shall include modifications to or any re-enactment thereof as in force from time to time;

Associate or Affiliate means, in relation to either Party and/or the Sponsor, a Person who controls, is controlled by, or is under the common control with such Party and/or the Sponsor (as used in this definition, the expression “control” means, with respect to a Person which is a company or corporation, the ownership, directly or indirectly, of more than fifty per cent (50%) of the voting shares of such person and the power to direct the management and policies of such Person, whether by operation of law or by contract or otherwise), and with respect to a Person which is not a company or corporation, the power to direct the management and policies of such Person, whether by operation of law or by contract or otherwise);

Assured Availability shall have the meaning ascribed thereto in SCHEDULE P (Assured Availability Formula);

ASTM Standards means tests and standards prescribed by ‘American Society for Testing and Materials’ as prescribed internationally;

Award shall bear the meaning as ascribed thereto in Section 30.3.4;

Base Case Financial Model means the financial model attached herewith as SCHEDULE U (Financial Model);
**Base Case Spread** means the spread/margin, not falling below one percent (1%), of the rate of mark-up in respect of the Financing, as set out in the Base Case Financial Model.

**Base Equity Funding Amount** means collectively the sum of:

(a) the Agency Equity Funding Amount; and

(b) the Sponsor Equity Funding Amount;

which is thirty percent (30%), collectively, of the Pre-Estimated Project Cost.

**Base Price** means the price of the Escalable Items at the rate prevailing twenty-eight (28) days prior to the Bid Submission Date, as confirmed and notified by the Independent Engineer in accordance with the Price Escalation Agreement;

**Bid** means the technical and financial bid of the Sponsor with respect to the Project submitted to the Agency on [●];

**Bid Submission Date** means the date on which the Bid is submitted on [●];

**Bidding Process** shall have the meaning ascribed thereto in Recital A above;

**Board of Arbitrators** shall bear the meaning as ascribed thereto in Section 30.3.1;

**Board Resolution** means a resolution passed by the board of directors of the Concessionaire authorizing the Concessionaire to, inter alia, enter into this Agreement;

**Capital Cost Increase** means, in relation to a Relief Compensation Relief Event, the amount (if any) by which:

(a) Capital expenditure that is demonstrably incurred by the Concessionaire in carrying out its obligations under this Agreement as a direct consequence of such Relief Compensation Relief Event, the Concessionaire having taken all reasonable steps to minimize such Capital expenditure, exceeds:

(b) Capital expenditure which would have been demonstrably incurred by the Concessionaire in carrying out its obligations under this Agreement without such Relief Compensation Relief Event;

**Capital Cost Saving** means, in relation to a Relief Compensation Relief Event, the amount (if any) by which:

(a) Capital expenditure that is demonstrably incurred by the Concessionaire in carrying out its obligations under this Agreement as a direct consequence of such Relief Compensation Relief Event, the Concessionaire having taken all reasonable steps to minimize such Capital expenditure,
is less than:

(b) Capital expenditure which would have been demonstrably incurred by the Concessionaire in carrying out its obligations under this Agreement without such Relief Compensation Relief Event;

**Change in Complete Control** means any issuance, sale, transfer, conveyance, disposal or any event, transaction, arrangement, Encumbrance or agreement of any nature that results in or may result in:

(a) the issuance of any Class A Share to any Person other than the Sponsor; or

(b) the transfer of direct and/or indirect, legal and/or beneficial ownership of any shares, or securities convertible into shares, that causes or may cause the sale, transfer, conveyance or disposal of the Sponsor's legal and/or beneficial ownership, direct or indirect, in the total (or any part thereof) paid up and outstanding Class A Shares of the Concessionaire; and

(c) the Sponsor, as a result of (a) or (b) above, holding less than hundred percent (100%) of the Class A Shares and/or losing the power to direct the management, policies, control and/or decisions, in each case, of the Concessionaire;

**Change in Control** means any issuance, sale, transfer, conveyance, disposal or any event, transaction, arrangement, Encumbrance or agreement of any nature that results in or may result in:

(a) the issuance of any Class A Share to any Person other than the Sponsor; or

(b) the transfer of direct and/or indirect, legal and/or beneficial ownership of any shares, or securities convertible into shares, that causes or may cause the sale, transfer, conveyance or disposal of the Sponsor's legal and/or beneficial ownership, direct or indirect, in the total (or any part thereof) paid up and outstanding Class A Shares of the Concessionaire; and

(c) the Sponsor, as a result of (a) or (b) above, holding less than fifty-one percent (51%) of the Class A Shares and/or loses the power to direct the management, policies and decisions, in each case, of the Concessionaire;

**Change in Law** means the occurrence of any of the following events at any time, commencing from twenty-eight (28) days prior to the Bid Submission Date:

(a) the enactment of any new federal, provincial or local government law, as applicable in the Province of Sindh;

(b) the repeal, modification or re-enactment of any existing federal, provincial or local government law, as applicable in the Province of Sindh;

(c) the imposition by a Government Authority of any additional Concessionaire Permit;
(d) a change in the interpretation or application of any Applicable Law (as applicable in the Province of Sindh) by a court of record as compared to such interpretation or application by a court of record prior to the date of this Agreement;

(e) the commencement of any federal, provincial or local government law (or any provision thereof) (as applicable in the province of Sindh), which has not entered into effect and the date of effectiveness whereof has not been notified or declared, in each case, until the Bid Submission Date;

(f) any new tax imposition or withdrawal from any existing (applicable) zero tax rate regime, as applicable in the Province of Sindh;

provided, that any:

(i) coming into effect, on or after the Bid Submission Date, of any federal, provincial or local government law (or any provision thereof) (as applicable in the Province of Sindh) which is already gazetted in accordance with the Applicable Laws and the date of effectiveness whereof has already been notified or declared, in each case, prior to the Bid Submission Date; or

(ii) any new Applicable Law or any change in the existing Applicable Law, which is already gazetted in accordance with the Applicable Laws and the date of effectiveness whereof has already been notified or declared, in each case, prior to the Bid Submission Date,

shall not constitute a ‘Change in Law’;

Change in Law Termination Amount shall bear the meaning as ascribed thereto in SCHEDULE T (Termination Payment);

Change in Shareholding means any issuance, sale, transfer, conveyance, disposal or any event, transaction, arrangement, Encumbrance or agreement of any nature that results in or may result in:

(a) the issuance of any Class A Share to any Person other than the Sponsor; or

(b) the transfer of direct and/or indirect, legal and/or beneficial ownership of any shares, or securities convertible into shares, that causes or may cause the sale, transfer, conveyance or disposal of the Sponsor’s legal and/or beneficial ownership, direct or indirect, in the total (or any part thereof) paid up and outstanding Class A Shares of the Concessionaire; and

(c) the Sponsor as a result, by virtue of (a) or (b) above holding not less than fifty one percent (51%) of Class A Shares provided that the Sponsor does not lose the power to direct the management, policies and decisions of the Concessionaire;

Change of Scope shall bear the meaning as ascribed thereto in Section 16.1.1 (Change of Scope);

Change of Scope Notice shall bear the meaning as ascribed thereto in Section 16.2.1;
Class A Share(s) means share capital held by the shareholders of the Concessionaire (excluding the Agency), from time to time, against the Sponsor Equity Funding Amount in accordance with the Equity Funding & Utilization Agreement and this Agreement;

Class B Dividends shall bear the meaning as ascribed thereto in Section 10.2.3;

Class B Share(s) means the non-voting and non-participating share capital held by the Agency (against the Agency Equity Funding Amount (or any part thereof) funded, from time to time, as equity in accordance with the Equity Funding & Utilization Agreement) and this Agreement;

Commencement Certificate means a certificate to be jointly issued in writing by the Independent Engineer and the Independent Auditor to the Concessionaire and to the Agency in accordance with Section 3.4 (Commencement Certificate & Commencement Date);

Commencement Date means the date set out in the Commencement Certificate being the date on which each of the Conditions Precedent stand satisfied, waived and/or deferred;

Commercial Operations Date means the date on which the Project shall commence, such period commencing on the day immediately succeeding the Substantial Completion Date;

Commercial Rights Management Fee shall bear the meaning as ascribed thereto in Section 29.2.8;

Completion Check List shall bear the meaning as ascribed thereto in Section 14.3.2;

Completion Check List Items shall bear the meaning as ascribed thereto in Section 14.4.1;

Completion Tests means the tests required to be conducted for Substantial Completion, as listed in SCHEDULE G (List of Tests & Completion Tests);

Completion Tests Date Notice shall bear the meaning as ascribed thereto in Section 14.1.1;

Concession means the right granted by the Agency to the Concessionaire to develop, build, operate and maintain the Concession Assets and carry out all other works that may be required to carry out such development, operation and maintenance in accordance with the terms of this Agreement, during the Concession Period;

Concession Assets means the Temporary Concession Assets and Permanent Concession Assets;

Concession Direct Agreement means the direct agreement that may be entered into between the Concessionaire, the Agency and the Financiers, if required by the Financiers;
Concession Period means, in respect of the Concession and the Concession Assets, the period commencing on the Commencement Date (provided, however, that the Concession Period in respect of the Preliminary Works (if any) shall commence on the Effective Date) and ending on the Trigger Date;

Concessionaire shall bear the meaning as ascribed thereto in the Preamble;

Concessionaire Advertising Plan has the meaning given to that term in Section 29.1.3;

Concessionaire Annuity Amount Payment Account means the account to be established by the Concessionaire and Notified to the Agency as a Concessionaire Condition Precedent to receive the Annuity Amount Payments under the Annuity Amount Payment Agreement;

Concessionaire Authorized Representative shall bear the meaning as ascribed thereto in Section 7.4.1(a);

Concessionaire Conditions Precedent means the conditions precedent, to be fulfilled by the Concessionaire in accordance with the satisfaction of the Agency, as set out in part 1 of SCHEDULE Y (Conditions Precedent and Conditions Subsequent);

Concessionaire Conditions Subsequent means the conditions subsequent to be fulfilled by the Concessionaire in accordance with the satisfaction of the Agency, as set out in part 3 of SCHEDULE Y (Conditions Precedent and Conditions Subsequent);

Concessionaire Cost Escalation Delay Event shall bear the meaning as ascribed thereto in Section 13.7.2;

Concessionaire Cost Escalation Delay Event Amounts shall bear the meaning as ascribed thereto in Section 13.7.2;

Concessionaire Default Termination Amount shall bear the meaning as ascribed thereto in SCHEDULE T (Termination Payment);

Concessionaire Engaged Persons means each of the Concessionaire’s representatives (including the Concessionaire Authorized Representative and the Concessionaire Project Engineer), agents, executives, contractors, employees, subcontractors, vendors, suppliers, parties with whom it has entered into the Project Agreements, Contractors and other personnel, in each case, that are engaged, hired, appointed, contracted (directly or indirectly) by the Concessionaire for the performance of Project Works or any part thereof;

Concessionaire Event of Default shall bear the meaning as ascribed thereto in Section 22.1.1 (Concessionaire Event of Default);

Concessionaire Indemnified Persons shall bear the meaning as ascribed thereto in Section 9.1.2;
Concessionaire Independent Auditor Payment Account means the bank account to be established by the Concessionaire and Notified to the Agency, in accordance with the terms of this Agreement and the Independent Auditor Contract;

Concessionaire Independent Auditor Payment Account Bank means a financial institution/banking company mutually agreed between the Parties for the purposes of establishing and maintaining the Concessionaire Independent Auditor Payment Account pursuant to the terms of the Independent Auditor Contract, the Agency Agreements and the Project Agreements;

Concessionaire Independent Auditor Payment Account Standing Instructions shall bear the meaning as ascribed thereto in Section 6.6.2;

Concessionaire Independent Engineer Payment Account means the bank account to be established by the Concessionaire and Notified to the Agency, in accordance with the terms of this Agreement and the Independent Engineer Contract;

Concessionaire Independent Engineer Payment Account Bank means a financial institution/banking company mutually agreed between the Parties for the purposes of establishing and maintaining the Concessionaire Independent Engineer Payment Account pursuant to the terms of the Independent Engineer Contract, the Agency Agreements and the Project Agreements;

Concessionaire Independent Engineer Payment Account Standing Instructions shall bear the meaning as ascribed thereto in Section 5.6.2;

Concessionaire Management Fee shall bear the meaning as ascribed thereto in Section 29.1.6;

Concessionaire Permits means all such approvals, consents, authorizations, notifications, concessions, acknowledgements, Licence, permits, decisions or similar items that relate to the Project and its implementation including all such consents and authorizations issued by a Government Authority and which the Concessionaire is or its Contractors are required to obtain from any Government Authority and thereafter to maintain to fulfill its obligations under the Agency Agreements, including the Specified Concessionaire Permits; provided, however, that in no event shall the Concessionaire Permits include any concessions or exemptions from the Applicable Laws unless they are expressly granted pursuant to the terms of the Agency Agreements;

Concessionaire Preliminary Notice shall bear the meaning as ascribed thereto in Section 23.2.1;

Concessionaire Project Engineer shall bear the meaning as ascribed thereto in Section 7.4.1(c);

Conditions Precedent means the conditions precedent listed in part 1 and part 2 of SCHEDULE Y (Conditions Precedent and Conditions Subsequent);

Conditions Subsequent means the conditions subsequent listed in part 3 and part 4 of SCHEDULE Y (Conditions Precedent and Conditions Subsequent);
Construction Completion shall bear the meaning as ascribed thereto in Section 14.7.1;

Construction Completion Certificate shall bear the meaning as ascribed thereto in Section 14.6.1;

Construction Completion Date shall bear the meaning as ascribed thereto in Section 14.7.1;

Construction Completion Schedule means the schedule attached herewith as SCHEDULE E (Construction Completion Schedule) setting out:
(a) the Scheduled Construction Completion Date;
(b) the Scheduled Substantial Completion Date; and
(c) the Project Construction Milestones;

Construction Drawings means the drawings, designs, calculations and documents prepared and/or to be prepared by the Concessionaire pursuant to the Applicable Standards and the Design Requirements that pertain to the Concession Assets and which are detailed in PART I - SCHEDULE C (List of Construction Drawings), as amended from time to time by the Concessionaire in accordance with the terms of this Agreement with the approval of the Independent Engineer (in consultation with Agency);

Construction Inspection Report shall bear the meaning as ascribed thereto in Section 13.6.2;

Construction Monthly Progress Report shall bear the meaning as ascribed thereto in Section 13.5.1;

Construction Performance Security means a first demand irrevocable, unconditional and without recourse guarantee, issued by a scheduled commercial bank in Pakistan (with a minimum credit rating of at least ‘AA-’ as rated by JCR VIS or an equivalent rating by PACRA) acceptable to the Agency, in the form of a demand draft, bank guarantee or a pay order, guaranteeing the payment to the Agency of an amount equal to two percent (2%) of the Pre-Estimated Project Cost, in the form of the instrument attached herewith as SCHEDULE L (Form of Construction Performance Security);

Construction Performance Security Expiry Date shall bear the meaning as ascribed thereto in Section 11.1.6;

Construction Period means the period commencing on the Commencement Date and ending on the Construction Completion Date;

Construction Period Damages shall bear the meaning as ascribed thereto in Section 14.5.1;

Construction Period Damages Payment Date shall bear the meaning as ascribed thereto in Section 14.5.2;
**Construction Period Insurances** means the Insurances procured and/or obtained by the Concessionaire pursuant to the provisions of and in accordance with Section 20.1 (Construction Period Insurances) and **PART I (Construction Period Insurances) - SCHEDULE I (Insurances)**;

**Construction Programme** shall bear the meaning as ascribed thereto in Section 13.2.1; **Construction Requirements** means the relevant standards, requirements and criterion (as applicable) that are set out in relation to and are applicable to the Construction Works, as set out in:

(a) the Main Body;

(b) the Scope of the Project;

(c) the AASHTO Standards (to the extent adopted by the National Highway Authority in the “NHA General Specifications of 1998”), being the requirements applicable in respect of matters relating to the Concession Assets;

(d) the Design Requirements;

(e) accordance with **SCHEDULE G (List of Tests & Completion Tests)**;

(f) accordance with **SCHEDULE C (List of Construction Drawings)**;

(g) the Construction Programme; and

(h) any other standards, requirements and criterion (as applicable), mutually agreed between the Parties from time to time,

provided, however, in the event of any discrepancy in the standards, requirements and criterion in accordance with nationally and internationally accepted standards as per Good Industry Practice (as applicable), shall apply (unless otherwise mutually agreed between the Parties); provided further, that in the event there is any deficiency in the standards and requirements (as applicable) the AASHTO Standards, ASTM Standards and NHA Standards (as certified by the Independent Engineer) shall apply;

**Construction Tests** shall bear the meaning as ascribed thereto in Section 13.4.1;

**Construction Time For Completion** means the time permitted herein for performance and completion of Construction Works and all other obligations to be performed by the Concessionaire for the issuance of the Construction Completion Certificate, as set out in and contemplated by the Applicable Standards and the Construction Programme, including the:

(i) completion of engineering and design works and services on or prior to the date set out in the Construction Completion Schedule;

(ii) submission of Construction Drawings on or prior to the dates contemplated by the Applicable Standards and the Construction Programme;
(iii) performance and completion of each Project Construction Milestone on or prior to its Project Construction Milestone Date;

(iv) achievement of Substantial Completion on or prior to the Scheduled Substantial Completion Date;

(v) achievement of Substantial Completion on or prior to the Scheduled Substantial Completion Date; and/or

(vi) achievement of Construction Completion on or prior to the Scheduled Construction Completion Date;

Construction Works means all obligations, works, services and duties undertaken and/or performed and/or to be undertaken and/or performed by the Concessionaire until the Construction Completion Date pursuant to the Applicable Standards including, inter alia, the obligations, works, services and duties undertaken and/or performed and/or to be undertaken and/or performed by the Concessionaire in respect of: (a) preparation, completion and delivery of Construction Drawings; (b) the engineering (including design), procurement and construction of the Concession Assets (including all activities and obligations incidental thereto); (c) the Site Construction Works; and (d) the activities consisting of, and for achievement of, in each case, each Project Construction Milestone;

Contractor(s) means the EPC Contractor(s) and the O&M Contractor and any of the Concessionaire’s other direct contractors and any of their direct sub-contractors integrally involved in the Project for the performance of Project Works (or any part thereof);

Corporate Documents means the constitutional documents and the corporate authorizations set out in SCHEDULE K (Corporate Documents);

Corrupt Act means:

(a) offering, giving or agreeing to give to the Agency, a Government Authority or to any Person employed by or on behalf of the Agency and/or a Government Authority any gift or consideration of any kind as an inducement or reward:

   (i) for doing or not doing (or for having done or not having done) any act in relation to the obtaining or performance of this Agreement or any other contract relating to this Agreement with the Agency and/or a Government Authority; or

   (ii) for showing or not showing favor or disfavor to any Person in relation to this Agreement or any other contract relating to this Agreement with the Agency and/or a Government Authority;

(b) entering into this Agreement or any other contract relating to this Agreement with the Agency and/or a Government Authority in connection with which commission/discount has been paid/received (as the case may be) or has been agreed to be paid or received by the Concessionaire or on its behalf, or to its
knowledge, unless before the relevant contract is entered into particulars of any such commission and the terms and conditions of any such contract for the payment of such commission/discount have been disclosed in writing to the Agency;

(c) committing any offence:

(i) under any law, in respect of fraudulent acts in relation to this Agreement, from time to time dealing with bribery, corruption or extortion;

(ii) under any law, in respect of fraudulent acts in relation to this Agreement, creating offences in respect of fraudulent acts; or

(iii) in respect of fraudulent acts in relation to this Agreement;

(d) in respect of fraudulent acts in relation to this Agreement, defrauding or attempting to defraud or conspiring to defraud the Agency or any other public body;

**Corrupt Act Termination Amount** shall bear the meaning as ascribed thereto in **SCHEDULE T (Termination Payments)**;

**CPI** means the Pakistan Consumer Price Index, published by Pakistan Bureau of Statistics, being the rate published on the last working day of the last quarter of a calendar year;

**Cure Period** means:

(a) in respect of a Concessionaire Event of Default:

(i) during any period when any Financing Due is outstanding, the period commencing on the date of receipt by the Concessionaire of the Agency Preliminary Notice and expiring on the date falling ninety (90) days thereafter, or such other time period as may be agreed in the Concession Direct Agreement;

(ii) during any period when any Financing Due is not outstanding, the period commencing on the date of receipt by the Concessionaire of the Agency Preliminary Notice and expiring on the date falling forty five (45) days thereafter;

(b) in respect of an Agency Event of Default, the period commencing on the date of receipt by the Agency of the Concessionaire Preliminary Notice and expiring on the date falling sixty (60) days thereafter;

**Debt Repayment Date** means the earlier of (a) the date falling on the eighth anniversary of the Substantial Completion Date; and (b) the date on which the financing availed pursuant to the Financing Term Sheet is scheduled to be fully repaid which shall in any event not be earlier than eight (8) years commencing from Scheduled Substantial Completion Date;
Provided however, the Concessionaire may, at least ninety (90) days prior to the Financial Close seek written approval from the Agency and the Independent Auditor, which approval and/or disapproval (as the case may be) shall be provided by the Agency and the Independent Auditor within thirty (30) days of receipt of such approval request, propose and agree with the Agency and the Independent Auditor to a period more than eight (8) years following Scheduled Substantial Completion Date;

Moreover, the debt repayment calculation shall only be done through the payment (PMT) formula whereas, debt sculpting shall not be allowed.

**Decommissioned Project Area** shall bear the meaning as ascribed thereto in Section 7.13.1;

**Defects & Deficiencies** means:

(a) in respect of Project Works, any Project Works (or any part thereof) that fail to conform to the Applicable Standards in any manner (including (without limitation) in services, performance, materials, design, execution, engineering, operations and maintenance and/or workmanship);

(b) in respect of the Concession Assets, any Concession Asset (or any part thereof) that fail to conform to the Applicable Standards;

**Defects Liability Period** means the twenty-four (24) months period for notifying and rectifying the Defects & Deficiencies, being the period commencing on the Substantial Completion Date and expiring on the date falling twenty-four (24) months following the Substantial Completion Date;

**Delayed Payment Rate** means the six (6) months KIBOR plus one percent (1%), calculated for the actual number of days which the relevant amount remains unpaid on the basis of three hundred and sixty five (365) day year;

**Design Requirements** means the design requirements of the Concession Assets, as set out in SCHEDULE B (Design Requirements);

**Detailed Engineering Design** means the detailed engineering design for the Project prepared by the Concessionaire in accordance with Applicable Standards;

**DFBOT** shall mean design, finance, build, operate and transfer;

**Dispute** shall bear the meaning as ascribed thereto in Section 30.1.1;

**Dispute Resolution Procedure** means the procedure for resolution of Disputes as set out in Article 30 (Dispute Resolution);

**Divestment Requirements** shall bear the meaning as ascribed thereto in Section 24.1.1;
**Easementary Rights** means all easements, reservations, rights-of-way, utilities and other similar purposes, or zoning or other restrictions relating to the Project Site and to the use of real property relating to the Project Site, which are necessary or appropriate for the conduct of activities of the Concessionaire related to the Concession Assets;

**Effective Date** means the date on which this Agreement is signed by each of the Parties;

**EIA Approval** means the approval to be obtained by the Concessionaire from the Sindh Environmental Protection Agency (or a successor entity) in relation to the Project in accordance with (without limitation) the Environmental Standards;

**Emergency** means a condition or situation that is likely to endanger the security of the individuals on or about the Project Site including Users thereof or which poses an immediate threat of material damage to any of the Concession Assets or the Project Site;

**Emergency Decommissioning** shall bear the meaning as ascribed thereto in Section 7.12.1;

**Encumbrance** means any encumbrance on an asset, including (without limitation) mortgage, charge, pledge, lien, hypothecation and/or any security interest, assignment, privilege or priority of any kind having the effect of security or other such obligations and shall include without limitation any designation of loss payees or beneficiaries or any similar arrangement under any insurance policy pertaining to the Concession Assets and/or any part or portion thereof and physical encumbrances and encroachments thereon;

**Environmental Standards** means collectively, the applicable environmental guidelines and occupational health and safety standards established by the “Pakistan Environmental Protection Agency”, the Sindh Environmental Protection Agency and the IFI Standards;

**EPC Contract(s)** means the agreement entered or to be entered into between the Concessionaire and the EPC Contractor(s) in accordance with this Agreement, for, *inter alia*, the design, engineering, procurement, construction, completion, testing of the Concession Assets and the commissioning of the same, as such agreement may be amended by the parties thereto from time to time;

**EPC Contractor(s)** means collectively the Lead EPC Contractor and Other EPC Contractor(s) engaged by the Concessionaire under the EPC Contract(s), meeting the eligibility criteria under the RFP and details in respect of which are provided under [●] of the Bid;

**Equity Funding & Utilization Agreement** means the agreement (in the form agreed between the Parties and the Sponsors) to be entered into by and between, *inter alia*, the Agency, the Sponsor and the Concessionaire, at any time prior to the Scheduled Commencement Date, for the purposes of, *inter alia*, (a) the Agency’s contribution towards the Base Equity Funding Amount (with respect to Class B Shares), and (b) the Sponsor’s contribution towards the Base Equity Funding Amount (with respect to Class
A Shares), respectively, and the utilization of the same, in each case, in accordance with the terms thereof;

**Escalable Items** means:

(a) cement, forming seven percent (7%) of the construction cost (including taxes);

(b) bitumen, forming five percent (5%) of the construction cost (including taxes);

(c) steel, forming fourteen (14%) of the construction cost (including taxes); and

(d) petroleum, oil and lubricant (POL) for construction machinery and equipment, forming five percent (5%) of the construction cost (including taxes);

**Escalable Items Saving** has the meaning ascribed thereto in Section 10.5.3;

**Escalation Cost** has the meaning ascribed thereto in Section 10.5.1;

**Exit Implementation Period** means:

(a) in case of Termination of this Agreement, the period commencing on the Termination Date and expiring on the Transfer Date;

(b) in case of expiry of this Agreement on the Final Expiry Date, the period commencing thirty (30) days prior to the Final Expiry Date and expiring on the Final Expiry Date;

**Extended Agency Financial Instrument** shall bear the meaning as ascribed thereto in Section 17.

**Extended Agency Financial Instrument Extension Failure Certificate** shall bear the meaning as ascribed thereto in Section 17.3.4(b);

**Final Expiry Date** means the date falling on the tenth (10th) yearly anniversary of the Substantial Completion Date; provided, however, the Agency and the Concessionaire may agree to extend the Final Expiry Date (and, as a result, the Concession and the Concession Period) with mutual written consent in accordance with and subject to the Applicable Laws;

**Financial Close** means the execution and delivery of the Financing Documents that (together with Base Equity Funding Amount commitments) evidence sufficient financing for the construction, testing, and commissioning of the Project and achievement of Construction Completion (following the resolution of any objections raised by the Agency and/or the Independent Auditor to the Financing Term Sheet that sets out a principal repayment schedule and the other principal terms of the Financing Documents between the Concessionaire and the Financiers) and evidence of commitments for such equity as is required by the Concessionaire to satisfy the requirements of the Financiers and the satisfaction of all Conditions Precedent for the initial availability of funds under the Financing Documents and the Concessionaire having immediate access to the Financing;
Financial Close Achievement Notice shall bear the meaning as ascribed thereto in Section 27.5.1;

Financial Close Cure Period Date means the date falling ninety (90) days following the Scheduled Financial Close Period;

Financial Model means the Base Case Financial Model, as revised by the Independent Auditor in accordance with the terms of this Agreement and/or any Agency Agreement;

Financiers means the financial institutions, banks, Islamic financiers, infrastructure investment funds, trusts or trustees of the holders of debentures or other securities their successors and assigns, that extend Financing to the Concessionaire pursuant to the Financing Documents;

Financing means 70% of the Pre-Estimated Project Cost and this in relation to the finance facilities, loans, advances, financial accommodation and/or arrangement, subscription and/or issuance of debentures/bonds/redeemable capital, risk participation, take out financing and/or any other financial obligation availed by the Concessionaire from the Financiers in respect of the Project, pursuant to the Financing Documents.

Provided however, the Concessionaire may, at least ninety (90) days prior to the Financial Close seek written approval from the Agency and the Independent Auditor, which approval and/or disapproval (as the case may be) shall be provided by the Agency and the Independent Auditor within thirty (30) days of receipt of such approval request, propose and agree with the Agency and the Independent Auditor to a period more than eight (8) years following Scheduled Substantial Completion Date;

Provided, in the event the Sponsor wishes to arrange sub-debt in addition to the commercial debt from financial institutions up to seventy percent (70%) of the Pre-Estimated Project Cost collectively, the Concessionaire shall be entitled to, subject to prior approval from the Agency and the Independent Auditor at least ninety (90) days prior to the Financial Close, seek written approval from the Agency and the Independent Auditor, which approval and/or disapproval (as the case may be) shall be provided by the Agency and the Independent Auditor within thirty (30) days of receipt of such approval request, raise any shortfall in debt / financing through private placement of debt/financing, which may be extended by the Sponsor(s) and shall be on no more favorable commercial terms and conditions as the commercial debt financing.

Financing Amendment Term Sheets shall bear the meaning as ascribed thereto in Section 27.3.3;

Financing Component means the component of Annuity Amount Payment that relates to the repayment and servicing of Financing (i.e. both Principal repayment and interest/mark-up payments), as set out in the Financial Model;

2 On such financing, the procedures for procurement and approval of such debt and its reflection in the DCA shall be as is the case with commercial debt (financing).
**Financing Due** means the aggregate of the following sums expressed in Pakistani Rupees outstanding and payable to the Financier up to the date immediately preceding the Termination Payment Date pursuant to the Financing Documents:

(a) the principal amount of the financing provided and disbursed by the Financiers under the Financing Documents for financing the Project (the **Principal**) in accordance with the Financial Model and the Financing Term Sheet and Financing Amendment Term Sheets (if any) delivered to and not objected to by the Agency and the Independent Auditor in accordance with Section 27.3 (**Financing Term Sheet & Financing Amendment Term Sheets**);

(b) the interest or mark-up (or any other term connoting the return paid to the Financiers on financing) accrued on the Principal in accordance with the Financial Model and the Financing Term Sheet and the Financing Amendment Term Sheets (if any) delivered to and not objected to by the Agency and the Independent Auditor in accordance with Section 27.3 (**Financing Term Sheet & Financing Amendment Term Sheets**);

(c) only in the event of Termination due to Agency Event of Default, penal interest or charges payable under the Financing Documents to the Financiers;

**Financing Documents** means the loan/financing agreements or instruments relating to or contemplated by the Financing Term Sheets that have not been objected to or deemed not to have been objected to by the Agency and/or the Independent Auditor pursuant to Section 27.3 (**Financing Term Sheet & Financing Amendment Term Sheets**) as may be amended from time to time in accordance with the provisions of Section 27.3 (**Financing Term Sheet & Financing Amendment Term Sheets**);

**Financing Term Sheet** shall bear the meaning as ascribed thereto in Section 27.3.1;

**First Agency Financial Instrument** means an irrevocable and unconditional guarantee from the Agency in a form and substance acceptable to the Financiers as a stand-by letter of credit or a debit authority from the Agency authorizing the State Bank of Pakistan to debit the relevant account of the Agency with the State Bank of Pakistan on demand from the security trustee acting on behalf of the Financiers;

**First Agency Financial Instrument Amount** shall bear the meaning as ascribed thereto in Section 17.3.3(a)(i);

**First Agency Financial Instrument Expiry Date** shall bear the meaning as ascribed thereto in Section 17.3.4(a);

**First Agency Financial Instrument Extension Failure Certificate** shall bear the meaning as ascribed thereto in Section 17.3.4(a);

**First IA List** shall bear the meaning as ascribed thereto in Section 6.1.1;

**First IE List** shall bear the meaning as ascribed thereto in Section 5.1.1;
**Force Majeure Costs** means all such costs that are directly attributable to, arise from and are a direct result of, in each case, a Force Majeure Event and shall include interest and principal payments under the Financing Documents that are in accordance with the Financing Term Sheets and the Financing Amendment Term Sheets; any additional capital expenditures; any additional construction costs; and any additional operating costs; provided, however, all such additional costs and payment of interest and principal shall be subject to confirmation by the Independent Auditor and the Independent Engineer and provided further, for the purposes of determining such costs, information contained in the Financial Model shall be relied upon;

**Force Majeure Event** means the occurrence of any or all of the Non-Political Events and/or the Political Events;

**Force Majeure Notice** shall bear the meaning as ascribed thereto in Section 21.2.1;

**Force Majeure Period** means, as determined by the Independent Engineer, the period commencing from the date of occurrence of a Force Majeure Event and ending on (a) the date on which the Affected Party resumes or should have resumed (as determined by the Independent Engineer) such of its obligations the performance of which it was excused in terms of Section 21.8 (Excuse from Performance of Obligations); or (b) the Termination Date; as applicable;

**Good Industry Practice** means those practices, methods, techniques, standards, skills, diligence and prudence which are generally and reasonably expected from a reasonably skilled and experienced operator engaged in the same type of undertaking as envisaged in respect of the Concessionaire under this Agreement and acting generally in accordance with the provisions of the Applicable Laws, and would mean good engineering practices in the design, engineering, construction and project management and which would be expected to result in the performance of its obligations by the Concessionaire and in the operation and maintenance of the Project in accordance with the Applicable Standards. “Good Industry Practices” are not limited to optimum practices, methods, techniques, standards, skills, diligence, prudence or acts to the exclusion of all others, but rather are a spectrum of possible practices, methods, techniques, standards, skills, diligence, prudence or acts which could have been expected to accomplish the desired result at reasonable cost consistent with reliability and safety;

**Government Authority(ies)** means the Government of Pakistan, the Agency, any governmental department, commission, board, body, bureau, agency, authority, instrumentality, court or other judicial or administrative body having jurisdiction over the Concessionaire, the Project, Project Site, the Concession Assets or any part thereof, or the performance of all or any of the services or obligations of the Concessionaire under or pursuant to this Agreement;

**Handover List** shall bear the meaning as ascribed thereto in Section 25.1.1;

**Hydraulic Model Study** means a physical model to most appropriate scale prepared by a reputed and competent hydraulic research institute / department (Indus Research Centre at Hyderabad or Hydraulic Research Institute at Nandipur) using the riverine survey data, flood hydrology report, historic data, existing outfalls of storm-water drains disposal, etc. Physical model thus prepared will be operated after calibration for variable
water flow discharges, including the maximum and historical discharges, to study the behaviour of river and to recommend the most appropriate location, length, skew angle of bridge, type and sizes and geometry of river training works such as guide banks, flood bunds, cullette, spurs, etc. and also the afflux at different water flow condition including maximum discharge for which the bridge and river training works will be designed.

**IFI Standards** means the environmental and social standards of International Finance Institutions (IFIs), as Notified by the Agency to the Concessionaire;

**Indemnified Party** shall bear the meaning as ascribed thereto in Section 9.3.1;

**Indemnifying Party** shall bear the meaning as ascribed thereto in Section 9.3.1;

**Independent Auditor** means the auditor appointed in respect of the Project in accordance with Article 6 (Independent Auditor) and in terms of the Independent Auditor Contract;

**Independent Auditor Appointment Term** shall bear the meaning as ascribed thereto in Section 6.2.1;

**Independent Auditor Contract** means the contract to be entered into between the Agency, the Concessionaire, the Independent Auditor and any other Person agreed by the Parties in accordance with Article 6 (Independent Auditor);

**Independent Auditor Payments** shall bear the meaning as ascribed thereto in Section 6.5.1;

**Independent Engineer** means the engineer appointed in respect of the Project in accordance with Article 5 (Independent Engineer) and in terms of the Independent Engineer Contract;

**Independent Engineer Appointment Term** shall bear the meaning as ascribed thereto in Section 5.2.1;

**Independent Engineer Contract** means the contract to be entered into between the Agency, the Concessionaire, the Independent Engineer and any other Person agreed by the Parties, in accordance with Article 5 (Independent Engineer);

**Independent Engineer Payments** shall bear the meaning as ascribed thereto in Section 5.5.1;

**Indicative Independent Auditor Terms of Reference** means the duties, functions and the scope of work to be performed by the Independent Auditor, as indicatively attached herewith as **SCHEDULE N - PART I** (Indicative Independent Auditor Terms of Reference); provided, however, upon execution of the Independent Auditor Contract, the scope of work of the Independent Auditor set out therein shall be deemed to replace **SCHEDULE N - PART I** (Indicative Independent Auditor Terms of Reference);

**Indicative Independent Engineer Terms of Reference** means the duties, functions and the scope of work to be performed by the Independent Engineer, as indicatively attached herewith as **SCHEDULE N-PART II** (Indicative Independent Engineer Terms of Reference);
Reference); provided, however, upon execution of the Independent Engineer Contract, the scope of work of the Independent Engineer set out therein shall be deemed to replace SCHEDULE N - PART II (Indicative Independent Engineer Terms of Reference);

**Insurances** means all insurances, reinsurance, agreements of insurance and reinsurance and/or arrangement for insurance and/or reinsurance in relation to the Project, the Concession Assets, the Construction Works and/or any part or portion thereof procured or to be procured by the Concessionaire, including (without limitation) to the Construction Period Insurances and the Operations Period Insurances;

**KIBOR** means the 6 - Month Karachi Interbank Offered Rate, being the Average rate, Offer, for the six (6) months tenor, as published on State Bank of Pakistan page on that date or as published by the Financial Markets Association of Pakistan in case the State Bank of Pakistan page is unavailable;

**Lapse of Consent** means any Concessionaire Permit:

(a) ceasing to remain in full force and effect and not being renewed or replaced within the time period prescribed by the Applicable Laws for the renewal or replacement of such Concessionaire Permit or, where a time period is not prescribed by the Applicable Laws, within sixty (60) days of such Concessionaire Permit ceasing to be in full force and effect; or

(b) (other than a Specified Concessionaire Permit) not being issued upon application having been properly and timely made and diligently pursued within the time period prescribed by the Applicable Laws or where a time period is not prescribed by the Applicable Laws, within sixty (60) days of proper application being made for such Concessionaire Permit; or

(c) being made subject, upon renewal, or otherwise, to any terms or conditions that materially and adversely affect the Concessionaire’s (or a Contractor’s) ability to perform its obligations under any document included within the Agency Agreements and/or the Project Agreements,

in each of the above instances despite such party’s compliance with the applicable procedural and substantive requirements as applied in a “non-discriminatory” (as explained in Section 8.6) manner;

**Lead EPC Contractor** means the contractor engaged by the Concessionaire under the EPC Contract, performing at least fifty-one percent (51%) of Construction Period Works, meeting the eligibility criteria under the RFP and details in respect of which are provided under Form I-5 of the Bid;

**Licence** shall bear the meaning as ascribed thereto in Section 4.1.1;

**Losses** means, as certified by the Independent Engineer and the Independent Auditor, as determined by the Independent Engineer and the Independent Auditor, any loss, damage, liability, payment and obligation (excluding any indirect or consequential loss, damage, liability, payment or obligation), and all expenses (including, without limitation, reasonable legal fees);
Main Body means this Agreement excluding the Schedules;

Maintenance Requirements means maintenance requirements for the maintenance of the Project, as prescribed by the Applicable Standards;

Material Adverse Effect means, in the opinion of the Independent Engineer (in respect of technical matters) and/or in the opinion of the Independent Auditor (in respect of financial matters), there has occurred or could reasonably be expected to occur an effect, event, matter or circumstance or a change in the circumstances which materially and adversely impairs:

(a) the business, operations, property, assets, present or future condition (financial or otherwise) or prospects of the Concessionaire, Sponsor or Contractor) in respect of the Project;

(b) the ability or probability (financial or otherwise) of the Concessionaire, Sponsor or Contractor to perform and observe its respective obligations under the Project Agreements;

(c) the legality, validity or enforceability of, or the rights, obligations or remedies of, the Agency under this Agreement; and/or

(d) the Concessionaire’s ability to implement, design, finance, construct, operate and maintain the Project in accordance with the terms of the Agency Agreements and the Project Agreements;

Material Adverse Impediment shall bear the meaning as ascribed to it in Section 4.14.1;

Material Breach means breach by either Party or the Sponsor of any of its/their obligations under the Agency Agreements which has/is likely to have a Material Adverse Effect on the Project and which such breaching Party shall have failed to cure (within the applicable Cure Period) and if such Cure Period is not applicable then by the date falling forty-five (45) days following the date of receipt of a Notice issued by the non-breaching Party to the breaching Party to cure such breach;

Material Breach of O&M Requirements shall bear the meaning as ascribed to it in Section 19.3.1;

Material Impediment Removal Period shall bear the meaning as ascribed to it in Section 4.14.2;

Minimum Indemnification Amount means the amount equal to PKR 1,000,000/- (Pakistani Rupees One Million only) that a Party’s claims for indemnification pursuant to Article 9 (Indemnities & Limitation of Liabilities) must exceed in the aggregate before that Party shall be entitled to indemnification;

New IA List shall bear the meaning as ascribed thereto in Section 6.2.3;

New IE List shall bear the meaning as ascribed thereto in Section 5.2.3;
**New O&M Performance Security** shall bear the meaning as ascribed thereto in Section 11.3.8;

**Non Availability** means the period during which the Project is not available for use by the Users, due to the occurrence of the Annuity Amount Payment Damages Event, in the relevant Annuity Amount Payment Evaluation Period;

**NHA Standards** means the relevant standards adopted by the 'National Highway Authority';

**Non-Political Event** shall bear the meaning as ascribed thereto in Section 21.1.1(b);

**Non-Political Event Termination Amount** shall bear the meaning as ascribed thereto in **SCHEDULE T** (**Termination Payments**);

**Notice, Notify, Notification and its grammatical variations** means as notified in writing;

**Notice of Remedy** shall bear the meaning as ascribed thereto in Section 18.2.1(c);

**O&M Contract** means the contract entered into or that may be entered into by the Concessionaire in accordance with this Agreement for the provision of the Operation and Maintenance in accordance with the O&M Requirements and the O&M Manual;

**O&M Contractor** means the Person of good repute with whom the Concessionaire has entered into or may enter into the O&M Contract;

**O&M Cost Component** means a component of Annuity Amount Payment relating to the operations and maintenance expenses, as set out in the Financial Model and as adjusted from time to time on each Annuity Amount Payment Date on the following basis: (i) twenty percent (20%) of the operations component of the O&M Cost Component shall be indexed to a fixed rate of ten percent (10%); (ii) remaining operations component of the O&M Cost Component shall be indexed to Consumer Price Index (CPI); and (iii) maintenance component of the O&M Cost Component shall be indexed to Wholesale Price Index (WPI);

**O&M Documents** means all such reports, records, surveys, plans, analyses, calculations, manuals, operating procedures, guides and manuals, updated 'as built' drawings and documentation of any nature prepared, updated and submitted by the Concessionaire in connection with the Operations and Maintenance to the Agency, the Independent Engineer and/or the Independent Auditor pursuant to the Applicable Standards and pursuant to any requests made in accordance with the Applicable Standards by the Agency, the Independent Engineer and or the Independent Auditor from time to time;

**O&M Inspection Report** shall bear the meaning as ascribed thereto in Section 19.13.2;

**O&M Manual** shall bear the meaning as ascribed thereto in Section 19.7.2;

**O&M Monthly Status Report** shall bear the meaning as ascribed thereto in Section 19.12.1;
**O&M Performance Security** means the performance security, in the form of a bank guarantee, demand draft or pay order, issued by a scheduled bank in Pakistan (with a minimum credit rating of at least ‘AA-’ as rated by JCR VIS or an equivalent rating by PACRA) acceptable to the Agency, being in an amount equal to ten percent (10%) of the O&M Cost Component for the Operational Year furnished from time to time by the Concessionaire to the Agency in accordance with Section 11.3 (*O&M Performance Security*), in case of a bank guarantee, the same shall be in form and substance as attached hereto as **SCHEDULE M (Form of O&M Performance Security)**;

**O&M Programme** shall bear the meaning as ascribed thereto in Section 19.7.2;

**O&M Requirements** means the relevant standards, requirements and criterion (as applicable) that are set out in relation to and are applicable to the Operation and Maintenance, as set out in:

(a) the Main Body;

(b) the Scope of the Project;

(c) the AASHTO Standards (to the extent adopted by the National Highway Authority in the “NHA General Specifications of 1998”), being the requirements applicable in respect of matters relating to the Concession Assets;

(d) the **SCHEDULE H (O&M Requirements)**;

(e) the O&M Manual;

(f) the Safety Requirements;

(g) the Applicable Standards being the requirements applicable in respect of matters relating to the Concession Assets;

(h) in respect of each Operational Year following Substantial Completion Date, the O&M Programme prepared for such Operational Year in accordance with Section 19.8 (*O&M Programme*); and

(i) any other standards, requirements, criterion and timelines (as applicable), mutually agreed between the Parties from time to time,

provided, however, in the event of any discrepancy in the standards, requirements and criterion (as applicable) set out in the abovementioned, the standards, requirements and criterion in accordance with nationally and internationally accepted standards as per Good Industry Practice (as applicable), shall apply (unless otherwise agreed between the Parties) provided further, that in the event there is any deficiency in the standards and requirements (as applicable) the AASHTO Standards, ASTM Standards and NHA Standards (as certified by the Independent Engineer) shall apply;

**O&M Tests** shall bear the meaning as ascribed thereto in Section 19.14.1;

**O&M Time For Completion** means the time permitted herein for performance and completion of Operations and Maintenance and all other obligations to be performed by
the Concessionaire during the Operations Period, as set out in and contemplated by the Applicable Standards and each O&M Programme, including (without limitation) performance and completion of each Project O&M Milestone on or prior to its Project O&M Milestone Date;

**Operation and Maintenance** or **Operate and Maintain** means all obligations, works, services and duties undertaken and/or performed and/or to be undertaken and/or performed by the Concessionaire during the Operations Period, pursuant to the Applicable Standards including (a) the preparation, completion and delivery of all O&M Documents; (b) the operation and maintenance of the Concession Assets during the Operations Period; (c) functions of operations, maintenance, traffic movement, safety measurements etc., and performance of other services and obligations incidental thereto; and (d) achievement of Project O&M Milestones;

**Operational Year** means a period of one (1) year commencing on each consecutive anniversary of the Commercial Operations Date and ending as of the end of the day preceding the next anniversary of the Commercial Operations Date, except for the first (1st) Operational Year which shall start on the Commercial Operations Date;

**Operations Period** means the period commencing on the Commercial Operations Date and ending on the Trigger Date;

**Operations Period Insurances** means the Insurances procured and/or obtained by the Concessionaire pursuant to the provisions of and in accordance with Section 20.2 (Operations Period Insurances) and **PART I (Operations Period Insurances)** - **SCHEDULE I (Insurances)**;

**Other EPC Contractor(s)** means the contractor(s), other than the Lead EPC Contractor, engaged by the Concessionaire under the EPC Contract(s), collectively performing at maximum forty-nine percent (49%) of Construction Period Works, meeting the eligibility criteria under the RFP and details in respect of which are provided under Form I-5 of the Bid;

**Outstanding Termination Payment** shall bear the meaning as ascribed thereto in Section 17.4.1(c);

**Parties** shall have the meaning ascribed thereto in the Preamble;

**Adjustable Annuity Amount Payment Damages** shall bear the meaning as ascribed thereto in Section 17.2.2;

**Payable Termination Payment Amount Shortfall** shall bear the meaning as ascribed thereto in Section 17.4.1(b);

**Permanent Concession Assets** means the Project including all Project Facilities and all rights, title, benefits and easements that may be required for the operation and maintenance of the Project, in accordance with this Agreement;

**Permitted Events** means:
(i) Force Majeure Events;
(ii) Agency Events of Default;

(iii) Emergency Decommissioning, to the extent the same does not result from reasons attributable to the Concessionaire;

(iv) Material Adverse Impediment, to the extent the same does not result from reasons attributable to the Concessionaire;

(v) a Change in Law causing a delay in the performance of the Concessionaire’s obligations under this Agreement;

(vi) the occurrence of the circumstances set out in Section 4.9 (Geological and Archeological Finds) causing a delay in the performance of the Concessionaire’s obligations under this Agreement; and

(vii) the occurrence of the Agency Overriding Power Event, to the extent the same does not result from reasons attributable to the Concessionaire;

**Persistent Breach of O&M Requirements** means:

(a) any reoccurring and persistent breach of the O&M Requirements that remains un-remedied despite the issuance of Notice of Remedy by the Independent Engineer;

(b) repeated occurrences of a breach that has been remedied pursuant to a Notice of Remedy, notwithstanding that the earlier occurrences of breach may have been remedied pursuant to the Notice of Remedy or otherwise,

in each case, sub-clause (a) and (b) above, that results in a Material Adverse Effect; provided, however, the Concessionaire shall not be deemed to be in Material Breach of the O&M Requirements in the afore-stated circumstances in the event such breach is caused by the Permitted Events;

**Person** means any individual, firm, company, corporation, society, partnership (whether or not having a separate legal personality), joint venture, trust, unincorporated organization, government state, association or Government Authority or any other legal entity and shall include successors and assigns;

**PKR** or **Pakistani Rupees** means the lawful currency of the Islamic Republic of Pakistan;

**Political Event** shall bear the meaning as ascribed thereto in Section 21.1.1(a);

**Political Event Termination Amount** shall have the meaning ascribed thereto in **SCHEDULE T** *(Termination Payments)*;

**Pre-Estimated Project Cost** means the estimated cost of the Project, as specified in the Base Case Financial Model and being funded through the proceeds of the Financing and the Base Equity Funding Amount;
**Preliminary Expenditure** means such expenditures (including expenditures for Preliminary Works) that are deemed to form part of the Pre-Estimated Project Cost and Total Project Cost in accordance with the Base Case Financial Model excluding costs to be paid to the Contractor(s), provided that such expenditures are certified by the Independent Engineer and the Independent Auditor;

**Preliminary Works** means such works as are mutually agreed between the Parties to be performed by the Concessionaire prior to the Commencement Date, which shall be funded by the Sponsor(s) in accordance with the terms of the Equity Funding & Utilization Agreement, provided, that the Agency may, in its discretion, fund the cost of the Preliminary Works based on Agency Equity Funding Amount in respect of the Base Equity Funding Amount as set out in the Base Case Financial Model and the Equity Funding & Utilization Agreement;

**Preservation Costs** shall bear the meaning as ascribed thereto in Section 18.3.4;

**Principal** shall bear the meaning as ascribed thereto in the definition of ‘Financing Due’;

**Project** includes Korangi Link Road Project, and means each of the following activities, as performed (in each case) in accordance with this Agreement:

(i) the ownership and possession of the Concession Assets;

(ii) the design and detailed design, engineering, financing, construction, procurement, permitting, testing and commissioning of, in each case, the Concession Assets;

(iii) the procurement and contracting for goods, equipment and services for the Concession Assets;

(iv) the insuring and Operation and Maintenance of the Concession Assets;

(v) the making available, on a continuous basis, of the Concession Assets for the Users;

(vi) payments by the Parties of amounts due and payable under this Agreement;

(vii) the recruitment, employment and training of staff for the Concession Assets;

(viii) the transfer of the Concession Assets to the Agency on the Transfer Date;

(ix) all activities incidental or related to any of the above;

**Project Agreements** means:

(a) the Agency Agreements;

(b) the Financing Documents;

(c) the O&M Contract;
(d) the EPC Contract(s);

(e) any other material contract entered into or to be entered into by the Concessionaire at any time after the Effective Date in connection with the Project and designated as a “Project Agreement” with the consent of the Agency;

**Project Construction Milestones** means the progressive milestones relating to the performance of Construction Works and other obligations to be performed by the Concessionaire until the Construction Completion Date and the dates for achievement of each such milestone, as set out in:

(a) this Agreement; and

(b) the Construction Programme;

**Project Construction Milestone Date** means the date permitted herein for achievement of each Project Construction Milestone, as set out and contemplated (in respect of each Project Construction Milestone) in:

(a) the Applicable Standards;

(b) the Construction Programme;

**Project Facilities** means the facilities to be constructed, built, installed, erected and/or provided by the Concessionaire on the Project Site, as detailed in **Schedule D (Project Facilities)**;

**Project Funding Percentage** means the combination of the following;

(a) Financing, fixed at seventy percent (70%) of the Pre-Estimated Project Cost; and

(b) Base Equity Funding Amount, fixed at thirty percent (30%) of the Pre-Estimated Project Cost;

**Korangi Link Road Project** means the following, in aggregate approximately 12.0 km:

(i) bridge approximately 1.0 km length over Malir River (between Korangi Causeway and Jam Sadiq Bridge) with all flood bunds etc and training works required as per Physical/Hydraulic Model Study.

(ii) new road over Left Bank of Korangi river (to connect Korangi road of approximately 1.5 km length),

(iii) lane interchange / loop ramps at Korangi Bridge / Link road for Korangi Creek, Coastal road with shoulders on either side including revetement and earthwork of approximately 5.9 km length,

(iv) culverts, PRL road to connect Link Korangi to Korangi Creek of approximately 1.0 km length,

(v) rehabilitation / widening of Existing PRL road of approximately 1.6 km length,
(vi) stormwater drains approximately 1.0 km length,

(vii) realignment of existing Creek Avenue, Roundabout at Creek Avenue to link with Malir Expressway,

(viii) rehabilitation of existing bunds, Street Lights.

as more particularly described and indicated in the **Schedule F (Project Site)**;

provided however, the exact lengths of the Korangi Link Road Project shall be accurately finalized at the detailed design stage based on recommendations of Hydraulic Model Study;

**Project Manager/Project Director** shall bear the meaning as ascribed thereto in Section 8.12.1;

**Project Management/Implementation Unit** means the project management/implementation unit established by the Agency in accordance with the Applicable Laws for the purpose of overseeing the day to day implementation of the Project in accordance with the terms of this Agreement and Applicable Laws, particularly during the Construction Period, and shall be headed by the Project Manager/Project Director;

**Project Milestone** means:
(a) in respect of Construction Works, the Project Construction Milestones;
(b) in respect of the Operations and Maintenance, the Project O&M Milestones;

**Project Milestone Date** means:
(a) in respect of a Project Construction Milestone, the respective Project Construction Milestone Date for such Project Construction Milestone;
(b) in respect of a Project O&M Milestone, the respective Project O&M Milestone Date for such Project O&M Milestone;

**Project O&M Milestones** means the progressive milestones relating to the performance and completion of Operation and Maintenance that are to be achieved by the Concessionaire, pursuant to the Applicable Standards during an Operational Year of the Operations Period, as set out in:
(a) the Applicable Standards and specifications; and
(b) the O&M Programme for such Operational Year;

**Project O&M Milestone Date** means the date permitted herein for achievement of each Project O&M Milestone, as set out and contemplated (in respect of each Project O&M Milestone) in:
(a) the Applicable Standards; and
(b) the O&M Programme

**Project Requirements** means the Design Requirements, the Construction Requirements and the O&M Requirements, as applicable;

**Project Site** means the site on which the Project is to be implemented comprising of the immovable property including the right of way on which the Project Facilities (including the Concession Assets) are to be constructed, built, installed, erected and/or provided by the Concessionaire, in accordance with the terms of this Agreement as demarcated in the map attached hereto in **SCHEDULE F (Project Site)**;

**Project Site Conditions** shall bear the meaning as ascribed to it in Section 4.4.1;

**Project Site Licence Agreement** means the agreement of licence (in the form and substance agreed between the Parties) to be entered into between the Agency and the Concessionaire pursuant to which the Agency shall licence the land comprising the Project Site to the Concessionaire;

**Project Works** means all obligations, works, services and duties undertaken and/or performed and/or to be undertaken and/or performed by the Concessionaire pursuant to the Applicable Standards and shall include:

(a) the survey, riverine survey, physical / hydraulic model study, investigation, design work and all obligations, works, services and duties undertaken and/or performed and/or to be undertaken and/or performed by the Concessionaire until the Construction Completion Date;

(b) the Construction Works and all obligations, works, services and duties undertaken and/or performed and/or to be undertaken and/or performed by the Concessionaire until the Construction Completion Date; and

(c) the Operations and Maintenance and all obligations, works, services and duties undertaken and/or performed and/or to be undertaken and/or performed by the Concessionaire during the Operations Period;

**Proposed Construction Programme** shall bear the meaning as ascribed thereto in Section 13.2.1;

**Proposed Completion Tests Date** shall bear the meaning as ascribed thereto in Section 14.1.1;

**Proposed Detailed Design** shall bear the meaning as ascribed thereto in Section 12.5.3;

**Proposed O&M Programme** shall bear the meaning as ascribed to it in Section 19.7.1;

**Protected Assets** shall bear the meaning as ascribed thereto in Section 8.9.1(b);

**Recurrent Cost** means any expenditure (whether recurrent or not) which is not a Capital
expenditure;

**Recurrent Cost Increase** means, in relation to a Relief Compensation Relief Event, the amount (if any) by which:

(a) the Recurrent Costs demonstrably incurred and/or to be incurred by the Concessionaire in performing its obligations under this Agreement as a direct consequence of such Relief Compensation Relief Event, subject to the Concessionaire taking all reasonable steps (having regard to its continuing obligations under this Agreement) to minimize such Recurrent Costs insofar as they are attributable to such Relief Compensation Relief Event, exceeds:

(b) the Recurrent Costs which would demonstrably have been incurred by the Concessionaire in performing its obligations under this Agreement without such Relief Compensation Relief Event;

**Recurrent Cost Saving** means, in relation to a Relief Compensation Relief Event, the amount (if any) by which:

(a) the Recurrent Costs demonstrably incurred and/or to be incurred by the Concessionaire in performing its obligations under this Agreement as a direct consequence of such Relief Compensation Relief Event, subject to the Concessionaire taking all reasonable steps (having regard to its continuing obligations under this Agreement) to minimize such Recurrent Costs insofar as the Recurrent Costs are attributable to such Relief Compensation Relief Event, is less than:

the Recurrent Costs which would demonstrably have been incurred by the Concessionaire in performing its obligations under this Agreement without such Relief Compensation Relief Event;

**Relief Compensation** means, in respect of a Relief Compensation Relief Event, the compensation payable by the Agency to the Concessionaire in order to restore the Concessionaire to the same financial position the Concessionaire would have enjoyed if the Relief Compensation Relief Event had not occurred, which compensation shall be the sum of:

(a) a Capital Cost Increase; and/or

(b) a Recurrent Cost Increase; and/or

incurred by the Concessionaire as a direct consequence of the Relief Compensation Relief Event (the Concessionaire having taken all reasonable steps to mitigate such loss) to the extent the aggregate amounts referred to in paragraphs (a) and (b) above exceed the aggregate of any Capital Cost Saving, Recurrent Cost Saving and any other saving incurred as a direct consequence of such Relief Compensation Relief Event (the Concessionaire having taken all reasonable steps to maximize the same); provided, however, that all such elements of the Relief Compensation shall be subject to
confirmation by the Independent Auditor and the Independent Engineer and for the purposes of determining the same, information contained in the Financial Model shall be relied upon; provided, further, that in determining the Relief Compensation, the Independent Auditor and the Independent Engineer shall also take into consideration the receipt of insurance proceeds by the Concessionaire as a result of the underlying Relief Compensation Relief Event, so as to avoid duplication of compensation to the Concessionaire;

**Relief Compensation Relief Event** means each Relief Event set out in Sections 15.1.1(a) to 15.1.1(j);

**Relief Compensation Relief Event Period** means the length of time the Relief Compensation Relief Event has subsisted as per the terms of this Agreement;

**Relief Event(s)** shall bear the meaning as ascribed thereto in Section 15.1.1;

**Relief Order** means a written order jointly issued by the Independent Auditor and the Independent Engineer to the Parties pursuant to Article 15 (Relief Extensions & Relief Compensations) authorizing an extension of Time for Completion and/or payment of Relief Compensation in accordance with Article 15 (Relief Extensions & Relief Compensations);

**Relief Order Proposal** shall bear the meaning as ascribed thereto in Section 15.2.1;

**Relief Order Request** shall bear the meaning as ascribed thereto in Section 15.1.1;

**Remedy Events** shall bear the meaning as ascribed thereto in Section 18.2.1;

**Remedy Time Period** shall bear the meaning as ascribed thereto in Section 18.2.1(c);

**Return on Equity Component** means the component of the Annuity Amount Payment, as set out in the Base Case Financial Model, that relates to the return on the Equity of Class A Shares;

**RFP** shall bear the meaning as ascribed to in Recital B above;

**Safety Requirements** means the arrangements and procedures for conducting safety related measures in respect of the Concession Assets, as set out in the O&M Manual;

**Scheduled Commencement Date** means the date falling the later of:

(a) one hundred and eighty (180) days after the Effective Date; or

(b) ninety days (90) days from the approval of physical Hydraulic Model Study from the Irrigation Department of Government of Sindh,

as may be extended from time to time in accordance with this Agreement;
Scheduled Construction Completion Date shall bear the meaning as ascribed thereto in Section 14.4.2 (a);

Scheduled Financial Close Period means the date falling one hundred and eighty (180) days following the Effective Date;

Scheduled Substantial Completion Date means the date falling twenty four (24) months after the Commencement Date, as may be extended from time to time in accordance with the terms of this Agreement solely pursuant to a Relief Order;

Scope of the Project means the scope of the Project, as set out in SCHEDULE A (Scope of the Project);

Site Construction Works means all obligations, works, services and duties undertaken and/or performed and/or to be undertaken and/or performed by the Concessionaire at the Project Site during the Construction Period pursuant to the Applicable Standards including, inter alia, the obligations, works, services and duties undertaken and/or performed and/or to be undertaken and/or performed by the Concessionaire in respect of: (a) the procurement, construction, commissioning and completion of the Concession Assets (including all activities and obligations incidental thereto); (b) construction, alteration, up-gradation, repair, restoration, maintenance, extension, demolition or dismantling of buildings or structures, forming or to form, part of the Project Site, whether permanent or not, on which the Concession Assets shall be situated; and (c) performing all obligations and activities for performance and completion of each Project Construction Milestone; provided, however, “Site Construction Works” does not include any of the following work:

(a) the drilling for, or extraction of, oil or natural gas;

(b) the extraction (whether by underground or surface working) of minerals, including tunneling or boring, or constructing underground works, for that purpose;

(c) clearance of the Project Site, to the extent such clearance is to be expressly performed by the Agency in accordance with the terms of this Agreement;

Specific Requirements means:

(a) in respect of Construction Works, the Construction Requirements; and

(b) in respect of Operations and Maintenance, the O&M Requirements;

Specific Term Sheet Parameters shall bear the meaning as ascribed thereto in Section 27.3.1;

Specified Concessionaire Permits means the Concessionaire Permits set out in SCHEDULE J (Specified Concessionaire Permits);

Sponsor(s) means [●], a company(ies) incorporated under the laws of [●], having its registered office located at [●];
**Sponsor Equity Funding Amount** means the amount not less than fifty one percent (51%) of the Base Equity Funding Amount, in Sponsor’s Bid, as set out in the Base Case Financial Model and to be funded in accordance with the Equity Funding & Utilization Agreement;

**Sponsor Equity SBLC(s)** means an irrevocable and unconditional guarantee in a form and substance acceptable to the Agency as stand-by letter of credit issued by a scheduled commercial bank operating in Pakistan acceptable to the Agency (with a minimum rating of ‘AA-’ by JCR VIS or an equivalent rating by PACRA) issued either collectively or independently by the Sponsor(s), equal to lower of the following:

(a) the fifty percent (50%) of the Sponsor Equity Funding Amount, or

(b) the fifty percent (50%) of the Sponsor Equity Funding Amount minus (-) the costs already incurred by the Concessionaire on account of Preliminary Expenditure;

in accordance with the Equity Funding & Utilization Agreement and this Agreement;

**Sponsor Escalation Cost Share** shall bear the meaning as ascribed thereto in Section 10.5.2;

**Substantial Completion** shall bear the meaning as ascribed thereto in Section 14.4.3;

**Substantial Completion Certificate** means the certificate issued by the Independent Engineer at the request of the Concessionaire in accordance with Section 14.4 (Substantial Completion Certificate);

**Substantial Completion Date** shall bear the meaning as ascribed thereto in Section 14.3.2;

**Substantial Completion Delay Amount** means, in respect of the Substantial Completion Date, an amount equal to the amount of the Construction Performance Security equally divided over a period of one hundred and twenty (120) days;

**Suspension** shall bear the meaning as ascribed thereto in Section 18.3.1;

**Taxes Component** means a component of Annuity Amount Payment relating to the federal, provincial, local or other taxes, cess, duties, etc. that are applicable in Sindh province on the Concessionaire, as set out in the Financial Model, and as adjusted from time to time on the basis of Change in Law;

**Temporary Concession Assets** means the land, assets, rights, title, benefits and easements required for the development of the Permanent Concession Assets;

**Termination** means the termination of this Agreement and the Concession hereunder upon the issuance of a Termination Notice in accordance with the terms hereof and to the extent stated herein;

**Termination Date** means the date of issuance of the Termination Notice;
**Termination Dividend Amount** means the aggregate return on Termination Equity for the following periods, the same being an amount equal to the aggregate of Termination Equity IRR applied to the Termination Equity:

(i) In case the Concession Period of three (3) years or more is still remaining at Termination Date:

   for each of the three (3) Accounting Years falling after the Termination Date, as illustrated in **SCHEDULE V (Illustrations)**;

(ii) In case the Concession Period of less than three (3) years is still remaining at Termination Date:

   for the remaining duration of the Concession Period, as illustrated in **SCHEDULE V (Illustrations)**;

**Termination Equity** means, as of the Transfer Date occurring due to Termination, the aggregate of the Sponsor Equity Funding Amount reduced on a straight-line basis from the Substantial Completion Date through the term of this Agreement, as illustrated in **SCHEDULE V (Illustrations)**;

**Termination Equity IRR** means the post-tax internal rate of return, the same being seventeen percent (17%), on the Termination Equity;

**Termination Notice** means a notice to be issued in writing, by a Party notifying the other Party of the Termination in accordance with the applicable provisions of this Agreement including, where applicable, following the expiry of the relevant Cure Period or such other cure period specified in this Agreement;

**Termination Payment** means:

(a) in respect of Termination due to a Non-Political Event, the Non-Political Event Termination Amount;

(b) in respect of Termination due to a Political Event, the Political Event Termination Amount;

(c) in respect of Termination due to a Concessionaire Event of Default, the Concessionaire Default Termination Amount; in respect of Termination due to the Agency Event of Default, the Agency Default Termination Amount;

(d) in respect of Termination due to a Corrupt Act, the Corrupt Act Termination Amount;

(e) in respect of Termination due to a Change in Law, the Change in Law Termination Amount;

**Termination Payment Date** means the date on which the Agency has made payment of the relevant Termination Payments to the Concessionaire such date not exceeding ninety (90) days following the Termination Date;
Time For Completion means (as applicable):

(a) in respect of Construction Works, the Construction Time For Completion; and

(b) in respect of Operations & Maintenance, the O&M Time For Completion;

Total Project Cost means the actual capital cost of the Project upon completion of the Project, as certified by the Independent Auditor; provided, that the same shall not include (unless otherwise agreed with the Agency) the Additional Cost;

Transfer Date means:

(a) in case of early Termination of this Agreement prior to the Final Expiry Date, the Termination Payment Date subject to: (i) the Agency making payment of the relevant Termination Payments to the Concessionaire; and (ii) the Concessionaire completing the Divestment Requirements on or prior to such date;

(b) in case of achievement of Final Expiry Date pursuant to this Agreement, the Final Expiry Date;

Trigger Date means and includes, the Final Expiry Date, the Termination Date, and/or the Transfer Date as the case may be;

Unpaid Termination Equity Amount shall bear the meaning as ascribed thereto in Section 23.5.3(b);

Unpaid Termination Payment Amount shall bear the meaning as ascribed thereto in Section 17.4.1;

Unpaid Termination Payment Amount Certificate shall bear the meaning as ascribed thereto in Section 17.4.1;

User means the Person who traverses or travels over or on the Concession Assets or any portion thereof;

Utilities Affected Assets shall bear the meaning as ascribed thereto in Section 4.11.2;

Utility Proceeds shall bear the meaning as ascribed thereto in Section 4.11.3;

Vacant Possession means delivery to the Concessionaire by the Agency of possession of the Project Site in accordance with this Agreement, in accordance with Applicable Laws, and in accordance with the Project Site Licence Agreement free from all Encumbrances, encroachments, existing trees, existing structures and utilities etc.; and the grant of all Easementary Rights and all other rights appurtenant thereto, such that the Concessionaire enjoys complete uninterrupted and quiet possession and control of the Project Site from the grant of the Licence and throughout the Concession Period throughout the Concession Period;
provided, that the Concessionaire shall be liable to ensure clearance of the Project Site (including removal of all structures, physical impediments and clearing and grubbing at the Project Site) as part of the Site Construction Works;

**Vesting Certificate** shall bear the meaning as ascribed thereto in Section 24.4.1; and

**WPI** means the Wholesale Price Index as published by Pakistan Bureau of Statistics being the rate published for the last working day of the last quarter of a calendar year.

### 1.2 Construction

1.2.1 In this Agreement, unless the context otherwise requires:

(a) references to any legislation or any provision thereof shall include amendment or re-enactment or consolidation of such legislation or any provision thereof so far as such amendment or re-enactment or consolidation applies or is capable of applying to any transaction entered into hereunder;

(b) references to laws of Pakistan or Pakistan law or regulation having the force of law shall include the laws, acts, ordinances, rules, regulations, bye laws or notifications which have the force of law in the territory of Pakistan and as from time to time may be amended, modified, supplemented, extended or re-enacted;

(c) the table of contents, headings or sub-headings in this Agreement are for convenience of reference only and shall not be used in, and shall not affect, the construction or interpretation of this Agreement;

(d) the words “include” and “including” are to be construed without limitation and shall be deemed to be followed by “without limitation” or “but not limited to” whether or not they are followed by such phrases;

(e) references to “construction” or “building” include, unless the context otherwise requires, investigation, design, developing, engineering, procurement, delivery, transportation, installation, processing, fabrication, testing, commissioning and other activities incidental to the construction, and “construct” or “build” shall be construed accordingly;

(f) references to “development” include, unless the context otherwise requires, construction, renovation, refurbishing, augmentation, up-gradation and other activities incidental thereto, and “develop” shall be construed accordingly;

(g) any reference to any period of time means a reference to that according to Pakistan Standard Time;

(h) any reference to day means a reference to a calendar day as per the Gregorian Calendar;

(i) references to a “business day” shall be construed as a reference to a day (other than Saturday, Sunday or a gazetted holiday) on which banks in Pakistan are generally open for business;
any reference to month means a reference to a calendar month as per the Gregorian calendar;

references to any date, period or Project Milestone means and include such date, period or Project Milestone as may be extended pursuant to Relief Order;

any reference to any period commencing “from” a specified day or date and “till” or “until” a specified day or date shall include both such days or dates; provided, that if the last day of any period computed under this Agreement is not a business day, then the period shall run until the end of the next business day;

the words importing singular shall include plural and vice versa;

references to any gender shall include the other and the neutral gender;

“indebtedness” shall be construed so as to include any obligation (whether incurred as principal or surety) for the payment or repayment of money, whether present or future, actual or contingent;

references to the “winding-up”, “dissolution”, “insolvency”, or “reorganization” of a company or corporation shall be construed so as to include any equivalent or analogous proceedings under the law of the jurisdiction in which such company or corporation is incorporated or any jurisdiction in which such company or corporation carries on business including the seeking of liquidation, winding-up, reorganization, dissolution, arrangement, protection or relief of debtors;

save and except as otherwise provided in this Agreement, any reference, at any time, to any agreement, deed, instrument, Licence or document of any description shall be construed as reference to that agreement, deed, instrument, Licence or other document as amended, varied, supplemented, modified or suspended at the time of such reference; provided, that this sub-section shall not operate so as to increase liabilities or obligations of the Agency hereunder or pursuant hereto in any manner whatsoever;

any agreement, consent, approval, authorization, notice, communication, information or report required under or pursuant to this Agreement from or by any Party, the Independent Engineer or the Independent Auditor shall be valid and effective only if it is in writing under the hand of a duly authorized representative of such Party, the Independent Engineer or the Independent Auditor, as the case may be, in this behalf and not otherwise;

the Schedules and Recitals to this Agreement form an integral part of this Agreement and shall be in full force and effect as though they were expressly set out in the body of this Agreement;

references to Recitals, Articles, Sections, or Schedules in this Agreement shall, except where the context otherwise requires, mean references to Recitals, Articles, Sections, and Schedules of or to this Agreement, and references to a Paragraph shall, subject to any contrary indication, be construed as a reference to a Paragraph of this Agreement or of the Schedule in which such reference appears;
the damages (including the Construction Period Damages) payable by either Party to the other of them, as set forth in this Agreement, whether on per diem basis or otherwise, are mutually agreed genuine pre-estimated loss and damage likely to be suffered and incurred by the Party entitled to receive the same and are not by way of penalty; and

(v) time shall be of the essence in the performance of the Parties’ respective obligations. If any time period specified herein is extended, such extended time shall also be of the essence.

1.2.2 The rule of construction, if any, that a contract should be interpreted against the parties responsible for the drafting and preparation thereof, shall not apply.

1.2.3 Any word or expression used in this Agreement shall, unless otherwise defined or construed in this Agreement, bear its ordinary English meaning and, for these purposes, the General Clauses Act 1897 shall not apply.

1.3 COSTS FOR DOCUMENTS

1.3.1 Unless expressly provided otherwise in this Agreement, any documentation required to be provided or furnished by the Concessionaire to the Agency, the Independent Engineer and/or the Independent Auditor or any other relevant person so appointed or nominated by the Agency, the Financiers or any other person legally so required shall be provided free of cost and in three (3) copies, and if the Agency, the Independent Engineer and/or the Independent Auditor is required to return any such documentation with their comments and/or approval, they shall be entitled to retain two (2) copies thereof.

1.4 MEASUREMENTS AND ARITHMETIC CONVENTIONS

1.4.1 All measurements and calculations in respect of financial matters shall be in the metric system and calculations done to two (2) decimal places, with the third digit of five (5) or above being rounded up and below five (5) being rounded down, however all calculations in respect of technical matters shall be in SI/foot pound and second system in accordance with this Agreement.

1.5 PRIORITY OF AGREEMENTS, ARTICLES, SECTIONS AND SCHEDULES

1.5.1 This Agreement, and all other agreements and documents forming part of this Agreement are to be taken as mutually explanatory and, unless otherwise expressly provided elsewhere in this Agreement, the priority of this Agreement and the other Agency Agreement and other documents and agreements forming part thereof or referred to therein shall, in the event of any conflict between them, be in the following order (unless otherwise agreed between the Parties):

(a) this Agreement;

(b) the Agency Agreements (other than this Agreement).
1.5.2 Subject to the provisions of Section 1.5.1, in the event of any ambiguity and/or discrepancies with regard to this Agreement, the following shall apply:

(i) between two (2) or more Articles and/or Section of this Agreement, the provisions of a specific Article relevant to the issue under consideration shall prevail over those in other Article and/or Section;

(ii) between the Article and/or Section of this Agreement and the Schedules, the Article and/or Section shall prevail unless the issue in question/matter is specifically provided for in the Schedule and only referred to in the Article and/or Section, as the case may be;

(iii) between any two (2) Schedules, the Schedule relevant to the issue shall prevail;

(iv) between the written description on the Construction Drawings and the Construction Requirements, the latter shall prevail;

(v) between the written description on the O&M Documents and the O&M Requirements, the latter shall prevail;

(vi) between the dimension scaled from the Construction Drawing and its specific written dimension, the latter shall prevail;

(vii) between the dimension scaled from the O&M Documents and its specific written dimension, the latter shall prevail; and

(viii) between any value written in numerals and that in words, the latter shall prevail.
2. **CONCESSION**

2.1 **GRANT OF CONCESSION**

2.1.1 In consideration of the Concessionaire’s obligations contained in this Agreement and relying on the Concessionaire’s representations, warranties and covenants contained herein, the Agency, subject to the terms of this Agreement, hereby authorizes the Concessionaire, for the duration of the Concession Period, to investigate, study, design, engineer, procure, finance, construct, develop, operate and maintain and implement the Project on a design, finance, build, operate, finance and transfer basis (DFBOT), and to exercise and enjoy the rights, powers, benefits, privileges, authorizations and entitlements as set forth in this Agreement (the **Concession**).

2.1.2 The Concessionaire agrees and undertakes to implement the Project in accordance with the terms of this Agreement and the Agency Agreements.

2.2 **CONCESSION PERIOD**

2.2.1 The Concession hereby is granted and shall be effective for the Concession Period.

2.3 **EXTENSION OF CONCESSION PERIOD**

2.3.1 The Concessionaire may request an extension of the Concession Period at any time at least one (1) year prior to the Final Expiry Date; provided, that at the time of the request the Concessionaire is materially in compliance with its obligations under this Agreement and is not otherwise facing a default therein. The Agency has the right to accept or reject this request for extension at its sole and absolute discretion and to the extent the Agency accepts the extension in the Concession Period, the Parties shall enter into such instruments, agreements and arrangements (including any amendments in the Agency Agreements) and on such terms and conditions, in each case, as mutually agreed between the Parties in accordance with the requirements of the Applicable Laws.
3. **CONDITIONS**

3.1 **CONDITIONS PRECEDENT**

3.1.1 Save and except as expressly provided herein, the respective obligations of the Parties shall be subject to the satisfaction (waiver and/or deferral, in accordance with the terms herein) in full of the Conditions Precedent on or prior to the Scheduled Commencement Date.

3.1.2 The Concessionaire shall satisfy the Concessionaire Conditions Precedent to the satisfaction of the Agency, the Independent Engineer and the Independent Auditor prior to the Scheduled Commencement Date.

3.1.3 The Agency shall satisfy the Agency Conditions Precedent to the satisfaction of the Concessionaire, the Independent Auditor and the Independent Engineer prior to the Scheduled Commencement Date.

3.2 **CONDITIONS SUBSEQUENT**

3.2.1 In relation to the Conditions Subsequent:

(i) the Concessionaire undertakes to fulfill the Concessionaire Conditions Subsequent to the entire satisfaction of the Agency; and

(ii) The Agency undertakes to fulfill the Agency Conditions Subsequent to the satisfaction of the Concessionaire.

3.3 **WAIVER AND/OR DEFERRAL OF CONDITIONS AND EXTENSION OF SCHEDULED COMMENCEMENT DATE**

3.3.1 The:

(a) Agency may (at its discretion) waive and/or defer any of the Concessionaire Conditions Precedent and/or the Concessionaire Conditions Subsequent. For the avoidance of doubt, the Agency may, at its sole discretion, grant any waiver and/or deferral hereunder with such conditions as it may deem fit;

(b) Concessionaire may (at its discretion) waive and/or defer any of the Agency Conditions Precedent, and/or the Agency Conditions Subsequent. For the avoidance of doubt, the Concessionaire may, at its sole discretion, grant any waiver and/or deferral hereunder with such conditions as it may deem fit.

3.3.2 Without prejudice to the terms of Section 3.3.1 above, failure by the Concessionaire or the Agency to satisfy the Conditions Subsequent in terms of this Agreement shall constitute a Material Breach.

3.3.3 Notwithstanding anything contained herein, the Scheduled Commencement Date may be extended from time to time with the mutual consent of the Parties.
3.3.4 Any deferral and/or waiver of the Conditions Precedent and/or the Conditions Subsequent in terms of this Section 3.3 (Waiver And/Or Deferral Of Conditions And Extension Of Scheduled Commencement Date) shall be notified in writing to the Independent Engineer and the Independent Auditor by the Party granting such deferral and/or waiver of such condition in accordance with this Agreement.

3.4 COMMENCEMENT CERTIFICATE & COMMENCEMENT DATE

3.4.1 The Parties mutually agree that each Party shall promptly inform the other Party in writing (together with copies delivered to the Independent Engineer and the Independent Auditor) when the Conditions Precedent for which it is responsible have been satisfied;

3.4.2 The Parties agree that:

(a) within thirty (30) days of the Agency’s receipt from the Concessionaire, through the Independent Engineer and the Independent Auditor, evidence of satisfaction of a Concessionaire Condition Precedent, the Agency shall notify the Independent Engineer and the Independent Auditor in writing (with a copy to the Concessionaire) whether it has any objections on the satisfaction of such Concessionaire Condition Precedent. In the event the Agency does not raise any objection in writing on the satisfaction of a Concessionaire Condition Precedent within the thirty (30) day period set out herein, such Concessionaire Condition Precedent shall be deemed to be not objected to by the Agency. In the event, the Agency raises any objections on the satisfaction of a Concessionaire Condition Precedent and notifies the same to the Independent Engineer and the Independent Auditor (with a copy to the Concessionaire) within the thirty (30) day period set out herein, the Concessionaire shall address such objections and re-submit to the Independent Engineer and the Independent Auditor (with a copy to the Agency) evidence of satisfaction of such Concessionaire Condition Precedent and the process in this Section 3.4.2(a) shall be repeated until such time that the Agency has not objected to or is deemed to have not objected to the satisfaction of such Concessionaire Condition Precedent. The provisions of this Section 3.4.2(a) shall apply to each Concessionaire Condition Precedent for which evidence of satisfaction is submitted by the Concessionaire to the Independent Engineer and the Independent Auditor (with a copy to the Agency) from time to time; and

(b) within thirty (30) days of the Concessionaire’s receipt from the Agency, through the Independent Engineer and the Independent Auditor, evidence of satisfaction of the Agency Condition Precedent, the Concessionaire shall notify the Independent Engineer and the Independent Auditor in writing (with a copy to the Agency) whether it has any objections on the satisfaction of such Agency Condition Precedent. In the event the Concessionaire does not raise any objection in writing on the satisfaction of the Agency Condition Precedent within the thirty (30) day period set out herein, such Agency Condition Precedent shall be deemed to be not objected to by the Concessionaire. In the event the Concessionaire raises any objections on the satisfaction of the Agency Condition Precedent and notifies the same to the Independent Engineer and the Independent Auditor (with a copy to Agency) within the thirty (30) day period set out herein, the Agency shall address such objections and re-submit to the Independent Engineer and the Independent Auditor (with a copy to the
Concessionaire) evidence of satisfaction of such Agency Condition Precedent and the process in this Section 3.4.2(b) shall be repeated until such time that the Concessionaire has not objected to or is deemed to have not objected to the satisfaction of such Agency Condition Precedent. The provisions of this Section 3.4.2(b) shall apply to each Agency Condition Precedent for which evidence of satisfaction is submitted by the Agency to the Independent Engineer and the Independent Auditor (with a copy to Concessionaire) from time to time.

3.4.3 The Parties hereby jointly undertake to procure that the Independent Engineer and the Independent Auditor shall jointly issue the Commencement Certificate within three (3) days of the date on which the Independent Engineer and the Independent Auditor are satisfied that each of the:

(a) Concessionaire Conditions Precedent stand satisfied (and/or waived or deferred by the Agency in accordance with Section 3.3.1(a));

(b) Concessionaire Conditions Precedent are not objected to or deemed not to have been objected to by the Agency (acting through the Project Manager) in accordance with Section 3.4.2(a) and if any Concessionaire Condition Precedent is objected to by the Agency in accordance with Section 3.4.2(a), the Concessionaire has addressed such objections and re-submitted evidence of satisfaction of such Concessionaire Condition Precedent to the Independent Engineer and the Independent Auditor (with a copy to the Agency) in accordance with Section 3.4.2(a);

(c) Agency Conditions Precedent stand satisfied (and/or waived or deferred by the Concessionaire in accordance with Section 3.3.1(b)); and

(d) Agency Conditions Precedent are not objected to or deemed not to have been objected to by the Concessionaire in accordance with Section 3.4.2(b) and if any Agency Condition Precedent is objected to by the Concessionaire in accordance with Section 3.4.2(b), the Agency has addressed such objections and re-submitted evidence of satisfaction of such Agency Condition Precedent to the Independent Engineer and the Independent Auditor (with a copy to the Concessionaire) in accordance with Section 3.4.2(b).

3.4.4 The Independent Engineer and the Independent Auditor, jointly, shall set out in the Commencement Certificate the date on which the Commencement Date is achieved.

3.5 **TERMINATION PRIOR TO COMMENCEMENT DATE**

3.5.1 In the event:

(a) the Concessionaire Conditions Precedents are not satisfied, waived and/or deferred on or prior to the date falling ninety (90) days following the Scheduled Commencement Date (including the extended time, if any) due to reasons attributable to the Concessionaire; and/or

(b) of occurrence of a Concessionaire Event of Default prior to the Commencement Date;
then the Agency shall have the right (to be exercised in its sole and absolute discretion) to Terminate this Agreement by issuance of a written Termination Notice to the Concessionaire. In such case, the Agency shall be entitled to encash the Construction Performance Security to its full value, as further detailed in the Equity Funding & Utilization Agreement. Except as may be contemplated in the Equity Funding & Utilization Agreement, and except for the encashment of the Construction Performance Security, in terms of this Section 3.5.1, each Party hereto shall have no claims against the other for costs, damages, compensation or otherwise for such Termination of this Agreement. It is clarified that the provisions of this Section 3.5 (Termination Prior to Commencement Date) shall only apply to any Termination of this Agreement occurring prior to the Scheduled Commencement Date.

Provided, however, the Concessionaire shall only be entitled to an extension of the Scheduled Commencement Date till the Financial Close Cure Period Date, if:

(a) the Concessionaire has duly executed the Financing Term Sheet that is not objected to or deemed not to be objected to by the Agency and the Independent Auditor in accordance with Section 27.3 (Financing Term Sheet & Financing Amendment Term Sheets); and

(b) the Concessionaire has provided the Agency with a revised Construction Performance Security, for an amount equal to twice the value of the Construction Performance Security, that remains effective and valid till the Construction Performance Security Expiry Date.

Provided further, however, in the event the Concessionaire fails to achieve Financial Close until the Financial Close Cure Period Date, the Agency shall be entitled to encash the revised Construction Performance Security to its full value and, in each case, the entire Sponsor Equity Funding Amount funded by the Sponsor shall stand cancelled, as further detailed in the Equity Funding & Utilization Agreement.

3.5.2 In the event:

(a) The Agency Conditions Precedents are not satisfied, waived and/or deferred on or prior to the date falling ninety (90) days following the Scheduled Commencement Date (including the extended time, if any) due to reasons attributable to the Agency and/or a Force Majeure Event; and/or

(b) of occurrence of the Agency Event of Default prior to the Commencement Date,

the Concessionaire shall have the right (to be exercised in its sole discretion) to Terminate this Agreement by issuance of a written Termination Notice to the Agency. In such case, the Agency shall (within fifteen (15) days of its receipt of the Termination Notice) return the Construction Performance Security and the Sponsor Equity SBLC(s) (in case Sponsor Equity SBLC is submitted by the Sponsor) in accordance with the Equity Funding & Utilization Agreement, as applicable, to the Concessionaire without any encashment, demands or claims, provided further, in case the Concessionaire has incurred any cost for obtaining EIA Approval and/or completion of the Hydraulic Model Study and the same has been jointly approved and certified by the Independent Engineer and the Independent Auditor, the Agency shall make payment for the actual
cost incurred which under no circumstances shall exceed the amount of the Construction Performance Security. Except as may be contemplated in this Agreement and the Equity Funding & Utilization Agreement, each Party hereto shall have no claims against the other for costs, damages, compensation or otherwise for such Termination of this Agreement.

3.5.3 It is clarified that the provisions of this Section 3.5 (Termination Prior To Commencement Date) shall only apply to any Termination of this Agreement occurring prior to the Commencement Date.
4. **PROJECT SITE**

4.1 **LICENCE**

4.1.1 The Agency shall, as a Condition Precedent to achievement of the Commencement Date, licence the Concessionaire, pursuant to the Project Site Licence Agreement, the Vacant Possession of all the land and rights comprising the Project Site (the Licence). The Project Site Licence Agreement shall be duly executed by the Parties and, to the extent required by the Applicable Laws, registered by the Concessionaire with the relevant Government Authority and all costs, fees, expenses, duties, charges and taxes (including charges relating to the registration of the Project Site Licence Agreement) relating to the same shall be borne by the Concessionaire.

4.1.2 The Concessionaire shall be responsible for payment of all charges in accordance with the Project Site Licence Agreement that relate to the Licence of the Project Site to the Concessionaire by the Agency.

4.1.3 The Licence shall commence on the physical handing over of the Vacant Possession of the Project Site to the Concessionaire by the Agency and upon commencement shall be co-terminus on the Transfer Date without the need for any action to be taken by the Parties to terminate the Licence. Any extension of the Concession Period shall also extend the Licence and the Concessionaire, and the Agency shall enter into such addendums, extensions or modifications of the Project Site Licence Agreement as are necessary to give effect to such extension.

4.1.4 The Agency shall grant such permission or exemptions as may be required under the Applicable Laws relating to and regulating land, as applicable in the province of Sindh, Pakistan, so as to ensure that the Concessionaire can enjoy Vacant Possession and hold the area of land comprising the Project Site, except where failure to enjoy Vacant Possession has resulted from a breach by the Concessionaire of the Applicable Standards.

4.2 **TITLE OF PROJECT SITE & DELIVERY OF VACANT POSSESSION**

4.2.1 The Agency represents and warrants that it has the power and authority to grant the Licence in respect of the Project Site to the Concessionaire.

4.2.2 Subject to Section 15.2 (Relief Events), the Agency shall at its own cost and expense, deliver to the Concessionaire, the Vacant Possession of the Project Site (including all Easementary Rights) in accordance with the Project Site Licence Agreement.

4.2.3 The Parties agree and acknowledge that this Section 4.2.3 shall come into effect as of the Effective Date. In the event the Concessionaire is adversely affected and/or delayed in the performance of its obligations and/or there is any adverse financial impact on the Concessionaire, in each case, resulting from any delay and/or failure of the Agency to deliver Vacant Possession of the Project Site to the Concessionaire in accordance with the Project Site Licence Agreement, such delay and/or failure of the Agency shall entitle the Concessionaire to issuance of a Relief Order Request and in such case, the provisions of Article 15 (Relief Extensions & Relief Compensations) shall apply.
4.3 **USE OF PROJECT SITE**

4.3.1 The Concessionaire hereby unconditionally and irrevocably confirms, acknowledges and agrees that the Agency shall enter into the Project Site Licence Agreement with the Concessionaire that shall grant the Licence of the Project Site to the Concessionaire for the sole purpose of implementation of the Project and for enjoying the rights and benefits of the Concession granted hereunder and that the Concessionaire shall use the Project Site only for the purposes of implementing the Project thereupon and for purposes incidental or necessary thereto subject to the terms and conditions of the Applicable Standards. The Concessionaire shall, in carrying out its obligations under this Agreement, utilize all existing roads and land areas at the Project Site.

4.3.2 The Concessionaire hereby undertakes that it shall not without prior written consent of the Agency use the Project Site for any purpose other than:

(a) for the purposes of the Project and purposes incidental thereto;

(b) as permitted under this Agreement (including for the purposes set out in Article 29 (Additional Matters); or

(c) as may otherwise be approved by the Agency in writing.

4.4 **CONCESSIONAIRE’S RESPONSIBILITY**

4.4.1 Subject to Section 4.14 (Removal of Material Adverse Impediment), the physical and the ambient conditions (including climatic, hydrological, hydro-geological, ecological, environmental, geotechnical, geological, paleontological and archaeological conditions) of the Project Site (the **Project Site Conditions**) shall be the sole responsibility of the Concessionaire. Accordingly, without limiting any other obligations of the Concessionaire that are included in this Agreement, the Concessionaire shall be deemed as at the Effective Date to have:

(a) carried out an investigation of all Project Site Conditions and of any extraneous material in or under the Project Site including its surface, sub-soil and ground water to enable the Concession Assets to be designed and constructed and for its obligations to be performed with due regard for the Project Site Conditions and the seismic activity (if any) in the region of the Project Site;

(b) for the purpose of such investigation in section (a), inspected and examined the Project Site and surroundings;

(c) satisfied itself as to the nature of the Project Site Conditions, the surface, sub-soil and ground water of the Project Site, the form and nature of the Project Site, the load-bearing and other relevant properties of the Project Site, the risk of damage to property affecting the Project Site, the nature of the materials (whether natural or otherwise) to be excavated and the nature of the design, its obligations and material necessary for the implementation of the Project;

(d) satisfied itself as to the adequacy of its right of passage over, access to and through the Project Site and any accommodation it may require for the purposes
of fulfilling any of its obligations included in this Agreement, such as any additional land or buildings located outside the Project Site;

(e) satisfied itself as to the possibility of interference by Persons with rights-of-way across, access to or use of the Project Site with particular regard to the owners and users of any land adjacent to the Project Site; and

(f) satisfied itself as to the precautions, times and methods of working necessary to prevent or minimize nuisance or interference being caused to any third parties.

4.4.2 For the avoidance of doubt, the Concessionaire accepts full responsibility for all matters in Section 4.4.1 and the Concessionaire shall, subject to Section 4.14 (Removal of Material Adverse Impediment):

(a) not be entitled to make any claim against the Agency whether in contract, tort or otherwise on any ground relating to the matters in Section 4.4.1; and

(b) indemnify the Agency against all direct Losses sustained by the Agency and/or any third party in consequence of cleaning-up and otherwise dealing with any potentially hazardous materials being any natural or artificial substance, whether in solid, gaseous or liquid form capable of causing harm to any human or any other living organism supported by the environment (including air, water, land, surface land and sub-surface land) or capable of damaging the environment or public health or posing a threat to public safety including any pollutants and any hazardous, toxic, radioactive, noxious, corrosive or dangerous substances and all substances for which in each case liability or responsibility is imposed under applicable environment law) at the Project Site.

4.5 **NO SALE OR CREATION OF ENCUMBRANCE**

4.5.1 The Concessionaire shall not part with, dispose of, sell, sub-lease or create any Encumbrance of any nature whatsoever on the whole or any part of the Project Site and shall not place or create nor permit any Contractor or other person claiming through or under the Concessionaire to place or create any Encumbrance over all or any part of the Project Site or the Concession Assets, or on any rights of the Concessionaire therein or under this Agreement, save and except as otherwise expressly set forth in this Agreement.

4.6 **PROTECTION OF SITE FROM ENCOACHMENTS**

4.6.1 Following the delivery and handing over to the Concessionaire of the Vacant Possession of the Project Site by the Agency and until the Transfer Date, the Concessionaire shall be fully responsible for and shall protect the Project Site from, in each case, any and all occupations, thefts, encroachments and Encumbrances. The Concessionaire further undertakes, covenants and confirms to indemnify the Agency, any Government Authority and the Agency from any costs, claims expenses or charges incurred resulting from any breach of its obligations under this Section 4.6 (Protection of Site from Encroachments).

4.7 **SPECIAL/TEMPORARY RIGHT OF WAY**
4.7.1 The Concessionaire shall, at its own cost and risk, obtain any special or temporary right of way that is not included in the Scope of the Project and description of Project Site and the Concession Assets, and is required by the Concessionaire in connection with access to the Project Site and shall also obtain (at its cost and expense) such other facilities, the provision of which is not the responsibility of the Agency under the Agency Agreements, as may be required by the Concessionaire for the purposes of the Project and its implementation in accordance with the Applicable Standards; provided, that the Agency shall reasonably facilitate the Concessionaire in obtaining the aforesaid special or temporary right of way.

4.8 PROJECT SITE ACCESS

4.8.1 Following Licence of the Project Site and delivery of the Vacant Possession of the Project Site to the Concessionaire by the Agency, the Licence granted to the Concessionaire shall always be subject to the right of access of the Agency, any relevant Government Authority, the Independent Auditor and the Independent Engineer and their representatives, officers, employees and agents for inspection, viewing and exercise of their rights and performance of their obligations under this Agreement; provided, that the exercise of such right of access shall not interfere with the Concessionaire’s performance of its rights and obligations under this Agreement. Further, the Licence granted to the Concessionaire shall always be subject to the right of access of the Users.

4.9 GEOLOGICAL AND ARCHAEOLOGICAL FINDS

4.9.1 It is expressly agreed between the Parties that mining, geological or archaeological rights do not form part of the Licence to be granted to the Concessionaire in terms of the Project Site Licence Agreement and the Concessionaire hereby acknowledges and agrees that it shall not have any mining rights or interest in the underlying minerals, fossils, antiquities, structures or other remnants or things either of particular geological or archaeological interest and that all such rights, interest and property on or under the Project Site shall vest in and belong to the Agency or the relevant concerned Government Authority.

4.9.2 The Concessionaire shall procure all no-objection certificates and consents from the Culture, Tourism & Antiquities Department, Government of Sindh that may be required by the Concessionaire under the Applicable Laws, in respect of any potential geological and archeological finds on the Project Site, prior to commencement of the Project Works. Furthermore, the Concessionaire shall take all reasonable precautions to prevent its employees, workmen, agents, representatives and/ or any other persons appointed by the Concessionaire from having access to the Project Site, including the Contractors, from removing or damaging such interest or property (as set out in Section 4.9.1) and shall inform the Agency forthwith of the discovery thereof and comply with such instructions as the Agency and/or the concerned Government Authority may issue in relation to the protection and/or removal of such property. In the event any expenses are incurred by the Concessionaire in fulfilling its obligations as set out in this Section 4.9.2 and/or as a result of the geological and/or archaeological finds being on the Project Site, then the same shall be reimbursed by the Agency (provided the same are duly certified by the Independent Engineer and the Independent Auditor) and in such case the provisions of Article 15 (Relief Extensions & Relief Compensations) shall apply. Further,
in the event the Concessionaire is delayed in performance of its obligations under this Agreement due to the occurrence of the circumstances set out in this Section 4.9 (Geological and Archeological Finds), the Concessionaire shall be granted extensions in the timeline in which it has to perform its obligations under this Agreement (provided that such extensions are duly certified by the Independent Engineer) and in such case the provisions of Article 15 (Relief Extensions & Relief Compensations) shall apply. Notwithstanding anything contained herein, the Agency shall procure the issuance of the instructions required from the concerned Government Authority and referred to in this Section 4.9.2.

4.10 Existing Utilities and Roads

4.10.1 Notwithstanding anything to the contrary contained herein, the Concessionaire shall ensure that the respective entities owning the existing roads, right of way or utilities on, under or above the Project Site are enabled by the Concessionaire to keep such utilities in continuous satisfactory use, if necessary, by providing suitable temporary or permanent diversions with the authority of the controlling body of that road, right of way or utility, and the Agency shall, upon written request from the Concessionaire (as certified by the Independent Engineer), initiate and undertake, at the Agency’s cost, legal proceedings for acquisition of any right of way necessary for such diversion. The Concessionaire shall be responsible for identifying the existing utilities and roads through the Approved Detailed Engineering Design submitted by the Concessionaire to the Independent Engineer and during the activity of relocation of existing utilities their supervision in relation to the agreed alignment (for excavation, laying, backfilling, erection of utility, poles and etc.) by seeking assistance from the design consultant with respect to the survey points without damaging the existing utilities and roads. In the event of any breach by the Concessionaire of its obligations under this Section 4.10.1, the Concessionaire shall be responsible for rectification of the same at its own cost, risk and expense.

4.11 New Utilities and Roads

4.11.1 The Concessionaire shall allow utility companies (subject to consent of the Agency and subject to such conditions as the Agency may specify and subject to mutual agreement between the Agency, Concessionaire and the utility companies), access to, and use of the Project Site for laying telephone lines, water pipes, electric cables or other public utilities; provided, that nothing contained in this Section 4.11.1 shall waive and/or relieve or be deemed to waive and/or relieve the obligations of the Concessionaire contained in the Agency Agreements and any damage caused to the Concession Assets by such access to, and use of the Project Site for laying telephone lines, water pipes, electric cables or other public utilities shall be restored forthwith.

4.11.2 The affected part of the Concession Assets (or any part thereof) (the Utilities Affected Assets) shall be restored in accordance with the Applicable Standards and Good Industry Practice by the Concessionaire and the costs relating to the same shall be borne by the Concessionaire and/or the utility companies in accordance with the terms mutually agreed between the Concessionaire and the utility companies; provided, however, any such terms (including any amendments of the same) shall be subject to the prior approval of the Agency (which approval shall not be unreasonably delayed, conditioned or withheld). Notwithstanding anything to the contrary set out herein, the
Agency shall neither be responsible for restoration of any Utilities Affected Assets nor for any costs relating to the same.

4.11.3 The Agency (through its Class B Shares or otherwise) exclusively reserves the right to charge fees from the utility company or any other entity for allowing the passage of the telephone lines, water pipes, electric cables or other public utilities over or under the Project Site and such fee, in case being paid to the Concessionaire, shall be paid to the Agency through such mechanism as Agency has notified to the Concessionaire (the Utility Proceeds).

4.12 FELLING OF TREES

4.12.1 The Concessionaire undertakes to fell the trees at the Project Site, to be identified by the Concessionaire, the cost of which shall be borne by the Concessionaire; provided, further the Concessionaire shall be responsible for procuring any approvals and/or permits from the Agency or any other Government Authority for compliance with this Section 4.12 (Felling of Trees).

4.12.2 The trees removed pursuant to this Section 4.12 (Felling of Trees) shall be deemed to be owned by the Agency and shall be disposed in such manner and subject to such conditions as the Agency may in its sole discretion deem appropriate.

4.12.3 The Concessionaire hereby undertakes that it shall (as condition precedent to achievement of Substantial Completion), at its sole cost and expense, plant and maintain the greater of: (i) at least [●] ([●]) trees at the Project Site; or (ii) such number of trees as required under the Concessionaire Permits. Furthermore, the Concessionaire undertakes to maintain in accordance with the Applicable Standards and Concessionaire Permits, all the trees planted by it pursuant to this Section 4.12 (Felling of Trees) till the Transfer Date.

4.13 AGENCY INDEMNITIES IN RESPECT OF PROJECT SITE

4.13.1 The Agency shall indemnify and shall hold the Concessionaire harmless from any costs, claims expenses or charges incurred (in respect of the time period falling prior to delivery of Vacant Possession of Project Site to the Concessionaire) in relocating, rehabilitating or resettling persons in connection with making available the Project Site to the Concessionaire for implementation of the Project and for delivery of Vacant Possession of the Project Site to the Concessionaire.

4.13.2 The Agency hereby indemnifies and holds harmless the Concessionaire against all Losses arising in connection with or relating to any defect in title in the Concessionaire’s Licence interest in the Project Site, which prevents, impedes or delays the Concessionaire from constructing or, Operating and Maintaining the Concession Assets in accordance with this Agreement; provided, that such Losses are not the consequence of any breach or non-compliance by the Concessionaire of this Agreement, the Project Site Licence Agreement and the Applicable Standards; provided, further that such action is not a consequence or failure by the Concessionaire to meet its obligations under this Agreement.
4.14 **REMOVAL OF MATERIAL ADVERSE IMPEDIMENT**

4.14.1 Following delivery of the Vacant Possession of the Project Site to the Concessionaire by Agency, the Concessionaire shall be responsible for removal of all impediments, debris (including any structures not in anyone’s possession) on the Project Site, whether physical or legal, to the construction and, Operation and Maintenance of the Concession Assets; provided, however, that the Concessionaire shall Notify the Agency, within ten (10) days of any impediment (the *Material Adverse Impediment*) on the Project Site, whether physical or legal, to the construction and/or, Operation and Maintenance of the Concession Assets which:

(a) causes a Material Adverse Effect;

(b) is not attributable to the Concessionaire;

(c) in the opinion of the Independent Engineer, could not have been identified or foreseen through any investigations of the Project Site Conditions carried out, or deemed to be carried out, by the Concessionaire, in terms of Section 4.4; and

(d) does not result from any non-compliance by the Sponsor and/or the Concessionaire under any Agency Agreements.

provided, that the Concessionaire has taken all reasonable measures and steps to mitigate and minimize the Material Adverse Impediment.

4.14.2 Any Notice issued by the Concessionaire pursuant to Section 4.14.1 shall be duly verified and certified by the Independent Engineer prior to submission to the Agency and the Independent Engineer shall, prior to delivery of such Notice to the Agency, duly certify in the Notice, *inter alia*, the occurrence and subsistence of the Material Adverse Impediment and the time period required for removal of the same (the *Material Impediment Removal Period*). Upon receipt by the Agency of the Notice duly verified and certified by the Independent Engineer, the Agency shall act so as to remove such Material Adverse Impediment within the Material Impediment Removal Period. In the event the Concessionaire suffers delays in the performance of its obligations and/or incurs costs, in each case, as a direct result of the Material Adverse Impediment, the same shall entitle the Concessionaire to issuance of a Relief Order Request and in such case, the provisions of Article 15 (*Relief Extensions & Relief Compensations*) shall apply.
5. INDEPENDENT ENGINEER

5.1 SELECTION

5.1.1 Within five (5) days from the Effective Date, the Concessionaire shall provide the Agency with a list of three (3) reputable firms of engineers for appointment of the Independent Engineer (the First IE List).

5.1.2 Within ten (10) days of receipt by the Agency of the First IE List, the Agency shall (subject to one (1) of the firms in the First IE List being acceptable to the Agency) select a reputed firm of engineers from First IE List and the Agency and the Concessionaire shall appoint such firm as the Independent Engineer in terms of the Independent Engineer Contract within ten (10) days of receipt of such selection notice from the Agency. The Independent Engineer Contract shall be executed within one (1) month from the Effective Date.

5.1.3 In the event the firms of engineers identified by the Concessionaire in the First IE List are not acceptable to the Agency, the Concessionaire and the Agency shall appoint (in terms of the Independent Engineer Contract to be executed within one (1) month from the Effective Date) such firm as the Independent Engineer as is mutually acceptable to the Agency and the Concessionaire within one (1) month of the Effective Date and such appointment shall be made in terms of the Independent Engineer Contract (the Independent Engineer Appointment Date).

5.1.4 Failure by the Concessionaire to execute the Independent Engineer Contract by the Independent Engineer Appointment Date shall constitute a Material Breach of this Agreement.

5.1.5 The Independent Engineer shall provide the services set out in the Independent Engineer Contract and as requested by the Parties with mutual consent from time to time. Unless mutually agreed otherwise between the Parties, the Independent Engineer Contract shall be in accordance with the Indicative Independent Engineer Terms of Reference.

5.2 TERM OF APPOINTMENT OF THE INDEPENDENT ENGINEER

5.2.1 The appointment of the Independent Engineer shall be for an initial term of three (3) years from the date of the effectiveness of the Independent Engineer Contract (the Independent Engineer Appointment Term); provided, however, that:

(a) the Independent Engineer Appointment Term shall be extended prior to expiry of the same with the mutual written consent of the Parties so as to ensure that at all times during the Concession Period an Independent Engineer is retained/appointed, for the purposes set out in this Agreement; or

(b) the Parties shall be entitled to appoint a new Independent Engineer prior to the expiry of the Independent Engineer Appointment Term (such appointment to be effective upon expiry of the Independent Engineer Appointment Term) so as to ensure that at all times during the Concession Period an Independent Engineer is retained/appointed for the purposes set out in this Agreement. In the event of the
appointment of a new Independent Engineer upon expiry of the Independent Engineer Appointment Term, the provisions of Section 5.2.3 shall apply.

5.2.2 The appointment of the Independent Engineer may be terminated:

(a) by either Party if, the Independent Engineer is adjudged insolvent and/or bankrupt and/or the winding up proceedings are filed against the Independent Engineer and/or the Independent Engineer files winding up proceedings in a court of law and/or any action for malpractice and/or misadministration is filed against the Independent Engineer in a court of law;

(b) by the Parties with the mutual consent of the Parties.

5.2.3 Upon the occurrence of any of the events listed in Section 5.2.2, the Parties shall have the right to terminate the Independent Engineer Contract in accordance with the terms of the same and/or in the event of expiry of the Independent Engineer Appointment Term, the Parties shall appoint a new Independent Engineer in accordance with this Section 5.2.3. In the afore-stated circumstances, the Parties shall replace the appointed Independent Engineer with another consulting engineering firm or body corporate selected by the Agency from the First IE List provided by the Concessionaire pursuant to Section 5.1.1 above; provided, however, that the termination and/or replacement of the Independent Engineer shall not have effect till such time as the replacement Independent Engineer has been appointed. In the event the Agency objects to the appointment of any firm of engineers named in the First IE List, then the Concessionaire shall provide the Agency with a new list of three (3) reputable firms of engineers for appointment of the replacement Independent Engineer (the New IE List). Within ten (10) days of receipt by the Agency of the New IE List, the Agency shall either:

(a) select a reputable firm of engineers from the New IE List and shall cause the Concessionaire to appoint such firm as the Independent Engineer; or

(b) reject the appointment of any of the firms provided in the New IE List, in which case, the Parties shall appoint such firm of engineers as the new Independent Engineer as is mutually agreed by the Parties.

The provisions of this Article 5 (Independent Engineer) shall apply to any new Independent Engineer (including appointment and replacement of the same) appointed in accordance with the terms herein.

5.2.4 The term of appointment of the replacement Independent Engineer shall be the unexpired period of the Independent Engineer Appointment Term or such other term as may be mutually agreed between the Parties.

5.2.5 The Concessionaire shall ensure that all provisions of this Agreement pertaining to the Independent Engineer and its responsibilities in respect of the matters set out herein are duly incorporated in the Independent Engineer Contract.

5.3 **Independent Engineer Authorized Signatories**

5.3.1 The Parties shall require the Independent Engineer to designate and notify to the Agency and the Concessionaire of the authorized representatives of the Independent
Engineer that shall be authorized by the Independent Engineer to sign for and on behalf of the Independent Engineer, and any communication or document required to be signed by the Independent Engineer shall be valid and effective only if signed by such authorized signatories on behalf of the Independent Engineer; provided, that the Independent Engineer may, by Notice in writing to the Parties, substitute any of the authorized signatories.

5.4 **DECISION OF INDEPENDENT ENGINEER & DISPUTE RESOLUTION**

5.4.1 Subject to Section 5.4.2, any advice, verification, determination, certification, instruction, decision, direction and/or award of the Independent Engineer shall be binding on the Parties unless mutually agreed otherwise by the Parties.

5.4.2 In the event any Dispute arises between the Agency and the Concessionaire with regard to any advice, verification, determination, certification, instruction, decision, direction and/or award of the Independent Engineer, then such Dispute shall be resolved in accordance with the Dispute Resolution Procedure.

5.5 **INDEPENDENT ENGINEER REMUNERATION**

5.5.1 The Concessionaire shall (in consultation with the Agency) be solely responsible for the payment of the fees and expenses payable to the Independent Engineer pursuant to the Independent Engineer Contract (the **Independent Engineer Payments**), notwithstanding that the Independent Engineer shall be appointed by and shall fulfill its obligations in accordance with the terms of the Independent Engineer Contract.

5.5.2 The Concessionaire undertakes to affect the Independent Engineer Payments in a diligent and timely manner and in accordance with the Independent Engineer Contract.

5.6 **CONCESSIONAIRE INDEPENDENT ENGINEER PAYMENT ACCOUNT**

5.6.1 The Concessionaire shall establish and maintain the Concessionaire Independent Engineer Payment Account from the Commencement Date and until the Trigger Date. Unless otherwise agreed with the Financiers in the Concession Direct Agreement, the Agency may create a lien over the funds standing to the credit of the Concessionaire Independent Engineer Payment Account.

5.6.2 The Concessionaire shall issue irrevocable standing instructions to the Concessionaire Independent Engineer Payment Account Bank (in form and substance agreed between the Parties) (the **Concessionaire Independent Engineer Payment Account Standing Instructions**) in accordance with the Independent Engineer Contract.

5.6.3 The Concessionaire Independent Engineer Payment Account Standing Instructions issued by the Concessionaire shall not be unilaterally suspended, amended and/or revoked by either Party and shall remain effective, in each case, until the Trigger Date (or such other date as is mutually agreed between the Parties), and no withdrawal from the Concessionaire Independent Engineer Payment Account may be made by the Concessionaire, except as provided in this Agreement and the Concessionaire Independent Engineer Payment Account Standing Instructions. The Concessionaire
Independent Engineer Payment Account Standing Instructions may be suspended, amended and/or revoked with the mutual consent of the Parties.
6. INDEPENDENT AUDITOR

6.1 SELECTION

6.1.1 Within five (5) days from the Effective Date, the Concessionaire shall provide the Agency with a list of four (4) reputable firms of chartered accountants placed in category ‘A’ in the SBP Panel of Auditors for appointment of the Independent Auditor (the First IA List).

6.1.2 Within ten (10) days of receipt by the Agency of the First IA List, the Agency shall (subject to one of the firms in the First IA List being acceptable to the Agency) select a reputed firm of auditors from First IA List and the Agency and the Concessionaire shall appoint such firm as the Independent Auditor in terms of the Independent Auditor Contract within ten (10) days of receipt of such selection notice from the Agency. The Independent Auditor Contract shall be executed within one (1) month from the Effective Date.

6.1.3 In the event the firms of auditors identified by the Concessionaire in the First IA List is not acceptable to the Agency, the Concessionaire and the Agency shall appoint (in terms of the Independent Auditor Contract to be executed within one (1) month from the Effective Date) such firm as the Independent Auditor as is mutually acceptable to the Agency and the Concessionaire within one (1) month of the Effective Date and such appointment shall be made in terms of the Independent Auditor Contract (the Independent Auditor Appointment Date).

6.1.4 Failure by the Concessionaire to execute the Independent Auditor Contract by the Independent Auditor Appointment Date shall constitute a Material Breach of this Agreement.

6.1.5 The Independent Auditor shall provide the services set out in the Independent Auditor Contract and as requested by the Parties with mutual consent from time to time. Unless mutually agreed otherwise between the Parties, the Independent Auditor Contract shall be in accordance with the Indicative Independent Auditor Terms of Reference.

6.2 TERM OF APPOINTMENT OF THE INDEPENDENT AUDITOR

6.2.1 The appointment of the Independent Auditor shall be for an initial term of two (2) years from the date of the effectiveness of the Independent Auditor Contract (the Independent Auditor Appointment Term); provided, however, that:

(a) the Independent Auditor Appointment Term shall be extended prior to expiry of the same with the mutual consent of the Parties so as to ensure that at all times during the Concession Period an Independent Auditor is retained/appointed for the purposes set out in this Agreement; or

(b) the Parties shall be entitled to appoint a new Independent Auditor prior to the expiry of the Independent Auditor Appointment Term (such appointment to be effective upon expiry of the Independent Auditor Appointment Term) so as to ensure that at all times during the Concession Period an Independent Auditor is retained/appointed for the purposes set out in this Agreement. In the event of the
appointment of a new Independent Auditor upon expiry of the Independent Auditor Appointment Term, the provisions of Section 6.2.3 shall apply.

6.2.2 The appointment of the Independent Auditor may be terminated:

(a) by either Party if the Independent Auditor is adjudged insolvent and/or bankrupt and/or winding up proceedings are filed against the Independent Auditor and/or the Independent Auditor files winding up proceedings in a court of law and/or any action for malpractice and/or misadministration is filed against the Independent Auditor in a court of law;

(b) by the Parties with the mutual consent of the Parties.

6.2.3 Upon the occurrence of any of the events listed in Section 6.2.2, the Parties shall have the right to terminate the Independent Auditor Contract in accordance with the terms of the same or and/or in the event of expiry of the Independent Auditor Appointment Term, the Parties shall appoint a new Independent Auditor in accordance with this Section 6.2.3. In the afore-stated circumstances, the Parties shall replace the appointed Independent Auditor with another firm of chartered accountants selected by the Agency from the First IA List provided by the Concessionaire pursuant to Section 6.1.1 above; provided, however, that the termination and/or replacement of the Independent Auditor shall not have effect till such time as the replacement Independent Auditor has been appointed. In the event the Agency objects to the appointment of any firm of chartered accountants named in the First IA List, then the Concessionaire shall provide the Agency with a new list of three (3) reputable firms of chartered accountants for appointment of the replacement Independent Auditor (the New IA List). Within ten (10) days of receipt by the Agency of the New IA List, the Agency shall either:

(a) select a reputable firm of chartered accountants from the New IA List and shall cause the Concessionaire to appoint such firm as the Independent Auditor; or

(b) reject the appointment of any of the firms provided in the New IA List, in which case, the Parties shall appoint one of the Big Four Accounting Firms with mutual consent of the Parties as the new Independent Auditor.

The provisions of this Article 6 (Independent Auditor) shall apply to any new Independent Auditor (including appointment and replacement of the same) appointed in accordance with the terms herein.

6.2.4 The term of appointment of the replacement Independent Auditor shall be the unexpired period of the Independent Auditor Appointment Term or such other term as may be mutually agreed between the Parties.

6.2.5 The Concessionaire shall ensure that all provisions of this Agreement pertaining to the Independent Auditor and its responsibilities in respect of the matters set out herein are duly incorporated in the Independent Auditor Contract.

6.3  **INDEPENDENT AUDITOR AUTHORIZED SIGNATORIES**

6.3.1 The Parties shall require the Independent Auditor to designate and notify to the Agency and the Concessionaire of the authorized representatives of the Independent Auditor
that shall be authorized by the Independent Auditor to sign for and on behalf of the Independent Auditor, and any communication or document required to be signed by the Independent Auditor shall be valid and effective only if signed by such authorized signatories on behalf of the Independent Auditor; provided, that the Independent Auditor may, by Notice in writing to the Parties, substitute any of the authorized signatories.

6.4 **Decision of Independent Auditor & Dispute Resolution**

6.4.1 Subject to Section 6.4.2, any advice, instruction, decision, direction and/or award of the Independent Auditor shall be binding on the Parties unless mutually agreed otherwise by the Parties.

6.4.2 In the event any Dispute arises between the Agency and the Concessionaire with regard to any advice, instruction, decision, direction and/or award of the Independent Auditor, then such Dispute shall be resolved in accordance with the Dispute Resolution Procedure.

6.5 **Independent Auditor Remuneration**

6.5.1 The Concessionaire shall (in consultation with the Agency) be solely responsible for the payment of the fees and expenses payable to the Independent Auditor pursuant to the Independent Auditor Contract (the Independent Auditor Payments), notwithstanding that the Independent Auditor shall be appointed by and shall fulfill its obligations in accordance with the terms of the Independent Auditor Contract.

6.5.2 The Concessionaire undertakes to affect the Independent Auditor Payments in a diligent and timely manner and in accordance with the Independent Auditor Contract.

6.6 **Concessionaire Independent Auditor Payment Account**

6.6.1 The Concessionaire shall establish and maintain the Concessionaire Independent Auditor Payment Account from the Commencement Date and until the Trigger Date. Unless otherwise agreed with the Financiers in the Concession Direct Agreement, the Agency may create a lien over the funds standing to the credit of the Concessionaire Independent Auditor Payment Account.

6.6.2 The Concessionaire shall issue irrevocable standing instructions to the Concessionaire Independent Auditor Payment Account Bank (in form and substance agreed between the Parties) (the Concessionaire Independent Auditor Payment Account Standing Instructions) in accordance with the Independent Auditor Contract.

6.6.3 The Concessionaire Independent Auditor Payment Account Standing Instructions issued by the Concessionaire shall not be unilaterally suspended, amended and/or revoked by either Party and shall remain effective, in each case, until the Trigger Date (or such other date as is mutually agreed between the Parties), and no withdrawal from the Concessionaire Independent Auditor Payment Account may be made by the Concessionaire, except as provided in this Agreement and the Concessionaire Independent Auditor Payment Account Standing Instructions. The Concessionaire Independent Auditor Payment Account Standing Instructions may be suspended, amended and/or revoked with the mutual consent of the Parties.
7. **CONCESSIONAIRE’S REPRESENTATIONS, WARRANTIES AND CERTAIN OBLIGATIONS & UNDER Takings**

7.1 **CONCESSIONAIRE REPRESENTATIONS & WARRANTIES**

7.1.1 The Concessionaire hereby represents and warrants to the Agency that:

(a) it is duly organized and validly existing under the Applicable Laws, and that it has full power and authority to execute and perform its obligations under this Agreement and to carry out the transactions contemplated hereby;

(b) it has taken all necessary corporate and other actions under the Applicable Laws to:

(i) authorize the execution, delivery and performance of this Agreement; and

(ii) validly exercise its rights and perform its obligations under this Agreement;

(c) this Agreement and all obligations contained herein constitutes its legal, valid and binding obligations, enforceable against it in accordance with the terms hereof;

(d) it has the financial standing and capability to undertake and implement the Project in accordance with the Applicable Standards and neither the Concessionaire nor the Sponsor have committed a breach in respect of their payment obligations in relation to a financial indebtedness;

(e) it is subject to the Applicable Laws, and hereby expressly and irrevocably waives any immunity in any jurisdiction in respect of this Agreement and/or matters arising hereunder including any obligation, liability or responsibility hereunder;

(f) the execution, delivery and performance of this Agreement does not and shall not conflict with, result in the breach of, constitute a default under, or accelerate performance required by any of the terms of its memorandum and articles of association or any of its constitutive and corporate charters, filings with Government Authorities, documents, or any Applicable Laws or any covenant, contract, agreement, arrangement, understanding, decree or order to which it is a party or by which it or any of its properties or assets is bound or affected;

(g) there are no actions, suits, proceedings, or investigations pending or, to its knowledge, threatened against it under the Applicable Laws before any court or before any other judicial, quasi-judicial or other authority, the outcome of which may result in the breach of this Agreement or which individually or in the aggregate may result in any material impairment of its ability to perform any of its obligations under this Agreement;

(h) it has no knowledge of any violation or default with respect to any order, writ, injunction or decree of any court or any legally binding order of any Government Authority which may result in any Material Adverse Effect on its ability to perform its obligations under this Agreement and no fact or circumstance exists which
may give rise to such proceedings that would have a Material Adverse Effect on the performance of its obligations under this Agreement;

(i) it has complied with Applicable Laws in all material respects and has not been subject to any fines, penalties, injunctive relief or any other civil or criminal liabilities which in the aggregate have or may have a Material Adverse Effect on its ability to perform its obligations under this Agreement;

(j) the Sponsor owns one hundred percent (100%) of the Class A Shares as of the Effective Date and no Encumbrances exist on such Class A Shares;

(k) the Sponsor (along with its Associates (if any)) has the financial standing and resources to fund the Sponsor Equity Funding Amount in accordance with the Agency Agreements;

(l) the Concessionaire has the ability to achieve Financial Close;

(m) no representation or warranty made by the Concessionaire and contained herein or in any other document furnished by it to the Agency or to any Government Authority in relation to the Concessionaire Permits contains any untrue or misleading statement of material fact or omits or shall omit to state a material fact necessary to make such representation or warranty misleading;

(n) no sums, in cash or kind, have been paid or shall be paid, by it or on its behalf, to any Person by way of fees, commission or otherwise for securing the Concession or entering into this Agreement or for influencing or attempting to influence any officer or employee of the Agency in connection therewith and neither the Concessionaire nor the Sponsor (together with their Affiliates) have engaged in any Corrupt Act in respect of the foregoing;

(o) the Concessionaire and each of the Sponsor have complied with requirements of the Applicable Laws and the RFP (to the extent the same are applicable to the Concessionaire and the bidders) in the preparation, finalization, delivery and submission of its Bid for the award of the Project and the Concession to the Concessionaire and have undertaken all acts and deeds (to the extent the same are applicable to the Concessionaire and the bidders) necessary for award of the Concession and the Project to the Concessionaire in terms of the RFP and the Applicable Laws;

(p) all representations, breach of which may cause a Material Adverse Effect, provided by the Concessionaire and/or Sponsor in the Bid submitted in response to the RFP, are true and accurate in all respects;

(q) it is subject to civil and commercial law with respect to this Agreement and it hereby expressly and irrevocably waives any sovereign immunity (if any) in any jurisdiction;

(r) the Concessionaire has furnished a valid and effective Construction Performance Security to the Agency prior to the Effective Date and the Construction Performance Security is valid and subsisting;
(s) after the completion / finalization of the project alignment (i.e. Hydraulic Model Study) the Concessionaire shall prepare and submit the land folder to the Agency, and the Independent Engineer that includes the complete details of the land encountered in the ROW of the Project.

7.1.2 In the event that any occurrence or circumstance comes to the attention of either Party that renders any of its aforesaid representations or warranties untrue or incorrect, such Party shall immediately Notify the other Party of the same. Such Notification shall not have the effect of remedying any breach of the representation or warranty that has been found to be untrue or incorrect nor shall it adversely affect or waive any right, remedy or obligation of either Party under this Agreement or any Agency Agreement.

7.1.3 The Concessionaire shall repeat the representations and warranties under Section 7.1.1 at the Commencement Date.
7.2 **CONCESSIONAIRE’S GENERAL UNDERTAKINGS**

7.2.1 The Concessionaire hereby undertakes that it shall, at its own cost and expense:

   (a) comply with and perform all duties, obligations, acts, deeds and obligations set out in, in each case, the Applicable Standards;

   (b) continuously and diligently undertake, perform and complete all Project Works and Concession Assets in accordance with the Applicable Standards and within the Time for Completion;

   (c) ensure that all Project Works and Concession Assets comply with the Applicable Standards;

   (d) investigate, study, finance, design, construct, Operate and Maintain the Concession Assets in accordance with the Applicable Standards;

   (e) ensure and achieve each Project Milestone on or prior to its Project Milestone Date in accordance with the Applicable Standards including:

      (i) achieve Substantial Completion on or prior to the Scheduled Substantial Completion Date; and/or

      (ii) achieve Construction Completion on or prior to the Scheduled Construction Completion Date;

   (f) remedy any Defects & Deficiencies in the Project Works (including in the performance of the same) and/or the Concession Assets at its own cost and risk;

   (g) obtain and maintain all Concessionaire Permits (including any renewals of the same) in conformity with the Applicable Laws and be in compliance thereof, and deliver copies of the same to the Agency, the Independent Engineer and the Independent Auditor from time to time;

   (h) be in compliance with and perform all its obligations in accordance with, in each case, the Applicable Laws and fulfill the requirements (including the environmental requirements) under the Applicable Laws,

   (i) procure and maintain in full force and effect, as necessary, appropriate proprietary rights, licences, agreements and permissions for materials, methods, processes and systems used in or incorporated into the Project;

   (j) appoint, supervise, monitor and control as necessary, the activities of the Concessionaire Engaged Persons (including those of the Contractors under their respective and relevant Project Agreements), provided that, at all times, the Concessionaire shall be fully responsible for all acts or omissions of the Concessionaire Engaged Persons, as further contemplated in Section 7.3;

   (k) make its own arrangements for materials (including construction materials), parts, components, supplies, tools, machinery etc. for performance of the Project Works;
(l) be responsible for strict compliance with the relevant Applicable Standards notwithstanding the appointment and/or engagement by it of the Concessionaire Engaged Persons to implement the Project (or any part thereof) and performance of Project Works (or any part thereof);

(m) keep and maintain the Project Site free from all encroachments and take all steps necessary to remove encroachments, if any;

(n) except as provided in this Agreement, make payments to the relevant Government Authority, if required, for provision of such services as are not provided in the normal course or are available only on payment;

(o) afford access of the Project Site to the authorized representatives of the Agency, the Independent Engineer, Independent Auditor and any Government Authority having jurisdiction over the Project, including those concerned with safety, security or environmental protection to inspect the Project Works and the Concession Assets and, upon reasonable notice, to investigate any matter within their authority, and provide to such Persons assistance reasonably required to carry out their respective duties and functions;

(p) not engage in any business or activity other than the business or related to, and conducted for, the purpose of the Project and/or other than as provided in this Agreement;

(q) maintain its corporate existence and its rights to carry on operations of its business;

(r) provide all necessary assistance to the Project Manager, as the Project Manager may reasonably require for the performance of its duties and services;

(s) make all payments to the Agency of the amounts due and payable by the Concessionaire in accordance with the terms of this Agreement and the Agency Agreements;

(t) ensure that no damage is caused to any property belonging to Agency and/or other third parties in the execution of the Project Works;

(u) coordinate and manage all the Project Works and be responsible for the coordination and general management of the Project Works;

(v) provide to the Agency, the Independent Auditor and the Independent Engineer all such information relating to the Project Works and the execution and completion of the same as is reasonably requested by the Agency, the Independent Auditor and the Independent Engineer from time to time;

(w) notify the Agency, the Independent Engineer and/or the Independent Auditor (as applicable) without undue delay upon becoming aware of any changes in the information provided and/or to be provided to the same by the Concessionaire pursuant to the Applicable Standards;
(x) provide all necessary assistance to the Independent Engineer and the Independent Auditor as the same may reasonably require for the performance of their duties and services in accordance with the Independent Engineer Contract and the Independent Auditor Contract, respectively, and for the performance of its roles and obligations contemplated under this Agreement and the Agency Agreements;

(y) ensure that the Project Agreements entered into by the Concessionaire shall not be inconsistent with the terms and conditions of the Agency Agreements;

(z) submit from time to time to the Agency and the Independent Engineer its detailed design, construction methodology and quality assurance procedures for implementation and completion of the Project in accordance with the Applicable Standards and the same shall be subject to the review and approval of the Independent Engineer;

(aa) undertake, do and perform from time to time, all such acts, deeds and things as may be necessary or required before commencement of Project Works (or any part thereof) for the performance of the Project Works under and in accordance with the Applicable Standards;

(bb) construct, provide and maintain a reasonably furnished site office and accommodation for the Independent Engineer at the Project Site commencing from the Commencement Date and until the Transfer Date;

(cc) ensure the safety of the Concession Assets and the Users in accordance with the Safety Requirements;

(dd) maintain the Project Site and the Concession Assets in good condition;

(ee) comply with the Design Requirements;

(ff) the Concessionaire shall comply with all the conditions set–out in the EIA Approval obtained by the Concessionaire in accordance with the Applicable Laws and the same shall stand approved by the Sindh Environmental Protection Agency and shall submit a copy of each of the same (i.e. the report and its approval) to the Agency (with a copy delivered to the Independent Engineer and the Independent Auditor);

(gg) provide the Project Management/Implementation Unit with vehicles in accordance with Schedule W (Project Management and Implementation Unit Vehicles);

(hh) supervise the works during the relocation of existing utilities, and all utility stakeholders, in relation to the agreed alignments (for excavation, laying, back-filling, erection of utility poles etc.) by seeking assistance from the design consultant with respect to the survey points without damaging the existing utilities and roads for the relocation of utilities if encountered.

7.3 CONCESSIONAIRE ENGAGED PERSONS
7.3.1 The Concessionaire shall, commencing from the Effective Date, have requisite organization and designate and appoint suitable officers/representatives as it may deem appropriate to implement and supervise the Project, to deal with the Independent Engineer/Independent Auditor/the Agency and to be responsible for all necessary exchange of information required pursuant to the Applicable Standards.

7.3.2 The Concessionaire shall ensure that the Concessionaire Engaged Persons are experienced and qualified for the purposes of Project implementation and performance of the Project Works and are at all times properly trained for their respective functions. The Concessionaire shall be responsible for maintaining harmony and good industrial relations among the Concessionaire Engaged Persons.

7.3.3 The Concessionaire shall be fully and solely responsible for:

(a) observance by all the Concessionaire Engaged Persons of all the provisions and requirements of the Applicable Standards;

(b) the acts, omissions, failure to perform, breaches or defaults of the Concessionaire Engaged Persons of the Applicable Standards as fully as if they were the acts, omissions, failures, breaches or defaults of the Concessionaire of the Applicable Standards under this Agreement and the Agency Agreements.

7.3.4 The Concessionaire shall be responsible for strict compliance with the Applicable Standards notwithstanding the appointment and/or engagement by it of the Concessionaire Engaged Persons to implement the Project (or any part thereof) and performance of Project Works (or any part thereof) and any engagement by the Concessionaire of any of the Concessionaire Engaged Persons shall not release or discharge the Concessionaire of any of its liabilities, responsibilities or obligations under the Applicable Standards and the Concessionaire shall not be entitled to any relief or compensation (including any extension of Time For Completion and/or monetary compensations) under this Agreement or otherwise for any acts, omissions, failures, breaches or defaults of the Concessionaire Engaged Persons. Notwithstanding anything to the contrary, the Agency shall not be liable or responsible in any manner whatsoever under any Applicable Laws, in contract, tort or otherwise in respect of the Concessionaire Engaged Persons.

7.3.5 Employment of any foreign Concessionaire Engaged Persons shall be subject to grant of requisite regulatory permits and approvals including employment/residential visas and work permits, if any required, and the obligation to apply for and obtain the same shall be the sole responsibility of the Concessionaire and, notwithstanding anything to the contrary contained in this Agreement or otherwise, refusal of or inability to obtain any such permits and approvals by the Concessionaire or the relevant Contractor shall not constitute Force Majeure Event, and shall not in any manner excuse the Concessionaire from the performance and discharge of its obligations and liabilities under the Applicable Standards. The Concessionaire shall use reasonable efforts to promote local contractors and to employ and engage, to the extent practicable local employees and contractors.

7.3.6 The Concessionaire undertakes that it shall itself and/or any of its Concessionaire Engaged Persons shall be available to attend any meetings with the Agency, the Independent Engineer and/or the Independent Auditor at all reasonable times, as required and Notified by the Agency, the Independent Engineer and/or the Independent
Auditor (as applicable) to the Concessionaire. All costs for attending such meetings (including those relating to preparation and attendance in such meetings by the Concessionaire Engaged Persons) shall be on the Concessionaire’s account.

7.4 **CONCESSIONAIRE AUTHORIZED REPRESENTATIVE & CONCESSIONAIRE PROJECT ENGINEER**

7.4.1 Within forty (40) days following the Effective Date, the Concessionaire shall:

(a) appoint, with the prior written consent of the Agency (which consent shall be deemed to be accorded in case no response from Agency is received within twenty (20) days of Agency receipt of the Concessionaire’s written request for such consent), and prior Notification to the Independent Engineer and the Independent Auditor, in accordance with Section 5 *(Independent Engineer)* and Section 6 *(Independent Auditor)* and all Applicable Laws; its representative duly authorized to deal with the Agency in respect of all matters under or arising out of or relating to this Agreement (the Concessionaire Authorized Representative);

(b) appoint, in accordance with the criteria set out in **SCHEDULE A (Scope of Work)** and Applicable Laws with prior written consent of the Agency (which consent shall be deemed to be accorded in case no response from Agency is received within twenty (20) days of Agency receipt of the Concessionaire’s written request for such consent), and prior Notification to the Independent Engineer, at its sole cost and expense one or more established consulting engineering firm(s) to design the Construction Works;

(c) appoint, in accordance with the criteria set out in **SCHEDULE A (Scope of Work)** Applicable Laws, with prior written consent of the Agency (which consent shall be deemed to be accorded in case no response from Agency is received within twenty (20) days of Agency receipt of the Concessionaire’s written request for such consent), and prior Notification to the Independent Engineer, at its sole cost and expense one or more established consulting engineering firm and/or individual(s) to: (i) supervise the Construction Works; (ii) co-ordinate with the Independent Engineer and Agency with respect to technical matters relating to the Project; and (iii) ensure that the Construction Works are performed in accordance with the Applicable Standards (the Concessionaire Project Engineer). In the event the Concessionaire Project Engineer is a consulting engineering firm, any personnel assigned to this Project shall also be required to satisfy the criteria set out in **SCHEDULE A (Scope of Work)**;

7.4.2 The Concessionaire shall:

(a) ensure that the Concessionaire Authorized Representative or the Concessionaire Project Engineer perform their respective obligations in the same manner as the Concessionaire is required to perform its obligations under this Agreement; and

(b) prior to any substitution of the Concessionaire Authorized Representative and/or the Concessionaire Project Engineer, the Concessionaire shall submit the details of the same to the Agency in writing (with copies to the Independent Engineer and the Independent Auditor) and shall provide any other information reasonably requested by the Agency in respect of the same.
7.4.3 The Concessionaire shall substitute the Concessionaire Authorized Representative and the Concessionaire Project Engineer with the prior approval of the Agency. The approval by the Agency shall not be unreasonably withheld, conditioned or delayed; provided, however, in the event the Agency fails to grant its approval or disapproval to the Concessionaire for the appointment and/or substitution of the Concessionaire Authorized Representative and/or the Concessionaire Project Engineer within fifteen (15) days following the receipt of such request by the Agency from the Concessionaire, the approval of the Agency for the appointment and/or substitution of the Concessionaire Authorized Representative and/or the Concessionaire Project Engineer shall be deemed accorded. The Concessionaire hereby unconditionally and irrevocably confirms, acknowledges and agrees that the liability of the Concessionaire for the performance of its obligation pursuant to this Agreement shall neither be rescinded, waived, reduced, cancelled, terminated and/or in any manner adversely impacted as a direct and/or indirect consequence of the approval or otherwise of the Agency pursuant to this Section.

7.5 **THE EPC CONTRACTOR(S) & THE O&M CONTRACTOR**

7.5.1 The Concessionaire hereby undertakes that it shall:

(a) ensure that the EPC Contract(s) and the O&M Contracts are entered into on an arm's length basis and on commercially viable terms;

(b) ensure that the assets created and/or constructed forming part of the Concession Assets pursuant to the EPC Contract(s) and the O&M Contract vest in the Agency on the Transfer Date;

(c) ensure that the EPC Contractor(s) or the O&M Contractor perform their respective obligations in the same manner that the Concessionaire is required to perform its obligations under this Agreement; and

(d) deliver copies of each of the EPC Contract(s) and the O&M Contract(s) to Agency within seven (7) days of execution of each of the EPC Contract(s) and the O&M Contract(s), respectively.

7.5.2 The Agency shall not be liable for losses (including any Losses) of any nature resulting from the EPC Contract(s) and the O&M Contract entered into by the Concessionaire as a result of the expiry of the Concession Period or Termination of this Agreement.

7.5.3 Any substitution and/or replacement of the EPC Contractor(s) or the O&M Contractor of the Project shall be subject to the approval of the Agency, which approval shall be at the sole and absolute discretion of the Agency (in consultation with the Independent Engineer & the Independent Auditor upon expiry of the Defects Liability Period). In consideration of providing its approval, the Agency consider if the substitute EPC Contractor(s) or the O&M Contractor is, at least, technically, financially and otherwise capable in terms of the criteria provided in the RFP. Furthermore, in granting its approval, the Agency shall consider the determinations of the Independent Auditor and Independent Engineer, as provided in terms of Section 7.5.5. Provided, however, in the event the EPC Contractor ceases to exist, replacement of the EPC Contractor(s) of the Project shall be subject to the approval of the Agency in consultation with the Independent Engineer and the Independent Auditor.
7.5.4 The Independent Engineer (in respect of technical matters) and the Independent Auditor (in respect of financial matters) shall have the right to approve and/or disapprove any substitution of the EPC Contractor(s) and/or the O&M Contractor, if any, in the event (in the reasonable opinion of the Independent Engineer (in respect of technical matters) and the Independent Auditor (in respect of financial matters)):

(a) such EPC Contractor(s) is technically and financially incapable (to the extent of its scope of work) of performing the Construction Works (or any part thereof); or

(b) such O&M Contractor is technically and financially incapable (to the extent of its scope of work) to perform the Operations and Maintenance (or any part thereof);

provided, in their determination of the afore-stated, the Independent Engineer and the Independent Auditor shall ensure, at the very minimum, that the substitute EPC Contractor(s) and/or the O&M Contractor is/are, at least, technically, financially and otherwise capable in terms of the criteria provided in the RFP.

7.5.5 The execution of the EPC Contract(s) and/or the O&M Contract(s), or any amendment thereof shall be subject to the prior approval of the Independent Engineer in respect of payment terms, payment milestones, scope of the relevant Project Works and technical matters to ensure conformity with the terms of the Concession Agreement. The Concessionaire shall deliver to the Independent Engineer copies of the proposed EPC Contract(s) and O&M Contract(s) (with a copy to the Agency), or any amendment thereof. The Agency shall, within fifteen (15) days of its receipt of the proposed EPC Contract(s) and/or the O&M Contract(s), provide its comments or observation on the same, if any, to the Independent Engineer. The Independent Engineer shall, within twenty-eight (28) days of the delivery of the proposed EPC Contract(s) and O&M Contract(s) and/or any amendments thereof by the Concessionaire, grant its approval or disapproval of the same, in consultation with Agency, and/or after removing any objection by Agency. In the event no approval or objections to the proposed EPC Contract(s) and/or the O&M Contracts is granted by the Independent Engineer within twenty-eight (28) days of the delivery of the same by the Concessionaire, it shall be deemed not to have been objected to by the Independent Engineer.

7.5.6 The Concessionaire shall deliver certified (as being true and correct) copies of the executed EPC Contract(s) and O&M Contract(s), together with all amendments thereto, to the Agency, the Independent Engineer and the Independent Auditor within seven (7) days of execution of the same.

7.6 **CONCESSIONAIRE PERMITS**

7.6.1 The Concessionaire shall make or cause to be made, in a timely fashion, all applications (whether initial or renewal applications) for the Concessionaire Permits in the prescribed form and with the prescribed fee (in each case, in accordance with the Applicable Laws) to the appropriate Government Authority and shall diligently pursue all such applications. The information supplied in the applications shall be complete and accurate and shall satisfy the substantive and procedural requirements of the Applicable Laws applied in a “non-discriminatory” manner.
7.6.2 The Concessionaire shall make or cause to be made, at least monthly prior to the Construction Completion Date, and at least quarterly thereafter, reports listing its schedule for submitting Concessionaire Permits application forms or renewal application forms, the status of any Concessionaire Permit applications then outstanding, notifications of the granting or denial of any Concessionaire Permit or Concessionaire Permit renewal, and notifications of any violations of any Concessionaire Permit. Each report shall be submitted to the Agency, the Independent Engineer and the Independent Auditor and shall include copies of all applications and notifications discussed in the report which have not been provided with a previous report. The first section of each report shall also summarize any problems regarding any Concessionaire Permit or Concessionaire Permit application that may materially affect the Concessionaire’s performance under any Agency Agreement. In the event of any Lapse of Consent, the Concessionaire shall submit a report pursuant to this Section 7.6.2 within three (3) days after becoming aware thereof.

7.7 PRELIMINARY WORKS AND PRELIMINARY EXPENDITURES

7.7.1 The Concessionaire shall perform the Preliminary Works by utilizing the proceeds received against encashment of the Sponsor Equity SBLC(s) (if already provided) or by utilizing the funds allocated for the Sponsor Equity Funding Amount, in accordance with this Agreement and the Equity Funding & Utilization Agreement, as mutually agreed between the Parties. The costs of all Preliminary Works shall be deemed to be included in the Pre-Estimated Project Cost and the Total Project Cost. However, the Preliminary Works and the Preliminary Expenditures must be approved by the Independent Engineer and the Independent Auditor.

7.8 ACCESS ROUTE & TRANSPORTATION

7.8.1 The Concessionaire shall be responsible for selection and usage of all transportation means, transportation routes, roads, bridges, highways and routes within, and to and from the Project Site in respect of performance of its Project Works and the Agency shall not be responsible for any claims attributable to Concessionaire in respect of the same. The Concessionaire shall (as between the Parties) be responsible for the repair of access routes damaged by the Concessionaire and/or the Concessionaire Engaged Persons. The extent to which the access routes have been damaged by the Concessionaire shall be assessed by the Independent Engineer.

7.9 TAXES AND SUBSIDIES

7.9.1 The Concessionaire shall be responsible to make all payments in respect of the rates, taxes (as applicable), charges, levies, assessments or equivalent taxes levied on it.

7.9.2 The Concessionaire may raise any objections in terms of any charges levied on it by any Government Authority; provided, that such objections shall be filed and pursued at the Concessionaire’s cost and the Concessionaire shall be entitled to any benefit accruing as a result of the Concessionaire’s successful objection.

7.9.3 The Concessionaire fully understands that the Agency or any other Government Authority shall not provide any guarantee, subsidy, grant or any financial support of any nature to the Concessionaire in respect of the Project other than as provided under the Agency Agreements.
7.10 **PROTECTION OF THE ENVIRONMENT**

7.10.1 The Concessionaire shall comply with all Applicable Standards (including any condition which may from time to time be imposed by any Government Authority, including the ‘Sindh Environmental Protection Agency’ as regards collection, treatment and disposal or discharge of effluents or waste) pertaining to protection of the environment in its arrangements, execution of Project Works, procurement, construction and operations on the Project Site. The Concessionaire shall take all necessary steps to protect the environment (both on and off the Project Site) and shall not cause damage and nuisance to people and property resulting from pollution, noise and other results of its operations. The Concessionaire shall ensure that air emissions, surface discharges and effluents from the Project Site during the Concession Period shall not exceed the values prescribed by the Applicable Standards.

7.10.2 The Concessionaire shall provide properly designed storage areas for its hazardous materials that are impermeable to leakage into the surrounding soil for storage of hazardous wastes. Such storage shall also be covered and protected from inundation and overflow by rainfall into the surrounding soil. Any hazardous materials generated during completion of the Project Works by the Concessionaire (including any of its Concessionaire Engaged Persons) shall be properly disposed off by the Concessionaire on completion of the Works. The Concessionaire shall be responsible for keeping safe and disposing any hazardous materials and any dangerous substances on the Project Site generated from time to time during performance and completion of the Project Works or brought on to the Project Site by the Concessionaire.

7.10.3 The Concessionaire undertakes to indemnify, defend and hold the Agency harmless from any and all liabilities, claims, damages, costs, penalties, fines, expenses, fees (including reasonable attorney's fees) and charges of any nature associated with any non-compliance by the Concessionaire of its obligations contained in this Section 7.10 (Protection of the Environment).

7.11 **INTERNAL INFRASTRUCTURE LINKAGES**

7.11.1 The Concessionaire shall be responsible for internal infrastructure linkages required for the Project such as wastewater and storm water drainage at the Project Site. The Agency shall use reasonable efforts to facilitate for the provision with respective Government Authorities at no cost to itself and it shall be the Concessionaire’s responsibility to fulfil any monetary or other compliances, as may be required by such Government Authorities.

7.12 **EMERGENCY DECOMMISSIONING**

7.12.1 In the event, during the Operations Period, in the reasonable opinion of the Concessionaire, there exists an Emergency that warrants de-commissioning and closure to traffic and/or the Users of the whole or any part of the Concession Assets (the Decommissioned Project Area), the Concessionaire shall be entitled to de-commission and close the whole or any part of the Decommissioned Project Area, as the case may be, to traffic and/or the Users for so long as such Emergency and the consequences thereof warrant (the Emergency Decommissioning); provided, however, that such Emergency Decommissioning and the particulars thereof shall be notified by the
Concessionaire to the Agency and the Independent Engineer without any delay, and the Concessionaire shall diligently abide by the Applicable Standards (including the Safety Requirements) in dealing with such Emergency Decommissioning and act in accordance with the directions that the Independent Engineer may issue for dealing with such Emergency Decommissioning; provided, however:

(a) that the Independent Engineer shall, within seven (7) days from the date of the Emergency Decommissioning, certify whether such Emergency Decommissioning was warranted; and

(b) that the Concessionaire shall re-commission the Decommissioned Project Area, without any delay, whenever the Independent Engineer either: (i) notifies the Concessionaire to re-commission the same; or (ii) certifies that such Emergency Decommissioning was not warranted.

7.12.2 Without prejudice to the provisions of Section 7.12.1(b), the Concessionaire hereby undertakes to re-commission the Decommissioned Project Area efficiently and in a time sensitive manner and as quickly as practicable after the circumstances leading to the Emergency Decommissioning have ceased to exist or have so abated as to enable the Concessionaire to re-commission the Decommissioned Project Area and shall notify the Agency and the Independent Engineer of the same without any delay.

7.12.3 The Emergency Decommissioning of the Decommissioned Project Area and the re-commissioning thereof shall, as soon as practicable, be brought to the notice of the affected Persons/Users by means of public announcements/notice by the Agency. The Independent Engineer shall determine whether the Concessionaire has successfully re-commissioned the Decommissioned Project Area and made the same available for traffic/Users as soon as practicable upon the termination/ceasing of the circumstances that have resulted in the Emergency Decommissioning.

7.12.4 All expenses, charges, fees, overheads and costs of any nature and all delays, in each case, resulting from and relating to the Emergency Decommissioning shall be borne by and shall be on account of the Concessionaire; provided, however, in the event the Emergency Decommissioning results from the Agency Event of Default and/or a Force Majeure Event, the Concessionaire shall be entitled to issuance of a Relief Order Request and in such case, the provisions of Article 15 (Relief Extensions & Relief Compensations) shall apply.

7.13 Restoration of Loss or Damage to Project

7.13.1 Save and except as a result of a Permitted Events (excluding a Non Political Event), in the event that the Project Works and/or Concession Assets or any part thereof suffers any loss or damage during the Concession Period, the Concessionaire shall, at its cost and expense, rectify and remedy such loss or damage forthwith in accordance with the Applicable Standards so that the Project Works and the Concession Assets conform to the Applicable Standards.

7.14 Accounts and Reports

7.14.1 Appointment of Auditors
The Concessionaire shall make arrangements with respect to the installation and operation of an accounting and cost control system and for the appointment, as statutory auditors, of a reputed firm of independent chartered accountants placed in category ‘A’ in the SBP Panel of Auditors, reasonably acceptable to the Agency and the Independent Auditor.

7.14.2 Specific Records

The Concessionaire shall maintain complete and accurate records accounting for all transactions relating to any Relief Order, Relief Compensation, extensions of Time For Completion, Class B Dividends, Change of Scope, minutes of board meetings and shareholder meetings and other records, which records shall be subject to inspection and audit by the Agency, the Independent Engineer and the Independent Auditor.

7.14.3 Periodic Reports

The Concessionaire shall in accordance with this Agreement furnish to the Agency, the Independent Engineer and the Independent Auditor,

(i) Construction Monthly Progress Report; and

(ii) the O&M Monthly Status Report.

The Concessionaire shall, as soon as available but in any event within sixty (60) days of filing, furnish to the Agency, the Independent Engineer and the Independent Auditor two (2) copies of all documents (including (without limitation) all tax returns, statutory returns and audited financial statements) filed in compliance with the requirements of the Companies Act, 2017 as amended or superseded from time to time or any other Applicable Laws.

The Concessionaire shall, as soon as available, furnish to the Agency, the Independent Engineer and the Independent Auditor, a report on any factors materially and adversely affecting, or that might materially and adversely affect, the Project or the Concessionaire’s business and operations.

7.14.4 Reporting of Changes

The Concessionaire shall, at least fourteen (14) days prior to it becoming effective, report to the Agency, the Independent Engineer and the Independent Auditor any contemplated (i) material change in its memorandum and articles of association; (ii) change in its fiscal year; (iii) change in the constitution of its board of directors; (iv) change in its chief executive officer, and (v) without prejudice to the provisions of Section 10.3 (Change in Control), registration of a transfer of Class A Shares and/or Class B Shares to any Person who thereby becomes a registered holder of greater than five percent (5%) of the issued Class A Shares and/or Class B Shares, or of a transfer of Class A Shares and/or Class B Shares to or from a Person or entity who, immediately prior to such transfer, held greater than five percent (5%) of the issued Class A Shares and/or Class B Shares; provided, however, that, reporting as aforesaid shall not relieve the Concessionaire from its obligations or liabilities towards any other Government Authority having jurisdiction over any such matter.
7.14.5 Lists of Financiers and Creditors

Together with the periodic reports required by Section 7.14.3, the Concessionaire shall also furnish to the Agency, the Independent Engineer and the Independent Auditor a list of:

(i) the Financiers; and

(ii) each of its creditors to which the Concessionaire has an outstanding obligation of PKR 1,000,000/- (Pakistani Rupees One Million only) or more,

in each case, along with statements or schedules of repayment of local and foreign loans/debts to such Financiers and creditors duly certified by its statutory auditors on a six (6) monthly basis in each Accounting Year. The report shall also indicate any changes, as compared to the report submitted the previous Accounting Year that might have occurred.

7.14.6 Information Regarding Statutory Notice/Winding Up Proceedings

The Concessionaire shall, within seven (7) days of receipt thereof, provide to the Agency, the Independent Engineer and the Independent Auditor a copy of any notice that the Concessionaire may be served under Sections 301 and 302 (as such Sections may be amended, modified or re-enacted) of the Companies Act, 2017 by any of the Financiers or its creditors.

The Concessionaire shall provide to the Agency, the Independent Engineer and the Independent Auditor all information in respect of any further actions taken by the Financiers or its creditors following any notice under Sections 301 and 302 (as such Sections may be amended, modified or re-enacted) of the Companies Act, 2017.

7.14.7 Failure by the Concessionaire to Submit Reports, Documents and Information

In addition to the rights the Agency may have under this Agreement or under the Applicable Laws, in the event that the Concessionaire fails to submit any of the documents, reports or information as and when required under this Agreement, the Agency shall be entitled to assess against and recover from the Concessionaire reasonable costs established from time to time by the Agency for such non-compliance. Such reasonable costs shall be paid to the Agency within ten (10) days of notice of such non-compliance and assessment by the Agency; provided, that such costs shall not exceed an amount equal to PKR 15,000/- (Pakistani Rupees Fifteen Thousand only) for each day that each such document, report or information remains outstanding commencing from the date that notice thereof is delivered by the Agency to the Concessionaire.

7.15 Affirmations

7.15.1 The Concessionaire hereby declares that it has not obtained or induced the procurement of this Agreement and/or any Project Agreement and/or any Agency Agreement and/or
any contract, consent, approval, right, interest, privilege or other obligation or benefit related to this Agreement and/or any Agency Agreement and/or the Project from the Agency and/or any Government Authority through any corrupt (including Corrupt Act) or illegal business practice.

7.15.2 Without limiting the generality of the foregoing, the Concessionaire represents and warrants that it has fully disclosed in writing all commissions, brokerage and other fees, and other compensation (other than compensation paid to employees of the Concessionaire for services provided) paid or payable to any Person within or outside Pakistan in relation to the Project and has not given or agreed to give and shall not give, or agree to give to any Person within or outside Pakistan either directly or indirectly through any natural or juridical Person, including its Affiliates, employees, agents, associates, brokers, consultants, officers, directors, promoters, shareholders, sponsors or subsidiaries (and any of their employees, agents, associates, brokers, consultants, officers, directors, promoters, shareholders or sponsors), any commission, gratification, bribe, finder’s fee or kickback, whether described as consultation fee or otherwise, with the object of obtaining or inducing the procurement of any Agency Agreement or any Project Agreement or any contract, right, interest, privilege or other obligation or benefit related to any Agency Agreement or the Project from the Agency or any Government Authority, except that which has been expressly declared pursuant hereto.

7.15.3 The Concessionaire accepts full responsibility and strict liability for making any intentional false declaration, not making full disclosure, misrepresenting facts or taking any action likely to defeat the purpose of the representations and warranties contained herein and the declarations required hereby. The Concessionaire agrees in the event that any of the representations and warranties made by it in Section 7.15.1 and 7.15.2 are proved to be materially incorrect, that any contract, consent, approval, right, interest, privilege or other obligation or benefit obtained or procured as aforesaid shall, without prejudice to any other right and remedies available to the Agency, be voidable and without legal effect at the option of the Agency.

7.15.4 Notwithstanding any rights and remedies that are available to and may be exercised by the Agency in this regard, the Concessionaire agrees to indemnify the Agency for any loss (including Losses) or damage incurred by it on account of its corrupt business practices and further pay compensation to the Agency in an amount equivalent to ten (10) times the amount of any commission, gratification, bribe, finder’s fee or kickback paid or given by the Concessionaire (either directly or indirectly through any natural or juridical Person, including its Affiliates, employees, agents, associates, brokers, consultants, officers, directors, promoters, shareholders, sponsors or subsidiaries (and any of their employees, agents, associates, brokers, consultants, officers, directors, promoters, shareholders or sponsors), as aforesaid for the purpose of obtaining or inducing the procurement of any Agency Agreement or any Project Agreement or any contract, consent, approval, right, interest, privilege or other obligation or benefit related to any Agency Agreement or the Project from the Agency or any Government Authority.

7.16 **NO RELIEF FROM LIABILITY**

7.16.1 No review, non-objection or approval by the Agency, the Independent Engineer, the Independent Auditor or any Government Authority of any Concession Asset or Project
Works (including any agreement, document, instrument, drawing, specifications or design proposed by the Concessionaire) shall relieve the Concessionaire from any liability that it would otherwise have had for its negligence in the performance and completion of the Project Works and the Concession Assets (including preparation of an agreement, document, instrument, drawing, specification or design) or failure to comply with the Applicable Laws with respect thereto, or to satisfy the Concessionaire’s obligations under the Agency Agreements, nor shall the Agency, the Independent Engineer, the Independent Auditor or any Government Authority be liable to the Concessionaire or any other Person by reason of its review and approval of an agreement, document, instrument, drawing, specification, or design.

7.16.2 The Concessionaire shall, at all times, be responsible and liable for all its obligations under the Applicable Standards notwithstanding anything contained in the Project Agreements or any other agreement, and no default under any Project Agreement or other agreement shall excuse the Concessionaire from its obligations or liability hereunder.

7.17 **WITHOUT PREJUDICE**

7.17.1 The representations, warranties, undertakings, obligations, roles and responsibilities of the Concessionaire set out in this Article 7 (Concessionaire’s Representations, Warranties And Certain Obligations & Undertakings) shall not limit or prejudice in any manner the representations, warranties, undertakings, obligations, roles and responsibilities of the Concessionaire set out elsewhere in the Agency Agreements.
8. **AGENCY REPRESENTATIONS, WARRANTIES AND CERTAIN OBLIGATIONS & UNDERTAKINGS**

8.1 **AGENCY REPRESENTATIONS & WARRANTIES**

8.1.1 The Agency hereby represents and warrants to the Concessionaire that:

(a) it has taken all necessary actions under the Applicable Laws to:

(i) authorize the execution, delivery and performance of this Agreement; and

(ii) validly exercise its rights and perform its obligations under this Agreement;

(b) this Agreement and all obligations contained herein constitutes its legal, valid and binding obligations, enforceable against it in accordance with the terms hereof;

(c) the execution, delivery and performance of this Agreement shall not conflict with, result in the breach of, constitute a default under, or accelerate performance required by any of Applicable Laws or any covenant, contract, agreement, arrangement, understanding, decree or order to which it is a party or by which it or any of its properties or assets are bound or affected;

(d) there are no actions, suits, proceedings, or investigations pending or, to its knowledge, threatened against it under the Applicable Laws before any court or before any other judicial, quasi-judicial or other authority, the outcome of which may result in a Material Adverse Effect;

(e) it has no knowledge of any violation or default with respect to any order, writ, injunction or decree of any court or any legally binding order of any Government Authority which may result in any Material Adverse Effect on its ability to perform its obligations under this Agreement and no fact or circumstance exists which may give rise to such proceedings that would adversely affect the performance of its material obligations under this Agreement; and

(f) it has complied with the Applicable Laws in all material respects and has not been subject to any fines, penalties, injunctive relief or any other civil liabilities which in the aggregate have or may have a Material Adverse Effect.

8.1.2 In the event that any occurrence or circumstance comes to the attention of either Party that renders any of its aforesaid representations or warranties untrue or incorrect, such Party shall immediately Notify the other Party of the same. Such notification shall not have the effect of remedying any breach of the representation or warranty that has been found to be untrue or incorrect nor shall it adversely affect or waive any right, remedy or obligation of either Party under this Agreement or any Agency Agreement.

8.2 **GENERAL UNDERTAKINGS**

8.2.1 The Agency hereby undertakes to the Concessionaire that it shall:
(a) ensure peaceful use of the Project Site by the Concessionaire without any let or hindrance from the Agency and/or any person or Government Authority claiming through or under them;

(b) procure police assistance for regulation of traffic on the Project and provide reasonable assistance to the Concessionaire in procuring police assistance for removal of trespassers, removal of encroachments and security on and/or in respect of the Project;

(c) upon written request of the Concessionaire, provide police support at and/or near the Project Site as required by the Concessionaire; and

(d) support, cooperate with and facilitate the Concessionaire in the implementation of the Project in accordance with the provisions of the Agency Agreements.

8.3 SUPPORT FOR CONCESSIONAIRE PERMITS & CONDITIONS FOR CONCESSIONAIRE PERMITS

8.3.1 Subject to the Concessionaire’s timely submission of reports required by Section 7.6.2, upon request of the Concessionaire, the Agency shall support and use reasonable efforts to expedite consideration of the applications for the Concessionaire Permits or reissuance(s) thereof filed pursuant to Section 7.6 (Concessionaire Permits), and the timely issuance thereof or reissuance of a Concessionaire Permit subject to a Lapse of Consent by any Government Authority. Any request for support under this Section shall be made by the Concessionaire and shall be accompanied with copies of the application for the Concessionaire Permit, any notice that the issuance or reissuance of the Concessionaire Permit was denied or deferred, and a statement of the efforts in obtaining the issuance or reissuance of the Concessionaire Permit to date.

8.3.2 The Agency or any Government Authority may attach such “non-discriminatory” terms and conditions (as explained in Section 8.6 (Non-Discriminatory)) to the issuance or renewal of any of the Concessionaire Permits as are in accordance with the Applicable Laws and the attachment of such terms and conditions shall not in and of itself constitute a breach of this Agreement by the Agency or a Permitted Event. The Concessionaire and its Contractors shall abide by all such terms and conditions (subject to this Section 8.3.2 and provisions in this Agreement relating to Change in Law and Lapse of Consent). If the Concessionaire (including where it is acting through its Contractors) fails to abide by any term or condition of any Concessionaire Permit, then the Agency or any Government Authority may exercise any power pursuant to the Applicable Laws (provided such power is exercised in a “non-discriminatory” manner) in respect of such failure and (subject to this Section 8.3.2 and provisions in this Agreement relating to Change in Law and Lapse of Consent) such exercise shall not of itself constitute a breach of this Agreement by the Agency or a Permitted Event; provided, however, that, with respect to all such Concessionaire Permits issued by the Agency or any Government Authority that is also a department or instrumentality of the Agency, the Agency shall not, and the Agency shall ensure that no such Government Authority shall, terminate prior to its expiration date or revoke any such Concessionaire Permit until the later of (a) thirty (30) days after delivery to the Concessionaire (or the relevant Contractor) of written notice by the Agency or such department or instrumentality of Agency of such failure and (b) the period of time, if any, that must expire under the Applicable Laws or the relevant Concessionaire Permit prior to early termination or revocation of any such Concessionaire Permit; provided, further, that nothing in this
Section shall limit the Agency or any Government Authority from taking any action in relation to a breach of, or non-compliance with, a Concessionaire Permit (other than termination or revocation) which it is entitled to take under the Applicable Laws (provided such action is taken in a “non-discriminatory” manner).

8.4 **SUPPORT FOR OBLIGATIONS**

8.4.1 Upon reasonable request by the Concessionaire, the Agency shall use its reasonable efforts and its good offices to support the Concessionaire’s performance of its obligations under and pursuant to this Agreement, including, its obligations to design, finance, insure, acquire, construct, complete, commission, own, operate and maintain the Concession Assets. If the Concessionaire has failed to comply with its obligations under any Agency Agreement and such failure is the principal cause of the Concessionaire’s difficulties in performing such activities, the Agency may advise the Concessionaire of such determination, and the Agency shall not be obligated to take any action to assist the Concessionaire until such time as the Concessionaire has fully complied with its obligations under the Agency Agreements. By agreeing to use its reasonable efforts and its good offices to support the Concessionaire’s efforts, the Agency has not relieved, and does not relieve in any way, the Concessionaire of its obligations or potential liability under the Agency Agreements and the other documents comprising the Project Agreements.

8.5 **PROCEDURE**

8.5.1 To the extent permitted under the Applicable Laws, all applications and any other necessary requisites, whether for the Concessionaire, its employees or Contractors, are to be routed through the Concessionaire.

8.6 **NON-DISCRIMINATORY**

8.6.1 The use of the term “non-discriminatory” or “discriminatory” in any Agency Agreement is not intended to prohibit or limit in any way the Agency or any Government Authority from making rational distinctions between parties or from using measures, establishing conditions, or enforcing requirements that are, in each case, intended or designed to advance the purposes of the program being implemented by the Agency or any Government Authority or of a Concessionaire Permit. It is intended, however, to prohibit the use of Government Authority, over Concessionaire Permits, for example, to deprive the Concessionaire of the benefits of the Agency Agreements or any other Project Agreement by the application of a higher standard to the Concessionaire (alone, or together with others in a small class) than to others similarly situated because of, for example, its foreign ownership, or to gain commercial or political advantage.

8.7 **POWERS OF THE AGENCY TO CHARGE AND IMPLEMENT FEES & FINES**

8.7.1 The Concessionaire expressly agrees and undertakes that the Agency shall either directly or through the Concessionaire shall have an exclusive right to demand and implement additional fees, revenues and fines on the Project in accordance with the Applicable Laws on the Users.
8.8 **AGENCY OVERRIDING POWERS**

8.8.1 Notwithstanding anything contained in this Agreement, the Agency shall have the right upon the occurrence of a national emergency, civil commotion and/or as a consequence of a Force Majeure Event, to take over the performance of any or all the obligations of the Concessionaire to the extent deemed necessary by the Agency or as directed by the relevant Government Authority, and exercise such control over the Concession Assets and/or give such directions to the Concessionaire as may be deemed necessary by the Agency; provided, however, that the exercise of such overriding powers by the Agency shall be of no greater scope and of no longer duration than is reasonably required in the circumstances which causes the exercise of such overriding power by the Agency (the **Agency Overriding Power Event**). The Concessionaire hereby agrees to act in accordance with the instructions issued by the Agency pursuant to the provisions of this Section and undertakes to provide assistance and co-operation to the Agency for performance of its obligations hereunder. In the event the Agency exercises its overriding powers under this Section 8.8 (Agency Overriding Powers) whereby the Concessionaire incurs any costs and expenses and/or is delayed in performance of its obligations under this Agreement, the Concessionaire shall be entitled to issuance of a Relief Order Request and in such case, the provisions of Article 15 (Relief Extensions & Relief Compensations) shall apply.

8.9 **SOVEREIGN IMMUNITY**

8.9.1 The Agency unconditionally and irrevocably:

(a) agrees that the execution, delivery and performance by it of the Agency Agreements and all other agreements, documents and writings relating to the same constitute private and commercial acts and not public or governmental acts;

(b) agrees that should any proceedings be brought against it or its assets (other than any of its assets which are significant in respect of national security of Pakistan (the **Protected Assets**)) in any jurisdiction in relation to the Agency Agreements or any transaction contemplated by the Agency Agreements, no immunity, sovereign or otherwise, from such proceedings, execution, attachment or other legal process shall be claimed by or on behalf of itself or with respect to any of its assets (other than the Protected Assets); and

(c) waives any such right of immunity, sovereign or otherwise, which the Agency or its assets now has or may acquire in the future (other than the Protected Assets), in respect of proceedings under the Agency Agreements.

8.10 **WITHOUT PREJUDICE**

8.10.1 The representations, warranties, undertakings, obligations, roles and responsibilities of the Agency set out in this Article 8 (Agency Representations, Warranties And Certain Obligations & Undertakings) shall not limit or prejudice in any manner the representations, warranties, undertakings, obligations, roles and responsibilities of the Concessionaire set out elsewhere in the Agency Agreements.
8.11 **PROJECT MANAGEMENT/IMPLEMENTATION UNIT**

8.11.1 The Project Management/Implementation Unit shall oversee day to day implementation of the Project in accordance with terms of the Agency Agreements.

8.12 **AGENCY PROJECT MANAGER / PROJECT DIRECTOR**

8.12.1 Unless already appointed prior to the Effective Date, the Agency shall, within seven (7) days following the Effective Date, appoint its representative duly authorized to deal on its behalf to facilitate on all matters under or arising out of or relating to the Agency Agreements (the **Project Manager/Project Director**). The Agency may, by notice in writing to the Concessionaire, substitute the Project Manager at its discretion at any time. The Agency shall ensure that at all times during the Concession Period, the Project Manager/Project Director remains appointed.

8.12.2 The Project Manager/Project Director shall have (without limitation) the following roles and duties:

(a) execution of the Agency Agreements on behalf of the Agency, other than this Agreement;

(b) opening all bank accounts on behalf of the Agency and issuance of standing instructions in relation to the same (if applicable), in each case, as contemplated in accordance with the terms of the Agency Agreements;

(c) appointment of the Independent Engineer and the Independent Auditor in accordance with the terms of this Agreement;

(d) such other roles and duties as assigned to the Project Manager/Project Director by the Agency from time to time;

(e) to protect the interest of the Agency by ensuring through monitoring and inspecting that the progress of the Construction Works and O&M Works, the supervision of which shall be carried out by the Independent Engineer, in accordance with this Agreement, according to the Applicable Laws, Project Requirements, Good Industry Practices and international standards;

(f) oversee that the Concessionaire complies with all highway safety standards in accordance with Good Industry Practice;

(g) coordinate and organize services to be provided by other agencies including public utility agencies, emergency services and traffic policing, during the construction of the Project Facilities;

(h) clarify and resolve with the Concessionaire Authorized Representative, the Independent Engineer, and the Independent Auditor any difficulties and disputes arising pursuant to this Agreement and manage any complaints by or against third parties; and
(i) to supervise the fulfillment of obligations of the Agency in this Agreement and Agency Agreements.

8.12.3 The Project Manager shall oversee the day to day implementation of the Project and facilitate implementation of the Project in accordance with the Agency Agreements.
9. **INDEMNITIES & LIMITATION OF LIABILITY**

9.1 **GENERAL INDEMNITY**

9.1.1 **THE CONCESSIONAIRE**

The Concessionaire shall indemnify and defend the Agency, for itself and its officers, servants, agents, Government Authority and Government owned and/or controlled entities/enterprises relating to the Project (the *Agency Indemnified Persons*) against, and hold the Agency Indemnified Persons harmless from, at all times after the Effective Date, any and all Losses, incurred, suffered, sustained or required to be paid, directly or indirectly, by, or sought to be imposed upon, the Agency Indemnified Persons for personal injury or death to persons or damage to property arising out of any negligent or intentional act or omission by the Concessionaire in connection with this Agreement. Notwithstanding anything to the contrary contained in the preceding sentence, nothing in this Section 9.1.1 shall apply to any Loss in respect of and to the extent of which the Agency receives proceeds from insurance policies relating to the Project.

9.1.2 **THE AGENCY**

Except as specifically provided elsewhere in this Agreement, the Agency shall indemnify and defend the Concessionaire, for itself and as trustee for its officers, directors and employees (the *Concessionaire Indemnified Persons*), against, and hold the Concessionaire Indemnified Persons harmless from, at all times after the Effective Date, any and all Loss incurred, suffered, sustained or required to be paid, directly or indirectly, by, or sought to be imposed upon the Concessionaire Indemnified Persons for personal injury or death to persons or damage to property arising out of any negligent or intentional act or omission by the Agency in connection with this Agreement. Notwithstanding anything to the contrary contained in the preceding sentence, nothing in this Section 9.1.2 shall apply to any Loss in respect of and to the extent of which the Concessionaire receives proceeds from insurance policies or indemnification from another party relating to the Project.

9.1.3 **JOINT NEGLIGENCE**

In the event injury or damage results from the joint or concurrent negligent or intentional acts or omissions of the Parties (as determined by the Independent Engineer and the Independent Auditor), each Party shall be liable under this indemnification in proportion to its relative degree of fault, as determined by the Independent Engineer and the Independent Auditor.

9.2 **ASSERTION OF CLAIMS TO EXCEED MINIMUM INDEMNIFICATION AMOUNT**

9.2.1 Each Party shall be solely liable and shall not be entitled to assert any claim for indemnification under this Agreement, for any Loss that would otherwise be the subject of indemnification under this Agreement, until all Losses of such Party, in the aggregate, during the then-current accounting year or Accounting Year (as the case may be), exceed the Minimum Indemnification Amount. For the purposes of this Section 9.2 (*Assertion of Claims to Exceed Minimum Indemnification Amount*), a Loss (or claim for indemnification) shall be deemed to arise in the accounting year or Accounting Year (as...
the case may be) in which the event giving rise to such Loss (or claim for indemnification) occurred, or if the event is continuing in more than one (1) accounting year or Accounting Year (as the case may be), in the accounting year or Accounting Year (as the case may be) in which such event ends.

9.3 **NOTICE AND CONTEST OF CLAIMS**

9.3.1 In the event that either Party receives a claim or demand from a third party in respect of which it is entitled to the benefit of an indemnity under this Article 9 (Indemnities & Limitation of Liability) (the **Indemnified Party**) it shall notify the other Party (the **Indemnifying Party**) within twenty one (21) days of receipt of the claim or demand and shall not settle or pay the claim without the prior approval of the Indemnifying Party, which approval shall not be unreasonably withheld, conditioned or delayed. In the event that the Indemnifying Party wishes to contest or dispute the claim or demand, it may conduct the proceedings in the name of the Indemnified Party, subject to the Indemnified Party being secured against any costs involved, to its reasonable satisfaction.

9.4 **DEFENSE OF CLAIMS**

9.4.1 The Indemnifying Party shall be entitled, at its option and expense and with counsel of its selection, to assume and control the defense of such claim, action, suit or proceeding, subject to the prior approval of the Indemnified Party; provided, however, it gives prompt notice of its intention to do so to the Indemnified Party, and reimburses, subject to the approval of the Independent Engineer and the Independent Auditor, the Indemnified Party for the reasonable costs and expenses incurred by the Indemnified Party prior to assumption by the Indemnifying Party of such defense.

9.4.2 Unless and until the Indemnifying Party acknowledges in writing its obligation to indemnify the Indemnified Party and assumes control of the defense of a claim, suit, action or proceeding in accordance with Section 9.4.1, the Indemnified Party shall have the right, but not the obligation, to contest, defend and litigate, with counsel of its own selection, any claim, action, suit or proceeding by any third party, alleged or asserted against such Party in respect of, resulting from, related to or arising out of any matter for which it is entitled to be indemnified hereunder, and the reasonable costs and expense thereof shall be subject to the indemnification obligations of the Indemnifying Party hereunder.

9.4.3 Upon assumption by the Indemnifying Party of the control of the defense of a claim, suit, action or proceeding, the Indemnifying Party shall reimburse the Indemnified Party for the reasonable costs and expenses of the Indemnified Party in the defense of the claim, suit, action or proceeding prior to the Indemnifying Party’s acknowledgment of the Indemnification and assumption of the defense.

9.4.4 Following acknowledgment of the indemnification and assumption of the defense by the Indemnifying Party, the Indemnified Party shall have the right to employ its own counsel, and such counsel may participate in such action, but the fees and expenses of such counsel shall be at the expense of such Indemnified Party, when and as incurred, unless:

(a) the employment of counsel by such Indemnified Party has been authorized in writing by the Indemnifying Party; or
the Indemnified Party shall have reasonably concluded that there may be a conflict of interest between the Indemnifying Party and the Indemnified Party in the conduct of the defense of such action; or

(c) the Indemnifying Party shall not, in fact, have employed independent counsel reasonably satisfactory to the Indemnified Party, to assume the defense of such action and shall have been so notified by the Indemnified Party; or

(d) the Indemnified Party shall have reasonably concluded and specifically Notified the Indemnifying Party either:

(i) that there may be specific defenses available to it which are different from or additional to those available to the Indemnifying Party; or

(ii) that such claim, action, suit or proceeding involves or could have a Material Adverse Effect upon it beyond the scope of this Agreement.

Provided that if Sections 9.4, (b), (c) or (d) shall be applicable, then the counsel for the Indemnified Party shall have the right to direct the defense of such claim, demand, action, suit or proceeding on behalf of the Indemnified Party, and the reasonable fees and disbursements of such counsel shall constitute legal or other expenses hereunder.

9.5 **NO CONSEQUENTIAL CLAIMS**

9.5.1 Notwithstanding anything to the contrary contained in this Article 9 (*Indemnities & Limitation of Liability*), the indemnities herein provided shall not include any claim or recovery in respect of any cost, expense, loss or damage of an indirect, incidental or consequential nature, including loss of profit, except as expressly provided in this Agreement.

9.6 **SURVIVAL ON TERMINATION**

9.6.1 The provisions of this Article 9 (*Indemnities & Limitation of Liability*) shall survive Termination for a maximum period of five (5) years following Termination and the provisions of this Article 9 (*Indemnities & Limitation of Liability*) shall apply solely in respect of claims that arose immediately on or prior to the Termination Date.

9.7 **LIMITATION OF LIABILITY & INDEMNIFICATION FOR FINES AND PENALTIES**

9.7.1 Neither Party shall be liable to the other Party in contract, tort, warranty, strict liability (except as may be expressly provided in any Agency Agreement), or any other legal theory for any indirect, consequential, incidental, punitive, or exemplary damages; provided, that the Parties hereby agrees that the Termination Payments payable under this Agreement are not indirect, consequential, incidental, punitive or exemplary damages. Neither Party shall have any liability to the other Party except pursuant to, or for breach of any Agency Agreement; provided, however, that this provision is not intended to constitute a waiver of any rights of one Party against the other with regard to matters unrelated to any Agency Agreement or to any activity not contemplated by the same.
9.7.2 Any fines or other penalties incurred by the Concessionaire for non-compliance with the Applicable Laws or other governmental directions issued pursuant thereto and in accordance therewith or the Concessionaire Permits shall not be reimbursed by the Agency or any Government Authority but shall be the sole responsibility of the Concessionaire.
10. **FUNDING REQUIREMENTS & SHAREHOLDING MATTERS**

10.1 **FUNDING OF BASE EQUITY FUNDING AMOUNT**

10.1.1 The Agency hereby undertakes to fund from time to time Agency Equity Funding Amount in accordance with the terms of the Equity Funding & Utilization Agreement.

10.1.2 The Concessionaire hereby undertakes to procure funding by the Sponsor from time to time of the Sponsor Equity Funding Amount through subscription in cash in Pakistani Rupees for Class A Shares by the Sponsors in accordance with the Equity Funding & Utilization Agreement.

10.1.3 All Base Equity Funding Amounts shall be funded and utilized from time to time in accordance with the Equity Funding & Utilization Agreement.

10.1.4 The Sponsor(s) shall establish the Sponsor Equity SBLC(s) on such terms and conditions and in such manner as stipulated in the Equity Funding & Utilization Agreement and this Agreement. The Sponsor Equity SBLC(s) shall be established at least thirty (30) days prior to the Scheduled Commencement Date as a Condition Precedent and shall secure the Sponsor Equity Funding Amount. All costs, expenses, fees and other charges of any nature associated with the issuance, maintenance and encashment of the Sponsor Equity SBLC(s) shall be borne solely by the Sponsors without any recourse to the Concessionaire.

10.1.5 The un-utilized/un-encashed portion (if any, after incurring the Preliminary Expenditure) of the Sponsor Equity SBLC(s) shall be encashed upon the Commencement Date and all such amounts shall be utilized for funding the Sponsor Equity Funding Amount.

10.1.6 In the event the Concessionaire fails to provide the Sponsor Equity SBLC to the Agency at least thirty (30) days prior to the Scheduled Commencement Date, then such failure of the Concessionaire shall constitute a Concessionaire Event of Default, and the Agency may, at its sole discretion and without prejudice to its other rights and remedies available under the Agency Agreements, terminate this Agreement in accordance with Article 23 (Termination).

10.2 **CLASS A SHARES & CLASS B SHARES**

10.2.1 Upon funding of the Agency Equity Funding Amount (or any part thereof) by the Agency from time to time in accordance with the Equity Funding & Utilization Agreement (if applicable), the Agency shall be issued Class B Shares by the Concessionaire in accordance with the Applicable Laws in the name of “PUBLIC PRIVATE PARTNERSHIP SUPPORT FACILITY, GOVERNMENT OF SINDH”.

10.2.2 Upon funding of the Sponsor Equity Funding Amount (or any part thereof) by the Sponsors from time to time in accordance with the Equity Funding & Utilization Agreement, the Sponsors shall be issued Class A Shares by the Concessionaire in accordance with the Applicable Laws. The obligation to fund the Sponsor Equity Funding Amount shall be independent of the shareholding of the Sponsor in the Concessionaire.
10.2.3 Following the end of each Accounting Year and in accordance with this Agreement and the Equity Funding & Utilization Agreement, the Agency shall be entitled to dividends in respect of Class B Shares which shall constitute of the following as certified by the Independent Auditor; (a) the Advertising Proceeds minus Concessionaire Management Fee; and (b) the Utility Proceeds; that become payable by the Concessionaire to the Agency, as applicable during the Concession Period, through such mechanism as is prescribed by the Agency (‘a’ and ‘b’ collectively referred to as the Class B Dividends). To the extent the Agency Equity Funding Amount is not funded through subscription to the Class B Shares or Class B Dividends cannot be paid to the Agency because of any Applicable Law, the Advertising Proceeds and Utility Proceeds shall be paid directly to the Agency.

10.2.4 The Concessionaire shall not create any classes of its shares other than Class A Shares and Class B Shares without the prior approval of the Agency.

10.2.5 The Concessionaire shall not offer for subscription the Class B Shares to any Person other than the Agency to the extent required by the Equity Funding & Utilization Agreement.

10.3 CHANGE IN COMPLETE CONTROL, CHANGE IN CONTROL AND CHANGE IN SHAREHOLDING

10.3.1 The Concessionaire shall not undertake or permit and hereby undertakes to procure that the Sponsor does not undertake or permit any Change in Complete Control until the second (2nd) anniversary of the Substantial Completion Date unless such Change in Complete Control:

(a) is required by any Applicable Laws or by the operation of the Applicable Laws or by order of a court, tribunal, or Government Authority with appropriate jurisdiction; or

(b) is affected with the prior written approval of the Agency.

10.3.2 The Concessionaire shall not undertake or permit and hereby undertakes to procure that the Sponsor (in case of a consortium the lead consortium member) does not undertake or permit any Change In Control until the Transfer Date unless such Change In Control:

(a) is required by any Applicable Laws or by the operation of the Applicable Laws or by order of a court, tribunal, or Government Authority with appropriate jurisdiction; and

(b) is affected with the prior written approval of the Agency provided, that the Agency shall exercise its discretion to grant such approval under this Section 10.3.2 in accordance with, inter alia, the Applicable Laws.

10.3.3 Following the second (2nd) anniversary of the Substantial Completion Date, the Concessionaire may undertake or permit and the Sponsor may undertake or permit, in each case, any Change in Shareholding, without the consent of the Agency but with prior Notification to the Agency; provided, that the Person(s) acquiring and/or subscribing to the Class A Shares resulting in the Change in Shareholding is:

(a) not from a nationality proscribed by the Applicable Laws;
(b) not blacklisted by any Government Authority; and

(c) not a defaulter of any bank or financial institution.

In each case above, as evidenced by such documentary support as is acceptable to the Agency, the Independent Engineer and the Independent Auditor.

10.4 **PUBLIC LISTING OF THE CONCESSIONAIRE**

10.4.1 On the best efforts basis and subject to: (a) the consent of the Financiers; (b) the commercial considerations of the Concessionaire and its stakeholders; (c) Applicable Laws; and (d) such other terms as are notified by the Agency, the Independent Engineer and the Independent Auditor with reference to the relevant matters as stipulated in this Agreement the Concessionaire shall make all necessary plans and arrangements to publicly list itself on the stock market within five (5) years of the Commercial Operations Date so that the shares of the Concessionaire are available to general public as an investment option.

10.5 **PRICE ESCALATION**

10.5.1 It is hereby acknowledged and agreed between the Parties that the Pre-Estimated Project Cost is inclusive of price escalation of up to ten percent (10%) on all Escalable Items.

10.5.2 In the event at any time, the amounts allocated for an Escalable Item in the Pre-Estimated Project Cost (as determined by the Independent Engineer) exceeds by ten percent (10%) of the amounts allocated for such Escalable Item in the Pre Estimated Project Cost due to an increase in the cost of such Escalable Items beyond ten percent (10%) of the Base Price (the **Escalation Cost**) (as determined by the Independent Engineer), the Agency shall bear and fund fifty percent (50%) of such Escalation Cost (the **Agency Escalation Cost Share**) and the Sponsor(s) shall bear and fund (50%) of such Escalation Cost (the **Sponsor Escalation Cost Share**), in each case, only upon the Independent Engineer and Independent Auditor duly verifying such Escalation Cost, as further detailed in the Price Escalation Agreement.

10.5.3 In the event the amounts allocated for an Escalable Item in the Pre-Estimated Project Cost (as determined by the Independent Engineer) does not exceed by ten percent (10%) of the amounts allocated for such Escalable Item in the Pre-Estimated Project Cost due to a lower than expected increase in the cost of such Escalable Items (the **Escalable Items Saving**) (as determined by the Independent Engineer), such Escalable Items Saving shall be shared between the Parties to the Price Escalation Agreement in proportion to their funding percentage in relation to the Pre-Estimated Project Cost set out in the Base Case Financial Model and the Equity Funding & Utilization Agreement, in each case, only upon the Independent Engineer and Independent Auditor duly verifying such Escalable Items Saving, as further detailed in the Price Escalation Agreement.

10.5.4 The obligation of the Parties to bear and fund the Escalation Cost in accordance with this Section 10.5 (Escalation Cost) and the Price Escalation Agreement shall terminate on the Scheduled Construction Completion Date.
10.5.5 The funding of the amounts set out in this Section 10.5 (Price Escalation) shall be in accordance with this Agreement and the Price Escalation Agreement.

10.5.6 Class A Shares shall be issued to the Sponsor against its funding and bearing of Sponsor Escalation Cost Share, and the Sponsor Escalation Cost Share shall form part of the Sponsor Equity Funding Amount.

Furthermore, Concessionaire shall not be entitled to include the Sponsor Escalation Cost Share for calculation of:

(a) the Return on Equity Component forming part of the Annuity Amount Payments;
(b) the Termination Equity; and
(c) the Termination Dividend Amount.

10.5.7 Class B Shares shall be issued to the Agency against its funding and bearing the Agency Escalation Cost Share, provided that at any time, the equity of Agency represented through Class B Shares in the Concessionaire must not exceed forty-nine (49%) of total equity (represented through Class A Shares and Class B Shares collectively) of the Concessionaire. In case, due to the issuance of Class B Shares, the equity of Agency is calculated to exceed forty-nine (49%) of total equity of the Concessionaire, such exceeding portion of the Agency Escalation Cost Share shall be borne and funded by the Agency but no Class B Shares will be issued to the Agency against the same. The Agency Escalation Cost Share against which Class B Shares will be issued to the Agency, shall also form part of the Total Project Cost.
11. **CONSTRUCTION PERFORMANCE SECURITY & O&M PERFORMANCE SECURITY**

11.1 **CONSTRUCTION PERFORMANCE SECURITY**

11.1.1 Prior to the Effective Date, the Concessionaire has provided and delivered to the Agency the Construction Performance Security. The Construction Performance Security:

   (a) has been issued and maintained without any recourse on the Concessionaire, its assets or properties; and

   (b) has not been secured through any Concession Assets and no Encumbrance of any nature has been created on the assets and properties of the Concessionaire in respect of the same.

All costs, expenses, fees and other charges of any nature, in each case, associated with the issuance, maintenance and encashment of the Construction Performance Security are solely on account of the Sponsor.

11.1.2 The Construction Performance Security shall secure:

   (a) all of the Sponsor’s obligations, liabilities, payments, indemnities, representations, guarantees, warranties and responsibilities under the Agency Agreements to which it is a party; and

   (b) all of the Concessionaire’s obligations, liabilities, payments, liquidated damages, indemnities, representations, guarantees, warranties and responsibilities under the Agency Agreements, including the integrity and quality of the Concessionaire’s and its Contractors’ workmanship, the timely and continuous performance of the Project Works, the quality and quantity of any equipment, materials, items and components supplied, the performance of Project Works (including the Preliminary Works) by the Concessionaire and compliance of the same with the Applicable Standards and all other works and services to be provided by the Concessionaire under the Agency Agreements.

11.1.3 The Construction Performance Security came into force and became effective upon issuance and delivery of the same to the Agency.

11.1.4 The Construction Performance Security shall be encashable in accordance with the terms thereof and shall be payable on the Agency’s first written demand without any prior notice, reference or recourse to the Concessionaire, the Sponsors or any other entity.

11.1.5 The Concessionaire shall be obligated to adjust the Construction Performance Security from time to time to reflect any amounts payable by the Agency pursuant to Article 16 (*Change of Scope*), such increase being an amount equal to two percent (2%) of the amounts payable to the Concessionaire from time to time in accordance with Article 16 (*Change of Scope*). In addition, the Construction Performance Security shall be adjusted, as condition precedent to issuance of the Construction Completion Certificate, prior to the Construction Completion Date so that it is equal in value to two percent (2%)
of the Total Project Cost less the aggregate of any encashments made by the Agency prior to the date of adjustment.

11.1.6 The Concessionaire shall be obligated to maintain and keep valid the Construction Performance Security until the date falling twenty four (24) months following Substantial Completion Date (the Construction Performance Security Expiry Date), as evidenced by a certificate jointly issued by the Independent Engineer and the Independent Auditor. In the event the Construction Performance Security expires prior to the Construction Performance Security Expiry Date, the Concessionaire shall extend the validity of the Construction Performance Security, at least fifteen (15) business days prior to its expiry, so as to keep it valid and enforceable until the Construction Performance Security Expiry Date. In the event of failure by the Concessionaire to keep valid or extend the validity of the Construction Performance Security in accordance with this Section 11.1.6, the Agency shall have the right to encash the Construction Performance Security at any time to its full outstanding value.

11.1.7 Upon the issuance of a certificate jointly issued by the Independent Engineer and the Independent Auditor evidencing the occurrence of Construction Performance Security Expiry Date, the Construction Performance Security shall be null and void and shall be returned to the Concessionaire by the Agency within fifteen (15) days of receipt by the Agency of the afore-stated certificate.

11.2 O&M PERFORMANCE SECURITY

11.2.1 The Concessionaire hereby undertakes to procure issuance and delivery to the Agency of the O&M Performance Security from time to time in accordance with this Section 11.2 (O&M Performance Security).

11.2.2 The Concessionaire shall deliver the O&M Performance Security to the Agency at least ninety (90) days prior to the Construction Performance Security Expiry Date. Following the Construction Performance Security Expiry Date, and until the Trigger Date, the Concessionaire shall replace the O&M Performance Security thirty (30) days prior to commencement of each Operational Year. Each O&M Performance Security shall become effective simultaneously upon issuance.

11.2.3 The O&M Performance Security:

(a) shall be issued and maintained without any recourse on the Concessionaire, its assets or properties; and

(b) shall not be secured through any Concession Assets and no Encumbrance of any nature shall be created on the assets and properties of the Concessionaire in respect of the same.

All costs, expenses, fees and other charges of any nature, in each case, associated with the issuance, maintenance and encashment of the O&M Performance Security are solely on account of the Sponsors.

11.2.4 The O&M Performance Security shall secure:
(a) all of the Sponsor’s obligations, liabilities, payments, indemnities, representations, guarantees, warranties and responsibilities under the Agency Agreements to which it is a party; and

(b) all of the Concessionaire’s obligations, liabilities, payments, liquidated damages, indemnities, representations, guarantees, warranties and responsibilities under the Agency Agreements, including the integrity and quality of the Concessionaire’s and its Contractors’ workmanship, the timely and continuous performance of the Project Works during the Operations Period, the quality and quantity of any equipment, materials, items and components supplied, the performance of Project Works during the Operations Period by the Concessionaire and compliance of the same with the Applicable Standards and all other works and services to be provided by the Concessionaire under the Agency Agreements.

11.2.5 The O&M Performance Security shall be encashable in accordance with the terms thereof and shall be payable on the Agency’s first written demand without any prior notice, reference or recourse to the Concessionaire, the Sponsor or any other entity.

11.2.6 The O&M Performance Security provided by the Concessionaire in respect of an Operational Year shall remain in force and effect until the date that falls on the expiry of such Operational Year subject to receipt by the Agency of a fully valid and effective O&M Performance Security for the subsequent Operational Year in accordance with the terms of this Agreement on or prior to such date (the O&M Performance Security Expiry Date). In the event an O&M Performance Security is to expire prior to the O&M Performance Security Expiry Date, the Concessionaire shall extend the validity of the O&M Performance Security, at least fifteen (15) days prior to its expiry, so as to keep it valid and enforceable until the O&M Performance Security Expiry Date. In the event of failure by the Concessionaire to keep valid or extend the validity of any O&M Performance Security in accordance with this Section 11.2.6, the Agency shall have the right to encash such O&M Performance Security at any time prior to its expiry to its full outstanding value.

11.2.7 Upon the delivery and commencement of a O&M Performance Security for an Operational Year (the New O&M Performance Security) to the Agency by the Concessionaire in accordance with this Section 11.2 (O&M Performance Security) on or prior to the commencement of such Operational Year, the previous O&M Performance Security issued for the previous Operational Year shall be null and void and shall be returned to the Concessionaire by the Agency simultaneously with the provision of the New O&M Performance Security.

11.2.8 Notwithstanding anything to the contrary, the Concessionaire hereby undertakes and agrees that the O&M Performance Security shall remain valid:

(a) in case of Termination, at least for one (1) year after the Termination Notice has been issued; and/or

(b) in case of expiry of this Agreement on the Final Expiry Date, one (1) year after the Final Expiry Date.
12. CONSTRUCTION DRAWINGS

12.1 PREPARATION OF CONSTRUCTION DRAWINGS

12.1.1 The Concessionaire shall prepare the Construction Drawings in accordance with the Applicable Standards and shall complete and deliver the same to the Agency and the Independent Engineer from time to time within the Construction Time For Completion. Further, the Concessionaire hereby undertakes that the Construction Drawings shall comply with the Applicable Standards.

12.1.2 Defects & Deficiencies, errors, omissions, ambiguities, inconsistencies, inadequacies and other defects in the Construction Drawings or arising therefrom shall be rectified by the Concessionaire at its sole cost and risk.

12.1.3 The Agency, the Independent Engineer and the Independent Auditor (as applicable) may use the Construction Drawings for such purposes as the same may require for the purposes of the Project.

12.1.4 The Concessionaire may at its discretion and subject to the Applicable Standards and the Design Requirements, propose with or without modifications the drawings made available by the Agency or adopt its own Construction Drawings after prior approval of the Independent Engineer; provided, however, that the Concessionaire shall always remain solely responsible and liable for the adequacy and accuracy of the Construction Drawings and shall not hold the Agency responsible or liable for the adequacy and/or the accuracy of the drawings provided by the Agency.

12.1.5 Notwithstanding the Concessionaire’s decision to adopt the drawings as provided by the Agency, irrespective of whether such drawings are adopted with or without modifications, or the adoption by the Concessionaire of its own Construction Drawings, the Concessionaire hereby confirms and agrees that all Construction Drawings shall remain subject to the review, approval and acceptance by the Independent Engineer prior to the adoption of the same by the Concessionaire.

12.1.6 The Agency and the Independent Engineer shall have the right to review and inspect all Construction Drawings. The Concessionaire shall provide all such Construction Drawings to the Agency and the Independent Engineer as may be reasonably required by the Agency and/or the Independent Engineer to inspect in respect of the Construction Works. It is made clear that nothing in the above shall diminish the Concessionaire’s responsibility to provide the Agency and the Independent Engineer with sufficient information to enable the same to satisfy themselves regarding the Construction Works.

12.1.7 After the identification of the existing utilities encountered in the right of way of the Project, the Concessionaire shall prepare the typical cross-section of the Project with respect to the relocation of utilities (if encountered in the existing right of way of the Project.

12.2 DETAILS OF CONSTRUCTION DRAWINGS

12.2.1 The Construction Drawings to be submitted by the Concessionaire to the Independent Engineer shall include but not be limited to the following details:
(a) alignment of the Project;
(b) plan and profile drawings of road, general drawings including road cross section(s) with pavement structure, setting out data, road furniture details, benchmarks details, intersections details, embankment protection details and drainage details;
(c) detailed structural drawings;
(d) general arrangement drawings of major bridges, flyovers and grade separators, details of foundation, transoms, girders, deck slab, railings and kerbs, signage, land marking, joints and bearing pads including steel reinforcement details for each component; and
(e) such further information and details as may be requested by the Independent Engineer and the Agency acting reasonably.

12.2.2 All Construction Drawings submitted by the Concessionaire shall comply with and shall be in accordance with the Design Requirements and the Applicable Standards.

12.3 REVIEW & APPROVAL OF CONSTRUCTION DRAWINGS

12.3.1 The Concessionaire shall promptly and in such sequence as is consistent with the Construction Requirements, submit four (4) copies of the Construction Drawings to the Independent Engineer and the Agency.

12.3.2 The submission of the Construction Drawings by the Concessionaire to the Independent Engineer and the Agency pursuant to the provisions of Section 12.3.1 shall constitute the representation of the Concessionaire that the Concessionaire has verified and determined that the Construction Drawings submitted by the Concessionaire are in conformity with the Design Requirements.

12.3.3 Within fifteen (15) days of receipt of the Construction Drawings, the Independent Engineer shall review and comment on the same taking into account, inter alia, the comments of the Agency, if any, thereon, and convey its comments/observations to the Concessionaire on the conformity of the Construction Drawings with Design Requirements.

12.3.4 The Concessionaire hereby undertakes to revise the Construction Drawings to the extent necessary and to re-submit the same for the review of the Independent Engineer and the Agency, in the event the comments and the observations of the Independent Engineer and/or the Agency indicate that the Construction Drawings initially submitted by the Concessionaire for review by the Independent Engineer pursuant to the provisions of Section 12.3.1, are not in conformity with the Design Requirements. The Independent Engineer shall provide its observations and comments on such re-submitted Construction Drawings, if any, within fifteen (15) days of receipt of such revised Construction Drawings.
12.3.5 The Concessionaire shall simultaneously with the submission of Construction Drawings to the Independent Engineer prepare and submit to the Independent Engineer the construction plan providing, inter alia, the "critical path method" in respect of the Project.

12.3.6 Notwithstanding anything contained herein:

(a) in the event the response of the Agency is not provided within the period stipulated in Section 12.3.3, the same shall stand deemed approved, then the Independent Engineer may, at its discretion proceed with the approval of Construction Drawings, on the basis of the Construction Drawings submitted by the Concessionaire to the Independent Engineer;

(b) the Concessionaire shall be solely liable for the Construction Drawings and their compliance and conformity with the Design Requirements, and shall not be relieved and/or absolved in any manner whatsoever of its obligations hereunder, irrespective of whether or not the Independent Engineer has provided its observations and comments in accordance with this Section 12.3 (Review & Approval of Construction Drawings);

(c) the Concessionaire shall continue to be liable for the Concessionaire's obligations and liabilities set out in this Agreement and shall neither be relieved of the same nor shall the same be transferred to any other Person, including, but not restricted to the Independent Engineer and/or the Agency, as a consequence of the requirement for the Independent Engineer to provide its observations and comments pursuant to Section 12.3.3 and/or Section 12.3.4. Neither the review of the Construction Drawings by the Independent Engineer, the failure of the Independent Engineer to provide its observations and comments in the approval nor the provision of the observations and comments by the Independent Engineer and/or the Agency on the Construction Drawings shall relieve the Concessionaire of its obligations and liabilities hereunder, nor shall the same be construed as a waiver of the Concessionaire's obligations contained herein; nor shall the Agency be held liable for the observations and comments provided by the Independent Engineer on the Construction Drawings;

(d) the Concessionaire shall be obligated to provide a copy of the approved Construction Drawings to the Agency and the Independent Engineer prior to commencement of the Construction Works in accordance with the terms of this Agreement.

12.3.7 The Concessionaire hereby undertakes that the Concessionaire shall be solely responsible and liable for:

(a) achieving completion of each Project Construction Milestone on or prior to its respective Project Construction Milestone Date;

(b) achieving Substantial Completion Date on or prior to the Scheduled Substantial Completion Date; and/or

(c) achieving Construction Completion on or prior to the Scheduled Construction Completion Date;
and, in each case above, the said obligation and liability of the Concessionaire shall not be reduced, negated, rescinded and/or waived by any delay and/or failure of the Independent Engineer to fulfill its obligations as set out in this Section 12.3 (Review of Construction Drawings).

12.4 **Submission of Final Construction Drawings Prior to Construction Completion Date**

12.4.1 Within forty-five (45) days of the Substantial Completion Date and in any event as one of the Conditions Precedent to the issuance of the Construction Completion Certificate, the Concessionaire shall submit to the Agency, in respect of each Project Construction Milestone, the “as built” Construction Drawings, duly verified and approved (in form and substance) by the Independent Engineer, including “as built” survey, illustrating the layout of the Project and the Project Facilities and setback lines, if any, of the buildings and structures forming part of the Project and the Project Facilities and reflecting the same as actually designed, engineered and constructed.

12.4.2 The Construction Drawings to be submitted by the Concessionaire pursuant to this Section 12.4 (Submission of Final Construction Drawings Prior to Construction Completion Date) shall be in such form as may be requested by the Agency, including but not restricted to paper format (hard copies), digital format, micro films or such other format as may be acceptable to the Agency.

12.4.3 The Concessionaire shall be responsible for amending, modifying and updating the Construction Drawings from time to time during the Operations Period including, carrying out any amendments and modifications resulting from the operations, repairs, maintenance and other activities relating to the Operations and Maintenance subject to the approval of Independent Engineer. All updated, amended and/or modified Construction Drawings shall be submitted by the Concessionaire to the Agency and the Independent Engineer and shall be subject to review of the same. Preparation, completion and delivery of the updated, amended and/or modified Construction Documents pursuant to this Section 12.4.3 shall form part of the Concessionaire’s obligations relating to the O&M Documents.

12.5 **Approval of the Detailed Engineering Design**

12.5.1 Notwithstanding anything to the contrary, the Concessionaire shall, as part of the process of the Concessionaire Conditions Precedent, submit its Detailed Engineering Design, to the Independent Engineer (with a copy to Agency) prior to the Scheduled Commencement Date for the approval of the Independent Engineer (the Proposed Detailed Design). The process of approval of the Detailed Engineering Design and issuance of the Approved Detailed Engineering Design shall be in accordance with Part I - SCHEDULE X (Proposed Detailed Design Approval Process). Within thirty (30) days of receipt of the Proposed Detailed Design, the Independent Engineer shall review the same and convey its observations to the Concessionaire with particular reference of the conformity of the same with Applicable Standards. In case, no comments/observations are provided by the Independent Engineer, as the case may be, within twenty (20) days of receipt of the Proposed Detailed Design, the Concessionaire shall notify the Independent Engineer about such inactivity. In case, no comments are received from the Independent Engineer within ten (10) days following such notification, the Proposed
Detailed Design, as submitted by the Concessionaire, shall be deemed to be approved by the Independent Engineer.

Provided, however, upon receipt of the Proposed Detailed Design, the Agency shall communicate its objections or reservations (if any) to the Independent Engineer and the Independent Engineer shall ensure that the same are adequately addressed and where necessary form an approval requirement for such Proposed Detailed Design.

12.5.2 In the event the specific observations of the Independent Engineer on the Proposed Detailed Design (or part thereof) indicate that the Proposed Detailed Design is not in conformity with the Applicable Standards, the Proposed Detailed Design (or part thereof) shall be revised by the Concessionaire, at the cost and expense of the Concessionaire, and resubmitted to the Independent Engineer (with a copy to Agency) for its review and approval within a period of fifteen (15) days after receiving the observations of the Independent Engineer on the Proposed Detailed Design. Following receipt of the observations on the revision (within the time periods contemplated herein), the Independent Engineer shall give its observations, if any, within seven (7) days of its receipt of the revised Detailed Engineering Design from the Concessionaire. In the event the Independent Engineer gives its observations on the revised Detailed Engineering Design, the Concessionaire shall revise the Detailed Engineering Design and submit the same to the Independent Engineer (with a copy to Agency) within fifteen (15) days after receiving of observations on the same.

The Parties hereby acknowledge and agree that the delivery of Vacant Possession of the Project Site, the exact area, location, relocation of existing utilities and other relevant matters relating to the same are a function of the Approved Detailed Engineering Design.
13. **CONSTRUCTION WORKS**

13.1 **CONSTRUCTION WORKS**

13.1.1 The Concessionaire shall commence the Construction Works in accordance with the Applicable Standards and shall perform and complete the same in accordance with the Construction Time For Completion. The Concessionaire shall commence the Site Construction Works on the Commencement Date; provided, however, all Preliminary Works forming part of Site Construction Works (if any) shall commence in accordance with the mutual agreement between the Parties. The Concessionaire shall immediately upon commencement of the Site Construction Works Notify the Agency, the Independent Engineer and the Independent Auditor of the same.

13.1.2 The Concessionaire shall perform the Construction Works in accordance with the Applicable Standards and shall ensure that the same complies with the Applicable Standards. During the Construction Period, the Concessionaire shall be responsible for ensuring that the roads and lanes existing on the Project Site are available for the Users in accordance with the Applicable Standards.

13.1.3 Without limiting the provisions of Section 13.1.2, the Concessionaire shall be in particular responsible for the performance and compliance, in each case, of the Construction Works with the Construction Requirements.

13.1.4 The Concessionaire shall perform the Construction Works within the Construction Time For Completion and hereby undertakes to perform and complete each Project Construction Milestone on or prior to its Project Construction Milestone Date.

13.1.5 The Concessionaire shall perform the Construction Works either itself, or through the EPC Contractor(s) appointed in accordance with the terms of this Agreement; provided, however, the Concessionaire shall remain solely responsible and liable for performance (within the Construction Time For Completion) and compliance of the Construction Requirements with the Applicable Standards irrespective of whether the Construction Works are undertaken by the Concessionaire or the EPC Contractor(s).

13.2 **CONSTRUCTION PROGRAMME**

13.2.1 Within two (2) days following the execution of the Independent Engineer Contract, the Concessionaire shall submit to the Independent Engineer, a proposed program, to be prepared in compliance with the Applicable Standards and Good Industry Practices, for performance of the Construction Works and achievement of each Project Construction Milestone (the **Proposed Construction Programme**). The Proposed Construction Programme shall not amend or vary the timelines for achievement of the Project Construction Milestones set out in the Construction Completion Schedule. The Proposed Construction Programme shall include, (without limitation), the following:

(a) the Project Construction Milestones to be achieved and the respective Project Construction Milestone Dates for each of the same;

(b) the detailed order in which the Construction Works shall be performed, together with timelines for performance of the same;
(c) arrangements and procedures for carrying out the Construction Works;

(d) the timelines, intervals and procedures for conducting the inspection of all elements of the Construction Works and any completed Concession Assets;

(e) arrangements and procedures for conducting safety related measures in relation to the Construction Works; and

(f) all major events and activities in the preparation of the Construction Drawings, the Construction Monthly Progress Report and submission of the same to the Agency, the Independent Engineer and/or the Independent Auditor (as applicable) for the review and approval (as applicable).

13.2.2 Within fourteen (14) days of the receipt of the Proposed Construction Programme by the Independent Engineer, the Independent Engineer shall finalize its comments on the same and shall ensure the incorporation of its comments and submit the same to the Agency. The Agency shall prior to granting its approval in respect of the Proposed Construction Programme, within fifteen (15) days of the Independent Engineer’s request for the same, revert to the Independent Engineer in respect of any observations and comments that it may have, if any; provided, however, that the approval of the Proposed Construction Programme shall be granted by Agency within fifteen (15) days of the Independent Engineer’s request for such approval if the Proposed Construction Programme is recommended by the Independent Engineer for approval after addressing any comments and observations of the Agency on the same. The Proposed Construction Programme, as approved by the Agency on the Independent Engineer’s recommendation, shall be binding on the Parties (the Project Construction Programme); provided, however, that the Project Construction Programme may be amended from time to time by the mutual agreement between the Parties and the Independent Engineer.

13.2.3 The Concessionaire shall, whenever required by the Agency, the Independent Engineer and/or the Independent Auditor, provide in writing, a general description of the arrangements and methods which the Concessionaire proposes to adopt for the execution of the Construction Works. Any alteration to such arrangements and methods shall be made by the Concessionaire with prior written consent of the Independent Engineer and the Agency.

13.2.4 Any reports (including the Construction Monthly Progress Report) submitted by the Concessionaire and covering the execution of the Construction Works shall also emphasize any delays in the Construction Time For Completion.

13.3 TRAFFIC FLOW & SAFETY

13.3.1 Following commencement of the Site Construction Works, the Concessionaire shall ensure that the existing roads on the Project Site remain open to traffic and that the traffic flow is safe at all times during the Construction Period in accordance with the Applicable Standards. The Concessionaire shall ensure minimal disruption in traffic on the existing roads and lanes situated at the Project Site.
13.3.2 The Concessionaire undertakes to perform the Site Construction Works in such manner as to ensure compliance with the obligation set out in Section 13.3.1.

13.4 **CONSTRUCTION TESTS**

13.4.1 The Concessionaire shall conduct or procure to be conducted such tests, as specified in **SCHEDULE G (List of Tests & Completion Tests)** and the AASHTO Standards (to the extent adopted by the National Highway Authority in the “NHA General Specifications of 1998”), in order to determine whether the Construction Works conform to the Applicable Standards (the **Construction Tests**). The Construction Tests shall be conducted at such time and frequency and in such manner as may be specified by the Independent Engineer in accordance with the AASHTO Standards (to the extent adopted by the National Highway Authority in the “NHA General Specifications of 1998”).

13.4.2 The Concessionaire hereby undertakes to conduct the Construction Tests under the supervision of the Independent Engineer and the Agency and in accordance with the Applicable Standards at its own cost and expense, provided however, in the event during the Construction Period the Agency determines that the Construction Works are not in accordance the Construction Requirements then the Agency shall conduct separate tests to determine the quality of the Construction Works. In the event it is determined that the Construction Works are not in accordance with the Construction Requirements (as determined by the Independent Engineer) the Concessionaire shall repair the same and the cost of such tests shall be borne by the Concessionaire provided however in the event it is determined that the Construction Works are in accordance with the Construction Requirements (as determined by the Independent Engineer), the cost of such tests shall be borne by Agency.

13.4.3 The Concessionaire hereby undertakes to carry out, at its sole cost, the necessary remedial measures required to rectify the Defects & Deficiencies in the Construction Works and/or the Concession Assets that are identified in the Construction Tests and to ensure that as a consequence of such remedial measures the Construction Works and the Concession Assets conform to the Applicable Standards. The Concessionaire further undertakes that the remedial measures required to be undertaken by the Concessionaire pursuant to this Section 13.4.3 shall be repeated by the Concessionaire at its sole cost till such time as the Construction Works and the Concession Assets conform to the Applicable Standards as verified by the Independent Engineer. In the afore-stated circumstances, the Independent Engineer may require the Concessionaire to conduct additional tests to determine whether the Defects & Deficiencies are rectified and in such case the costs of such additional tests shall be borne by the Concessionaire.

13.4.4 The Concessionaire shall maintain proper record of the Construction Tests and the remedial measures taken to cure the Defects & Deficiencies, if any, indicated by the Construction Test results.

13.4.5 Results of all Construction Tests shall be jointly recorded by the Independent Engineer, the Concessionaire and the EPC Contractor(s).

13.5 **CONSTRUCTION MONTHLY PROGRESS REPORT**

13.5.1 Commencing from the Effective Date, the Concessionaire shall until issuance of the Construction Completion Certificate, no later than ten (10) days after the end of each
calendar month, furnish to the Agency, the Project Manager, the Independent Auditor and the Independent Engineer a monthly report (the *Construction Monthly Progress Report*), stating in reasonable detail the status and condition of the Construction Works and the Concession Assets including its compliance or otherwise with the Applicable Standards and shall promptly give such other relevant information as may be required by the Independent Engineer, the Independent Auditor and/or the Agency. In particular, the Construction Monthly Progress Report shall separately identify and state in reasonable detail the Defects & Deficiencies in the Construction Works and/or the Concession Assets that require rectification and any delays in the Construction Time For Completion. The Construction Monthly Progress Report shall also expressly highlight all Defects & Deficiencies in the Construction Works and/or the Concession Assets identified by the Independent Engineer in its Construction Inspection Report and shall set out all actions taken, and arrangements made by the Concessionaire for remedying the same.

13.5.2 The Construction Monthly Progress Report shall be updated by the Concessionaire based on any observations and comments made by the Independent Engineer and/or the Agency and shall be provided again to each of the Agency and the Independent Engineer until such time that it is approved by the Independent Engineer; provided, that the Independent Engineer shall not accord its approval of the Construction Monthly Progress Report until it is satisfied that all reasonable comments and observations of the Agency on the Construction Monthly Progress Report are addressed.

13.5.3 The Construction Monthly Progress Report shall be in the form and substance approved by the Independent Engineer from time to time.

13.6 **CONSTRUCTION INSPECTION REPORT**

13.6.1 Commencing from the appointment of the Independent Engineer and until the issuance of the Construction Completion Certificate, the Concessionaire shall procure that the Independent Engineer inspects the Construction Works and the Concession Assets at least once a month and shall make all arrangements for the same.

13.6.2 The Independent Engineer shall make a report of such inspection (the *Construction Inspection Report*) stating in reasonable detail the Defects & Deficiencies, if any, in the Construction Works and/or the Concession Assets with particular reference to the Applicable Standards.

13.6.3 The Independent Engineer shall, within ten (10) days of commencement of a month, provide a copy of the Construction Inspection Report to the Concessionaire and the Agency.

13.6.4 The Concessionaire hereby undertakes that, within fifteen (15) days from receipt of the Construction Inspection Report, it shall rectify and remedy the Defects & Deficiencies, if any, stated in the Construction Inspection Report, on its own cost and expense.

13.6.5 The inspection or submission of the Construction Inspection Report by the Independent Engineer shall not relieve or absolve the Concessionaire of its obligations and liabilities hereunder in any manner whatsoever.

13.7 **DELAYS DURING CONSTRUCTION**
13.7.1 In the event the Concessionaire fails to achieve any Project Construction Milestone or the Independent Engineer shall have reasonably determined that the rate of progress of Construction Works is such that the Project cannot achieve the Construction Completion on or before the Scheduled Construction Completion Date, then the Independent Engineer shall issue a notice to the Concessionaire to this effect and the Concessionaire shall, within seven (7) days of such notice, inform the Independent Engineer in reasonable detail about the steps the Concessionaire proposes to undertake to expedite progress and the period within which it shall achieve Construction Completion by the Scheduled Construction Completion Date and the Substantial Completion by the Scheduled Substantial Completion Date.

13.7.2 In the event the Concessionaire fails to achieve Substantial Completion Date on or prior to the Scheduled Substantial Completion Date, (due to reasons attributable to the Concessionaire) resulting into cost escalation (including all cost relating to construction costs, financing costs and any other costs, fees, charges etc.) (the Concessionaire Cost Escalation Delay Event), the Concessionaire shall solely bear all such costs (including all interest accrued on account of the Financing and all additional costs incurred) (the Concessionaire Cost Escalation Delay Event Amounts). Such Concessionaire Cost Escalation Delay Event Amounts shall not form part of the Sponsor Equity Funding Amount. Funding of such Concessionaire Cost Escalation Delay Event Amounts shall be the sole responsibility of the Concessionaire and the Sponsor(s).

13.7.3 Furthermore, Concessionaire shall not be entitled to include the Concessionaire Cost Escalation Delay Event Amounts for calculation of:

(a) the Return on Equity Component forming part of the Annuity Amount Payments;

(b) the Termination Equity; and

(c) the Termination Dividend Amount.

13.7.4 In the event of any extension in the Scheduled Substantial Completion Date in accordance with Section 15.2.1 (Relief Events), All costs relating to such extension shall be determined in accordance with Section 15 (Relief Extension & Relief Compensations).
14. **COMPLETION**

14.1 **COMPLETION TESTS**

14.1.1 At least thirty (30) days prior to the expected Commercial Operations Date, the Concessionaire shall issue a Notice to the Agency and the Independent Engineer (the **Completion Tests Date Notice**) fixing a date and time for performance of the Completion Tests (the **Proposed Completion Tests Date**).

14.1.2 The Proposed Completion Tests Date proposed by the Concessionaire shall be final for the conducting of the Completion Tests; provided, however, that in the event the Proposed Completion Tests Date is unacceptable to the Independent Engineer and/or the Agency, the Concessionaire, the Agency and the Independent Engineer shall meet within seven (7) days of the Agency and Independent Engineer’s receipt of the Completion Tests Date Notice with an aim to mutually agree on an alternative date and time for performance of the Completion Tests, which date shall be no later than ten (10) days from the Proposed Completion Tests Date. If the Parties are unable to mutually agree on an alternative date and time for performance of the Completion Tests, the Concessionaire shall be entitled (with prior Notification to the Independent Engineer and the Agency) to carry out the Completion Tests on or after the tenth (10th) day from the Proposed Completion Tests Date.

14.1.3 Subject to the terms of this Agreement, in the event any Completion Tests are to be repeated due to reasons not attributable to the Agency, as determined by the Independent Engineer, such Completion Tests shall be repeated on account of the Concessionaire.

14.1.4 The Completion Tests shall be attended by the Project Manager and such other representatives of the Agency as the Agency may nominate in writing, subject to notification of the same to the Concessionaire and the Independent Engineer.

14.1.5 The Concessionaire shall provide such assistance as the Independent Engineer may reasonably require for conducting the Completion Tests.

14.2 **SCHEDULED SUBSTANTIAL COMPLETION DATE**

14.2.1 The Concessionaire hereby guarantees that the Substantial Completion shall be achieved in accordance with the provisions of the Applicable Standards and that the Substantial Completion Date shall occur on or before the Scheduled Substantial Completion Date.

14.3 **SUBSTANTIAL COMPLETION CERTIFICATE**

14.3.1 The Completion Tests shall be conducted in accordance with the provisions of Section 14.1 (**Completion Tests**) and **SCHEDULE G (List of Tests & Completion Tests)**.

14.3.2 The Independent Engineer shall (in consultation with the Agency), at the request of the Concessionaire, issue a Substantial Completion Certificate if the Completion Tests applicable to the Substantial Completion are successful though certain works or things forming part thereof are outstanding and not yet complete. In such an event, the
Substantial Completion Certificate shall have appended thereto a list of outstanding items signed jointly by the Independent Engineer and the Concessionaire (the Completion Check List); provided, that the Independent Engineer shall not withhold the Substantial Completion Certificate for reason of any work remaining incomplete if the delay in completion thereof is attributable to the Agency (as determined by the Independent Engineer). The Independent Engineer shall set out the date in the Substantial Completion Certificate on which the Completion Tests applicable to the Substantial Completion are successfully passed (the Substantial Completion Date) and Substantial Completion is achieved.

14.3.3 The Parties hereto expressly agree that a Substantial Completion Certificate under this Section shall, upon request of the Concessionaire to this effect, be issued by the Independent Engineer, if at least ninety-five percent (95%) of the Project has been completed, the Completion Tests applicable to the Substantial Completion are successfully passed and if the movement and safety of the Users is not affected, as determined by the Independent Engineer (the Substantial Completion). Upon issuance of such Substantial Completion Certificate in terms of this Section 14.3.3, the Substantial Completion shall be achieved.

14.4 COMPLETION CHECK LIST & FAILURE TO ACHIEVE SUBSTANTIAL COMPLETION

14.4.1 Notwithstanding that the Substantial Completion Certificate (as applicable) shall be signed by the Independent Engineer, the Completion Check List shall be jointly signed by the Independent Engineer and the Concessionaire as a confirmation of the outstanding works, actions and things required to be completed by the Concessionaire in line with the relevant Project Requirements (the Completion Check List Items).

14.4.2 The Concessionaire undertakes to complete all Completion Check List Items by the date determined by the Independent Engineer and set out in the Substantial Completion Certificate (the Scheduled Construction Completion Date); provided, however, the Parties agree that the Scheduled Construction Completion Date shall not be determined by the Independent Engineer to fall on any date that falls ninety (90) days following the Substantial Completion Date.

14.4.3 The Concessionaire shall be liable for payment of Construction Period Damages to the Agency in the event the Concessionaire fails to achieve Substantial Completion on or prior to the Scheduled Substantial Completion Date. In the event the Concessionaire fails to achieve Substantial Completion within a period of one hundred and twenty (120) days from the Scheduled Substantial Completion Date, then such failure of the Concessionaire shall constitute a Concessionaire Event of Default, and the Agency may, at its sole discretion and without prejudice to its other rights and remedies available under the Agency Agreements, terminate this Agreement in accordance with Article 23 (Termination).

14.5 CONSTRUCTION PERIOD DAMAGES

14.5.1 In the event the Concessionaire fails to achieve Substantial Completion by the Scheduled Substantial Completion Date, then the Concessionaire shall pay to the Agency damages in case of delay in achieving Substantial Completion, an amount equal to the Substantial Completion Delay Amount per day of delay in achievement of Substantial Completion, as determined by the Independent Engineer and Independent
14.5.2 All Construction Period Damages becoming due and payable by the Concessionaire in terms of this Section 14.5 (Construction Period Damages) shall be demanded, in writing, by the Agency from the Concessionaire and shall become due and payable on the date falling thirty (30) days following the Concessionaire’s receipt of such invoice (the Construction Period Damages Payment Date). In the event of failure by the Concessionaire to pay the Construction Period Damages to the Agency by the Construction Period Damages Payment Date, the Agency shall have the right to encash the Construction Performance Security in an amount equal to the Construction Period Damages. Notwithstanding anything contained herein, the recovery of Construction Period Damages under this Section 14.5.2 shall be without prejudice to the rights of the Agency under the Agency Agreements (including the right of Termination in accordance with Section 14.4.3).

14.5.3 The Parties agree that the amounts of Construction Period Damages provided under this Section 14.5 (Construction Period Damages) are in lieu of actual damages and are the Parties’ reasonable and genuine estimates of the losses and damages that may reasonably be anticipated from such failures in respect of such matters, and do not constitute a penalty.

14.6 **CONSTRUCTION COMPLETION CERTIFICATE**

14.6.1 Within ninety (90) days from the date of issuance of the Substantial Completion Certificate, the Independent Engineer shall issue a certificate certifying that the Project has achieved Construction Completion (the Construction Completion Certificate); provided, however, the Construction Completion Certificate may be issued only upon the confirmation by the Independent Engineer (in consultation with the Agency) that the Completion Check List Items have been completed in accordance with the Applicable Standards.

14.7 **CONSTRUCTION COMPLETION DATE**

14.7.1 The Project shall be deemed to achieve project construction completion (the Construction Completion) on the date of issuance of the Construction Completion Certificate (the Construction Completion Date).

14.7.2 For avoidance of doubt, the Parties hereby agree that in the event the Substantial Completion Certificate is issued prior to the Scheduled Substantial Completion Date, the Concession Period shall remain the same.

14.8 **SCHEDULED CONSTRUCTION COMPLETION DATE**

14.8.1 Subject to the terms of this Agreement, the Concessionaire hereby guarantees that the Construction Completion Date shall be achieved in accordance with the provisions of this Agreement and that the Construction Completion Date shall occur on or before the Scheduled Construction Completion Date.

14.9 **TITLE TO PROJECT SITE, CONSTRUCTION WORKS AND CONCESSION ASSETS**
14.9.1 The Agency shall retain all rights and title to the Project Site throughout the Concession Period. Subject to the terms of this Agreement, the Concessionaire has, and shall have, no title to, ownership interest in or lien over, the Project Site nor shall it create any Encumbrance with respect thereto.

14.9.2 Subject to Section 14.9.1, the Concessionaire shall retain all legal and beneficial rights and ownership of the Concession Assets (including the Construction Works) as and when the same are performed and/or completed until the Transfer Date.

14.9.3 On the Transfer Date and subject to:

(a) receipt by the shareholders of Class A Shares of the Termination Payment in accordance with Section 23.5 (Termination Payments);

(b) resolution of Disputes (if any);

(c) consent of the Financiers, during the period the Financing Due is outstanding; and

(d) settlement of outstanding payments and accounts of the Concessionaire with regards to any due and payable payments under this Agreement, as verified by the Independent Engineer and Independent Auditor;

the Concessionaire shall transfer the ownership rights to the Concession Assets to the Agency and at the Agency’s option (to be exercised in its sole discretion) transfer all the Class A Shares to the Agency in accordance with the terms of this Agreement. In the event the Agency:

(a) elects to acquire Class A Shares on the Transfer Date and if the Concessionaire is publicly listed on the Transfer Date, the Concessionaire and Agency shall mutually agree on a mechanism to acquire Class A Shares held by any shareholders other than the Sponsor; or

(b) elects not to exercise its discretion of acquiring Class A Shares from the Concessionaire to the Agency, then the Concessionaire hereby undertakes to cancel the Class B Shares in compliance with the Applicable Laws.
15. **RELIEF EXTENSIONS & RELIEF COMPENSATIONS**

15.1 **RELIEF EVENTS**

15.1.1 The Concessionaire shall only be entitled to initiate a request to the Independent Engineer and Independent Auditor (the *Relief Order Request*) for issuance by the same of a Relief Order relating to, as applicable, an extension of the Time For Completion and/or payment of Relief Compensation by the Agency in the event of occurrence of the following event which event (or its effects) continues for a period of more than fifteen (15) days as certified by the Independent Engineer (the *Relief Events*):

(a) a Material Adverse Impediment; provided, that the Concessionaire shall be entitled to only an extension in Time For Completion for any delays and to Relief Compensation that, in each case, directly result from the Material Adverse Impediment and as are determined by the Independent Engineer and Independent Auditor in the Relief Order;

(b) a Political Event; provided, that the Concessionaire shall be entitled to only an extension in Time For Completion for any delays and to Relief Compensation that, in each case, directly result from the Political Event and as are determined by the Independent Engineer and Independent Auditor in the Relief Order;

(c) an Emergency Decommissioning directly resulting from the Agency Event of Default or a Political Event; provided, that the Concessionaire shall be entitled to only an extension in Time For Completion for any delays and to Relief Compensation that, in each case, directly result from Emergency Decommissioning caused by a Political Event and as are determined by the Independent Engineer and Independent Auditor in the Relief Order;

(d) the occurrence of the circumstances set out in Section 4.9 (*Geological and Archeological Finds*) causing a delay in the performance of the Concessionaire’s obligations under this Agreement; provided, that the Concessionaire shall be entitled to only an extension in Time For Completion for any delays and to Relief Compensation that, in each case, directly result from the occurrence of the circumstances set out in Section 4.9 (*Geological and Archeological Finds*) and as are determined by the Independent Engineer and Independent Auditor in the Relief Order;

(e) the occurrence of the Agency Overriding Power Event; provided, that the Concessionaire shall be entitled to only an extension in Time for Completion for any delays and to Relief Compensation that, in each case, directly result from the Agency Overriding Power Event and as are determined by the Independent Engineer and Independent Auditor in the Relief Order;

(f) a delay by the Agency in providing the Vacant Possession of the Project Site in accordance with the terms of this Agreement; provided, that the Concessionaire shall be entitled to an extension in Time For Completion for any delays and to Relief Compensation that, in each case, directly result from such delay in providing Vacant Possession and as are determined by the Independent Engineer and Independent Auditor in the Relief Order;
(g) a Non-Political Event; provided, that the Concessionaire shall be entitled to only an extension in Time for Completion for any delays that directly result from the Non-Political Event and as are determined by the Independent Engineer and Independent Auditor in the Relief Order;

(h) an Emergency Decommissioning directly resulting from a Non-Political Event; provided, that the Concessionaire shall be entitled to only an extension in Time for Completion for any delays that directly result from Emergency Decommissioning caused by a Non-Political Event and as are determined by the Independent Engineer and Independent Auditor in the Relief Order;

(i) the occurrence of the Agency Overriding Power Event resulting from a Non-Political Event; provided, that the Concessionaire shall be entitled to only an extension in Time for Completion for any delays directly result from such Agency Overriding Power Event and as are determined by the Independent Engineer and Independent Auditor in the Relief Order; and

(j) a delay caused as a result of Suspension, provided that such Suspension is caused due to a Permitted Event; the Concessionaire shall be entitled to an extension in Time for Completion for any delays that directly result from such delay due to Suspension, as determined by the Independent Engineer and the Independent Auditor in the Relief Order;

15.1.2 If due to the occurrence of a Relief Event the Concessionaire is entitled to initiate a Relief Order Request, the Concessionaire shall prepare and deliver to the Independent Engineer and the Independent Auditor (with a copy to the Agency) a Relief Order Request, together with the Relief Order Proposal that is prepared in accordance with and is subject to Section 15.4 (Relief Order Procedure) and, if applicable, Section 15.3 (Additional Requirements For Relief Orders Relating To Extension Of Time For Completion). Each Relief Order Request prepared in accordance with Section 15.2 (Relief Order Procedure) and, if applicable, Section 15.3 (Additional Requirements For Relief Orders Relating To Extension Of Time For Completion) shall specifically set out in detail the events and circumstances constituting the Relief Event, together with all supporting satisfactory documentary evidence relating thereto.

15.1.3 Following submission to the Independent Engineer and the Independent Auditor of a Relief Order Request pursuant to Section 15.1.2, the Independent Engineer and the Independent Auditor shall proceed in accordance with Section 15.2 (Relief Order Procedure) and Section 15.3 (Additional Requirements for Relief Orders Relating to Extension of Time for Completion).

15.1.4 Notwithstanding anything to the contrary, the Parties agree that the Concessionaire shall not be entitled to any extensions of Time for Completion and/or Relief Compensation, as applicable, due to occurrence of a Relief Event, until such time the same is determined by the Independent Engineer and the Independent Auditor and set out in the Relief Order issued by the same in accordance with this Agreement provided further that the Independent Engineer certifies that the Concessionaire has no space for parallel or alternate sequencing of works available for carrying out its obligations within the prescribed timelines and until the Concessionaire has proved to have made all its efforts to avoid such Relief Event according to Good Industry Practices.
15.2 RELIEF ORDER PROCEDURE

15.2.1 In case the Concessionaire submits a Relief Order Request to the Independent Engineer and the Independent Auditor (with a copy to the Agency) pursuant to Section 15.1 (Relief Events) then prior to the Independent Auditor and the Independent Engineer issuing a Relief Order, the Concessionaire shall prepare and submit to the Independent Auditor and the Independent Engineer (with a copy to the Agency), as soon as practicable, a detailed proposal (the Relief Order Proposal) containing:

(a) a description of the proposed work to be performed and a detailed programme for its execution;

(b) the Concessionaire's proposal for any necessary modifications to the Construction Programme and/or the O&M Programme, as applicable;

(c) the Concessionaire's proposal for any Relief Compensation and any adjustments to Time For Completion and/or any Project Milestone Date, accompanied by detailed pricing and documentary evidence;

(d) a statement whether and the extent to which, in the Concessionaire’s opinion, the proposed proposals contained in the Relief Proposal would, notwithstanding the exercise of all due skill and care, result in defective Project Works or prevent the Concessionaire from performing its obligations under this Agreement, including defects liability,

provided, however, each Relief Order Request and Relief Order Proposal submitted by the Concessionaire that proposes an extension to Time for Completion or any Project Milestone Date for a Project Milestone shall be additionally subject to the provisions and requirements of Section 15.3 (Additional Requirements For Relief Orders Relating To Extension Of Time For Completion);

provided, further, however, in the event of submission of any Relief Order Request and a Relief Order Proposal, the Concessionaire shall provide such additional information as the Agency, the Independent Engineer and/or the Independent Auditor may reasonably request; and

provided, further, however, the Concessionaire shall keep and maintain such contemporary records (as may be necessary to substantiate any proposals contained in the Relief Order Proposal and/or the Relief Order Request) as may reasonably be requested by the Independent Engineer, the Independent Auditor and/or the Agency and the Concessionaire shall permit the Independent Engineer, the Independent Auditor and/or the Agency to inspect all such records and shall provide the same to the Project Manager with copies as required.

15.2.2 The Parties agree that compliance by the Concessionaire with the provisions of this Article 15 (Relief Extensions & Relief Compensation) shall be a condition precedent to the issuance, by the Independent Engineer and the Independent Auditor, of a Relief Order, unless waived in writing by the Agency. Further, notwithstanding anything to the contrary contained herein:
(a) if the Project Works (or any part thereof) are not in accordance with this Agreement, any rectification in that respect undertaken by the Concessionaire shall not entitle the Concessionaire to issuance of a Relief Order;

(b) the Concessionaire is expressly precluded from any extension of the Time For Completion and any extension of a Project Milestone Date for Project Milestone or to payment of any Relief Compensation due to delays resulting from any act or omission of the Concessionaire and/or the Concessionaire Engaged Persons;

(c) the Concessionaire shall not be entitled to any extensions of the Time For Completion for any delays or failure to perform and hence shall not be entitled to Relief Compensation or to initiate a Relief Order Request for issuance of a Relief Order to the extent the Concessionaire is, in any case, in delay of performance of its obligations under this Agreement.

15.2.3 Following receipt by the Independent Engineer and the Independent Auditor from the Concessionaire of the Relief Order Proposal and the Relief Order Request, the Independent Engineer and the Independent Auditor shall review the Concessionaire’s proposals contained in the Relief Order Proposal and the Relief Order Request, for the purpose of determining:

(a) the occurrence and subsistence of the Relief Event and the Concessionaire’s entitlement to issuance of the Relief Order Request;

(b) whether to proceed with the proposals submitted by the Concessionaire in its submitted Relief Order Proposal;

(c) (if applicable) any amendments or modifications to the estimates and proposals submitted by the Concessionaire in the Relief Order Proposal;

(d) other matters set forth in the Relief Order Proposal and the Relief Order Request including determination of extension of Time For Completion and Relief Compensation; and

(e) any other matters considered necessary by the Independent Engineer and the Independent Auditor for the purposes of issuance of the Relief Order.

15.2.4 Following the Independent Engineer and the Independent Auditor’s determination of matters set out in Section 15.4.3 (together with any other matters relating to their evaluation for issuance of a Relief Order), the Independent Engineer and the Independent Auditor shall either amend, approve or disapprove in writing the Concessionaire’s submitted proposals contained in the Relief Order Proposal and the Relief Order Request within twenty one (21) days following receipt by the Independent Engineer and the Independent Auditor from the Concessionaire of the Relief Order Proposal and the Relief Order Request. If the Independent Engineer and the Independent Auditor amend, modify or reject the Relief Order Proposal and the Relief Order Request, in each case, submitted by the Concessionaire, the Concessionaire shall submit a revised Relief Order Proposal and Relief Order Request taking into account the amendments, modifications and comments on the same made by the Independent Engineer and the Independent Auditor, which shall be subject to approval by the Independent Engineer and the Independent Auditor within twenty one (21) days of
submission of the revised Relief Order Proposal and the Relief Order Request. In the event of the Independent Engineer and the Independent Auditor’s approval of the Relief Order Proposal and the Relief Order Request or, if applicable, a revision of the same approved by the Independent Engineer and the Independent Auditor, it is agreed that the Independent Engineer and the Independent Auditor shall jointly issue a written order of Relief Order to the Agency and the Concessionaire simultaneously. All extensions in Time For Completion and in any Project Milestone Date for achievement of a Project Milestone and all Relief Compensation, as applicable, shall be expressly set out in the Relief Order and shall be (subject to Section 15.4 (Disputes and Burden of Proof) below) binding on the Parties; provided, however, that such extensions in Time For Completion and in any Project Milestone Date for achievement of a Project Milestone and the Relief Compensation set in the Relief Order shall not be in excess of the Concessionaire’s request under the Relief Order Proposal and the Relief Order Request; provided, further, that any Relief Compensation shall be paid by the Agency to the Concessionaire within ninety (90) days of receipt of the Relief Order by the Agency.

15.2.5 Notwithstanding anything to the contrary, in the event of occurrence of a Relief Event (excluding a Non-Political Event and an Emergency Decommissioning directly resulting from a Non-Political Event, in each case, for which no Relief Compensation shall be payable), the Concessionaire shall be only entitled to such Relief Compensation that:

(a) are directly attributable to the Relief Event; and

(b) represent increase (as a result of a Relief Event) in only such costs that are expressly set out in the Financial Model.

15.2.6 Subject to the terms of this Agreement, the Project Works shall not be delayed pending the issuance of a Relief Order by the Independent Auditor and the Independent Engineer or by the granting of an extension of Time For Completion or payment of Relief Compensation.

15.3 ADDITIONAL REQUIREMENTS FOR RELIEF ORDERS RELATING TO EXTENSION OF TIME FOR COMPLETION

15.3.1 The Parties agree that the provisions of this Section 15.5 (Additional Requirements For Relief Orders Relating To Extension Of Time For Completion) shall apply to each Relief Order Proposal and the Relief Order Request that, in each case, proposes an extension to the Time for Completion or to any Project Milestone Date for a Project Milestone.

15.3.2 Any Relief Order Proposal and/or, if applicable, the Relief Order Request submitted by the Concessionaire shall be subject to the Concessionaire otherwise being ready to progress with the aspect of the Project Works for which an extension is being sought. In the event the Concessionaire is in any event delayed in the performance of its obligations due to reasons other than the Relief Event, the Concessionaire shall not be granted any extension of Time For Completion to the extent of its delay.

15.3.3 In all cases where the Concessionaire submits a Relief Order Proposal and the Relief Order Request, the Concessionaire shall consult with the Agency, the Project Manager, the Independent Engineer and the Independent Auditor in order to determine steps (if any) which can be taken to overcome or minimize the actual or anticipated delay. The Concessionaire shall thereafter comply with all reasonable instructions that the
Independent Engineer and the Independent Auditor shall give in order to overcome or minimize such delay.

15.3.4 If the Concessionaire intends to initiate a Relief Order Request for issuance of a Relief Order for an extension of Time For Completion, the Concessionaire shall give Notice to the Independent Engineer and the Independent Auditor (with a copy to the Agency) of such intention as soon as possible and in any event within seven (7) days of the day the Concessionaire should reasonably have become aware of the start of the Relief Event giving rise to the delay, together with any other notice required by this Agreement and relevant to such cause. The Concessionaire is further required to submit to the Independent Engineer and the Independent Auditor (with a copy to the Agency), as part of the Relief Order Proposal relating to the Relief Order Request that pertains to an extension of Time for Completion, an acceleration strategy and schedule to demonstrate how such delay can be eliminated and/or mitigated.

15.3.5 Within twenty eight (28) days of the first day of a delay that has resulted from the Relief Event in initiation of the Relief Order Request by the Concessionaire for issuance of a Relief Order by the Independent Engineer and the Independent Auditor for an extension of Time for Completion, the Concessionaire shall submit full supporting details of its request, including, without limitation, a critical path analysis of the alleged delay reflecting the considerations set forth in this Section. If the Concessionaire cannot submit all relevant details within such period because the cause of delay has continued for a period exceeding seven (7) days, the Concessionaire shall submit interim details at intervals of not more than twenty eight (28) days (from the first day of such delay) and full and final supporting details of its request within sixty (60) days of the last day of delay. In the appropriate circumstances, the Agency shall have the right to waive the time periods set out as above.

15.4 DISPUTES AND BURDEN OF PROOF

15.4.1 Any Dispute between the Parties in reference to the issuance of a Relief Order and/or any matters relating to the same shall be resolved pursuant to Article 30 (Dispute Resolution).

15.4.2 In case of a Dispute regarding the application of the provisions of this Article 15 (Relief Extensions & Relief Compensation), the Concessionaire shall have the burden of proof as to its entitlement to relief under this Article 15 (Relief Extensions & Relief Compensation).

15.5 FULL COMPENSATION

15.5.1 Any:

(a) extensions of Time For Completion; and/or

(b) payment of Relief Compensation,

in each case, granted pursuant to a Relief Order shall be deemed to be full and complete compensation to the Concessionaire by the Agency in respect of matters relating to the Relief Order.
16. **CHANGE OF SCOPE**

16.1 **CHANGE OF SCOPE**

16.1.1 Notwithstanding anything to the contrary contained in this Agreement, the Agency may require a change/amendment in the Scope of the Project (the Change of Scope); provided, that the accrued and cumulative change at any given time does not result in a variation in the Pre-Estimated Project Cost by more than to fifteen percent (15%) (as such percentage is revised from time to time in accordance with the terms of the Applicable Laws), as determined by the Independent Engineer and the Independent Auditor. All Additional Costs to be paid by the Agency in respect of the Change of Scope and any extensions in the timelines for the performance by the Concessionaire of its obligations resulting from a Change of Scope shall be in accordance with Section 16.2 and Section 16.3.

16.2 **CHANGE OF SCOPE NOTICE**

16.2.1 The Agency may request for the Change of Scope by issuing a Change of Scope Notice in accordance with the provisions of this Section 16.2 (Change of Scope Notice).

16.2.2 The Agency may request for a Change of Scope by issuing a notice in writing to the Concessionaire through the Independent Engineer (the Change of Scope Notice):

(a) at least ninety (90) days prior to the Scheduled Substantial Completion Date in the event the Change of Scope is required during the Construction Period; and

(b) at any time in the event the Change of Scope is required during the Operations Period.

16.2.3 In the event at any time during the Construction Period and/or the Operations Period, the Concessionaire determines that a Change of Scope is necessary for providing safer and improved services to the Users, the Concessionaire shall issue a request in writing to the Agency through the Independent Engineer to consider issuing a Change of Scope Notice in respect of the same. The Agency shall within forty five (45) days from the date of receipt of such notice, either accept such request for Change of Scope, on an “as is” basis or with modifications and issue the requisite Change of Scope Notice in accordance with the provisions of this Section 16.2 (Change of Scope Notice) or communicate its reasons for not accepting the same to the Concessionaire.

16.3 **CHANGE OF SCOPE ORDER**

16.3.1 The Concessionaire shall, within fifteen (15) days of receipt of the Change of Scope Notice, provide to the Independent Engineer such information as is necessary and reasonable together with the preliminary documentation and details, including the calculations, where necessary, in support of the following (as applicable):

(a) the impact which the Change of Scope is likely to have on the Construction Requirements in the event the Change of Scope applicable during the Construction Period and/or the O&M Requirements in the event the Change of Scope applicable during the Operations Period;
(b) the budgeted estimate of the Additional Cost to be incurred by the Concessionaire for implementing the Change of Scope;

(c) the estimated additional time (number of days) that the Concessionaire would require to achieve Substantial Completion and/or Construction Completion consequent to the Change of Scope and any delay, if any, in the Final Expiry Date;

(d) any extensions in the Construction Completion Schedule resulting from the Change of Scope; and

(e) any extensions in the timelines for performance by the Concessionaire of its obligations under this Agreement resulting from the Change of Scope.

16.3.2 The Independent Engineer shall after reviewing the information, documentation and the budgeted estimate of the Additional Cost submitted by the Concessionaire pursuant to Section 16.3.1, settle the rates, approve the designs and forward the budgeted estimates of the Additional Cost, as duly certified by the (Independent Engineer and the Independent Auditor) in consultation with the Concessionaire, to the Agency.

16.3.3 The Agency may, within a period of fifteen (15) days from the date of receipt of such statement, issue an order in writing to the Concessionaire, through the Independent Engineer instructing the Concessionaire to affect the Change of Scope (the Change of Scope Order).

16.3.4 In the event, the Agency for any reason whatsoever decides not to issue a Change of Scope Order in accordance with Section 16.3.1, then the Agency shall reimburse the Concessionaire for the cost/expenses actually incurred by the Concessionaire in the preparation and submission of the drawings, documents, estimates and other information in compliance with the Change of Scope Notice; provided, such costs and expenses are duly certified by the Independent Auditor and the Independent Engineer.

16.3.5 The mode for payment of the Additional Costs to the Concessionaire shall be as follows and shall be complied by the Agency within forty-five (45) days of the issuance of a Change of Scope Order and until such time that the following conditions are complied with by the Agency, the Concessionaire shall not be obligated to commence and/or perform the works forming part of the Change of Scope Order:

(a) to ten percent (10%) of the Additional Cost shall be paid in advance upon issuance of the Change of Scope Order (or as agreed between the Parties in accordance with Applicable Laws);

(b) the remaining to ninety percent (90%) shall be transferred by the Agency to an escrow account pursuant to an escrow arrangement agreed with the Concessionaire wherefrom the same shall be utilized progressively upon certification by the Independent Engineer of the performance of works.

16.3.6 The Change of Scope Order shall be effective from the date that the Agency notifies the mode of reimbursement of the Additional Cost to the Concessionaire pursuant to subsection 16.3.5 of this Section 16.3 (Change of Scope Order).
16.3.7 Save for the advance payment under Section 16.3.5(a), the Agency shall progressively pay the Additional Cost in accordance with sub-section 16.3.5 of this Section 16.3 (Change of Scope Order) or any other modality as mutually agreed between the Parties, only upon receiving a certificate from the Independent Engineer confirming that the Concessionaire has completed the relevant milestone(s) of the works in accordance with the Change of Scope Order.
17. **ANNUITY AMOUNT PAYMENTS & AGENCY FINANCIAL INSTRUMENT**

17.1 **ANNUITY AMOUNT PAYMENTS**

17.1.1 Subject to the provisions of this Agreement and in consideration of the Concession and the undertaking by the Concessionaire to perform and discharge its obligations in accordance with the terms and conditions set out in the Agency Agreements, the Agency agrees and undertakes to pay each payable Annuity Amount Payments to the Concessionaire on its corresponding Annuity Amount Payment Date strictly in accordance with the terms of this Article 17 (Annuity Amount Payments & Agency Financial Instrument) and the terms (including the terms relating to the mechanism and parameters for funding and payment of the Annuity Amount Payments) of the Annuity Amount Payment Agreement.

17.1.2 The Agency shall fund the Annuity Amount Payments Reserve Amount in the Agency Annuity Amount Payment Account during a period commencing from six (6) months prior to the Scheduled Substantial Completion Date until the end of Operations Period.

17.1.3 Subject to Article 17.1.4, on the first Annuity Amount Payment Date, only the O&M Cost Component out of the total payable Annuity Amount Payment shall be paid to the Concessionaire. However, on the subsequent Annuity Amount Payment Dates the following portions of the Annuity Amount Payment shall be paid to the Concessionaire:

(a) Financing Component of the relevant Annuity Amount Payment Period

(b) Return on Equity Component of the relevant Annuity Amount Payment Period

(c) Taxes Component of the relevant Annuity Amount Payment Period

(d) O&M Cost Component of the immediately succeeding Annuity Amount Payment Period

17.1.4 It is highlighted that during the Defects Liability Period, the Concessionaire shall remain responsible to bear the maintenance cost incurred during such time but shall not include maintenance cost in the O&M Cost Component forming part of the Annuity Amount Payments.

17.2 **ANNUITY AMOUNT PAYMENT DAMAGES EVENTS & ANNUITY AMOUNT PAYMENT DAMAGES**

17.2.1 The Annuity Amount Payments payable by the Agency to the Concessionaire on each Annuity Amount Payment Date shall be subject to Annuity Amount Payment Damages due to occurrence of the Annuity Amount Payment Damages Events during the Annuity Amount Payment Evaluation Period relating to such Annuity Amount Payment Date.

17.2.2 The Annuity Amount Payment Damages, in respect of each Annuity Amount Payment Evaluation Period, shall be up to a maximum of following amount:

(a) hundred percent (100%) of the Return on Equity Component of the relevant Annuity Amount Payments; and
(b) fifty percent (50%) of the O&M Cost Component; of the relevant Annuity Amount Payments;

(collectively the “Adjustable Annuity Amount Payment Damages”)

17.2.3 The Adjustable Annuity Amount Payment Damages shall only be adjusted from the following components of the relevant Annuity Amount Payment, in the following order:

(a) Firstly, out of hundred percent (100%) of the Return on Equity Component; and, if the Adjustable Annuity Amount Payment Damages are not fully adjusted, then

(b) Secondly, out of fifty percent (50%) of the O&M Cost Component;

In case, the Annuity Amount Payment Damages is more than the Adjustable Annuity Amount Payment Damages in respect of relevant Annuity Amount Payment, the remaining Annuity Amount Payment Damages shall be carried forward and shall be adjusted from the Adjustable Annuity Payment Damages of the immediately succeeding Annuity Amount Payment. This process of carrying forward and adjustment of the remaining Annuity Amount Payment Damages shall continue till the entire Annuity Amount Payment Damages is adjusted from the Adjustable Annuity Amount Payment Damages in relation to the relevant Annuity Amount Payments.

17.2.4 In case, the Annuity Amount Payment Damages Event occurs in or continue for three (3) consecutive Annuity Amount Payment Periods, the same shall constitute a Concessionaire Event of Default.

17.2.5 In the event:

(a) the Actual Availability is less than eighty percent (80%) of the Assured Availability for a consecutive period of thirty (30) days during any two (2) Annuity Amount Payment Periods falling in any Operational Year; and/or

(b) the Actual Availability is less than eighty percent (80%) of the Assured Availability for an aggregate period of ninety (90) days during any Operational Year,

then, in each case above, the same shall constitute a Concessionaire Event of Default and the Agency may at its discretion Terminate this Agreement in accordance with Section 22.1.1 (Concessionaire Event of Default) except in cases where the same is due to the Permitted Events.

17.2.6 In the event the entire Project (or any portion thereof) is unavailable for traffic for a period of thirty (30) consecutive days, then the same shall constitute a Concessionaire Event of Default except in cases where the same results from Permitted Events.

17.3 **AGENCY FINANCIAL INSTRUMENT AND RELATED MATTERS**

17.3.1 Issuance of Agency Financial Instrument

(a) The Agency hereby agrees and undertakes to provide the Agency Financial Instrument (to be issued by the Agency Financial Instrument Issuing Bank) for an
amount calculated in accordance with Section 17.3.3 and hereby agrees to maintain the same in accordance with the terms of this Agreement.

(b) The Agency hereby agrees and undertakes that the Agency Financial Instrument shall be issued on its behalf. The Agency Financial Instrument shall be fully secured by Agency as a principal debtor and not as surety without any recourse to the Concessionaire, its assets or properties. All costs, expenses, fees and other charges of any nature associated with the issuance and maintenance of the Agency Financial Instrument shall be borne solely by the Agency.

(c) The Agency Financial Instrument shall be issued in the form and substance acceptable to the Concessionaire and the Agency Financial Instrument Issuing Bank.

(d) The Agency Financial Instrument shall be unconditional, irrevocable, encashable in accordance with the terms thereof and shall be payable on first written demand without any prior notice, reference or recourse to the Agency or any other entity. The Agency hereby agrees to the terms of encashment of the Agency Financial Instrument issued on its behalf, as set out in Section 17.3 (Agency Financial Instrument And Related Matters) and in the Agency Financial Instrument.

17.3.2 ENCASHMENT

(a) Without prejudice to or in any way limiting any other provisions of this Agreement, the Agency Financial Instrument may be encashed in accordance with this Agreement in the following circumstances:

(i) pursuant to Section 17.3.4(a);

(ii) pursuant to Section 17.3.4(b);

(iii) pursuant to Section 17.4.1(b);

(iv) pursuant to the Annuity Amount Payment Agreement, due to non-payment and/or non-funding of the Annuity Amount Payments in the Agency Annuity Amount Payment Account.

17.3.3 AGENCY FINANCIAL INSTRUMENT AMOUNT

(a) The Parties agree that the First Agency Financial Instrument and each Extended Agency Financial Instrument shall be issued in the following amounts and manner:

(i) the Agency shall issue the First Agency Financial Instrument in the form and manner set out in Section 17.3.1 for an amount equal to fifty percent (50%) of the Principal as set out in the Base Case Financial Model updated on the basis of Financing Term Sheet (the First Agency Financial Instrument Amount) as a Condition Precedent to the Commencement Date;
(ii) at least thirty (30) days prior to the expiry of the Agency Financial Instrument (including any days till the expiry date of the Agency Financial Instrument following its extension), the Concessionaire shall procure issuance by the Independent Auditor of a certificate (the **Agency Financial Instrument Extension Certificate**) setting out an amount equal to fifty percent (50%) of the outstanding Principal as on Agency Financial Instrument Extension Certificate issuance date as set out in the Base Case Financial Model updated as on Financial Close (the **Agency Financial Instrument Extension Amount**);

(iii) thirty (30) days prior to expiry of the Agency Financial Instrument and subject to receipt by the Agency of the Agency Financial Instrument Extension Amount Certificate, the Agency shall extend the validity of the Agency Financial Instrument for a period of two (2) years from the date of its expiry (the **Agency Financial Instrument Extension Period**) and shall adjust the value of the Agency Financial Instrument such that the value of the Agency Financial Instrument equals the Agency Financial Instrument Extension Amount, as set out in the Agency Financial Instrument Extension Certificate (the **Extended Agency Financial Instrument**).

17.3.4 **FAILURE TO EXTEND AGENCY FINANCIAL INSTRUMENT**

(a) Following the Substantial Completion Date, the Agency shall be obliged to maintain and keep valid the First Agency Financial Instrument until Debt Repayment Date (the **First Agency Financial Instrument Expiry Date**). In the event the First Agency Financial Instrument expires prior to the First Agency Financial Instrument Expiry Date, the Agency shall extend the validity of the First Agency Financial Instrument, at least thirty (30) days prior to its expiry, so as to keep it valid and enforceable until the First Agency Financial Instrument Expiry Date. In the event of failure by the Agency to extend the validity of the First Agency Financial Instrument in accordance with this Section 17.3.4(a), as certified by the Independent Auditor in its certificate (the **First Agency Financial Instrument Extension Failure Certificate**), the Concessionaire shall have the right, upon issuance of the first written demand (together with the First Agency Financial Instrument Extension Failure Certificate) to encash the First Agency Financial Instrument to its full outstanding value. All proceeds from encashment of the First Agency Financial Instrument pursuant to this Section 17.3.4(a) shall be credited to the Agency Annuity Amount Payment Account and shall be utilized as payment(s) by the Agency of the Annuity Amount Payments in accordance with the Annuity Amount Payment Agreement.

(b) In the event of failure by the Agency to keep valid or extend the validity of the Extended Agency Financial Instrument in accordance with this Section 17.3.4(b), as certified by the Independent Auditor in its certificate (the **Extended Agency Financial Instrument Extension Failure Certificate**), the Concessionaire shall have the right, upon issuance of the first written demand (together with the Extended Agency Financial Instrument Extension Failure Certificate), to encash the Extended Agency Financial Instrument to its full outstanding value. All proceeds from encashment of the Extended Financial Instrument pursuant to this Section 17.3.4(b) shall be credited to the Agency Annuity Amount Payment Account.
Account and shall be utilized as payment(s) by the Agency of the Annuity Amount Payments in accordance with the Annuity Amount Payment Agreement.

(c) The Agency hereby undertakes to establish, maintain and keep valid, at all times, the First Agency Financial Instrument and each Extended Agency Financial Instrument until the Debt Repayment Date.

(d) Upon the Extended Agency Financial Instrument becoming effective, all references in this Agreement to the Agency Financial Instrument shall mean to refer and shall be construed to refer to the Extended Agency Financial Instrument.

17.4 **PAYMENT OF TERMINATION PAYMENT BY DEBIT OF AGENCY ANNUITY AMOUNT PAYMENT ACCOUNT AND ENCASHMENT OF AGENCY FINANCIAL INSTRUMENT**

17.4.1 In the event of Termination of this Agreement and to the extent the Termination Payment (or any part thereof) remains due, payable and outstanding on the Termination Payment Date (as certified in a certificate (the *Unpaid Termination Payment Amount Certificate*) issued by the Independent Engineer and the Independent Auditor) (the *Unpaid Termination Payment Amount*), the Unpaid Termination Payment Amount shall be paid to the Concessionaire in the following manner on the Termination Payment Date:

(a) the Agency Annuity Amount Payment Account Bank shall, in accordance with the Agency Annuity Amount Payment Account Standing Instructions, debit the Agency Annuity Amount Payment Account on the date of its receipt of the Unpaid Termination Payment Amount Certificate in an amount equal to the Unpaid Termination Payment Amount and credit the same to the Concessionaire Annuity Amount Payment Account;

(b) in the event the funds standing to credit of the Agency Annuity Amount Payment Account are insufficient to fund the Unpaid Termination Payment Amount in full (the *Payable Termination Payment Amount Shortfall*), as certified and set out by the Independent Auditor and the Independent Engineer in the Unpaid Termination Payment Amount Certificate, the Concessionaire shall be entitled to encash the Agency Financial Instrument in an amount equal to the Payable Termination Payment Amount Shortfall; and

(c) in the event the Payable Termination Payment Amount Shortfall is not paid in full despite encashment of the Agency Financial Instrument in accordance with Section 17.4.1(b), the Agency shall pay the unpaid portion of the Payable Termination Payment Amount Shortfall (the *Outstanding Termination Payment*) to the Concessionaire by credit of the Outstanding Termination Payment to the Concessionaire Annuity Amount Payment Account.
18. **DEFECTS & DEFICIENCIES, NOTICE OF REMEDY, SUSPENSION**

18.1 **REMEDYING DEFECTS & DEFICIENCIES**

18.1.1 The Concessionaire warrants that the:

(a) Project Works shall be performed in good workmen like manner in accordance with the Applicable Standards and shall be free from all Defects & Deficiencies;

(b) the Concession Assets shall comply with the Applicable Standards; and

(c) the Project, following Substantial Completion, shall meet the Assured Availability.

18.1.2 In order that the Project Works and the Concession Assets comply with the foregoing warranties and that the same are in the condition required by this Agreement, the Concessionaire shall execute all works and services relating to amendment, reconstruction and remedying of Defects & Deficiencies (including the removal, replacement and reinstallation of materials and equipment, remedying of Defects & Deficiencies and retesting of repaired or replaced portions of the Project Works (if appropriate in accordance with Good Industry Practices)) at its own cost, risk and expense; provided, however, that the amendment, reconstruction and remedying of such Defects & Deficiencies shall be at the cost, risk and expense of the Agency in the event the same is caused by a Permitted Events (except for a Non Political Event).

18.1.3 If the remedying of any Defect & Deficiency or damage is such that it may significantly affect the performance of the Project Works and/or the Concession Assets, the Independent Engineer and/or the Agency may require that certain Construction Tests, O&M Tests and/or the Completion Tests (as the case may be) to be repeated to the extent necessary. The requirement shall be made by written Notice after the Defect & Deficiency or damage is remedied. Such tests shall be carried out by the Concessionaire in accordance with the Applicable Standards and all costs and expenses of any nature associated with re-performance of such tests shall be allocated in accordance with Section 18.1.2.

18.2 **NOTICE REMEDY**

18.2.1 In the event (the Remedy Events):

(a) the Project Works (or any part thereof) are not performed in accordance with the Applicable Standards; and/or

(b) the Project Works (or any part thereof) fail to comply with the Applicable Standards;

(c) the Concession Assets (or any part thereof) fails to comply with the Applicable Standards, then the Independent Engineer and/or the Agency (through the Independent Engineer) shall be entitled to issue a Notice to the Concessionaire to rectify and remedy the same (the Notice of Remedy). The Notice of Remedy shall set out the reasonable time period (as determined by the Independent Engineer) (the Remedy Time Period) in which the Concessionaire shall remedy
and rectify the Remedy Events in accordance with the Applicable Standards; and/or

(d) [●]3.

18.2.2 In the event of failure by the Concessionaire to remedy the Remedy Events within the Remedy Time Period, the Agency shall, without prejudice to any of its other rights and remedies under this Agreement, be entitled to, with the prior approval of the Independent Engineer and at the risk and cost of the Concessionaire, cause the remediying and rectification of the Remedy Events.

18.2.3 The Concessionaire shall reimburse all costs incurred by the Agency (as certified by the Independent Auditor and the Independent Engineer) on account of such remediying and rectification of the Remedy Events within thirty (30) days of receipt of the Agency’s claim thereof set out in an invoice approved by the Independent Engineer and the Independent Auditor (the Agency Remedy Invoice). In the event of failure by the Concessionaire to pay the amounts set out in the Agency Remedy Invoice (the Agency Remedy Amount) within the time period set out herein, the Agency shall be entitled to receive such Agency Remedy Amount through encashment of (as in effect at such time) the Construction Performance Security or O&M Performance Security. In the event the funds received by the Agency through encashment of the Construction Performance Security and/or the O&M Performance Security are less than the Agency Remedy Amount, the Concessionaire shall be obligated to pay the Agency the shortfall within three (3) days of the Agency’s written demand.

18.3 SUSPENSION

18.3.1 The:

(a) Agency may by Notice in writing to the Concessionaire (with a copy to the Independent Engineer and the Independent Auditor) require the Concessionaire to suspend forthwith the whole or any part of the Project Works if, in the reasonable opinion of the Agency: (i) such work threatens the safety of the Users and pedestrians; or (ii) such Project Works are not in accordance with the Applicable Standards and/or Good Industry Practices; and/or

(b) Independent Engineer may, by Notice to the Concessionaire (with a copy to the Agency and the Independent Auditor), require the Concessionaire to suspend forthwith the whole or any part of the Project Works which in the reasonable opinion of the Independent Engineer is being carried on/conducted in a manner that is not in conformity with the Applicable Standards and/or is not in accordance with Good Industry Practice,

(the Suspension, Suspend and its grammatical variations).

18.3.2 The Concessionaire shall, pursuant to any notice issued under Section 18.3.1, Suspend the Project Works or any part thereof for such time and in such manner as may be specified by the Agency and/or the Independent Engineer and thereupon carry out

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3 to advise whether the Remedy events are to include any further events;
remedial measures to secure the safety of Suspended works and the Users and for compliance of the Suspended Project Works with the Applicable Standards and Good Industry Practices.

18.3.3 The Concessionaire may by Notice (with a copy to the Agency) require the Independent Engineer to inspect such remedial measures forthwith and the Independent Engineer shall, following such inspection, make a report to the Agency recommending whether or not the Suspension may be revoked. Upon receiving the recommendations of the Independent Engineer, the Agency shall either revoke such Suspension or instruct the Concessionaire to carry out such other and further remedial measures as may be necessary in the reasonable opinion of the Agency, and the procedure set forth in this Section 18.3 (Suspension) shall be repeated till such time as the Suspension hereunder is revoked.

18.3.4 All reasonable costs incurred for maintaining and protecting the Project Works (or part thereof) during the period of Suspension (the Preservation Costs) shall be borne by the Concessionaire; provided, that if the Suspension has occurred as a result of a Permitted Event, the provisions of Article 21 (Force Majeure) and Article 15 (Relief Extensions & Relief Compensation), as the case may be, shall apply.

18.3.5 All delays caused as a result of the Suspension shall be on account of the Concessionaire; provided, however, in the event the Suspension is caused due to a Permitted Event, any extensions of the Time For Completion shall be subject to the provisions of Article 15 (Relief Extensions & Relief Compensation) and Article 21 (Force Majeure), as the case may be.
19. **OPERATION AND MAINTENANCE**

19.1 **OPERATION AND MAINTENANCE**

19.1.1 The Concessionaire shall perform the Operation and Maintenance in accordance with the Applicable Standards and shall ensure that the same complies with the Applicable Standards. During the Operations Period, the Concessionaire shall be responsible for Operating and Maintaining the Concession Assets on a twenty-four (24) hours per day, three-sixty-five (365) days per year basis according to the Applicable Standards so as to ensure that the same comply with the Applicable Standards.

19.1.2 Without limiting the provisions of Section 19.1.1, the Concessionaire shall be in particular responsible for the performance and compliance, in each case, of the Operation and Maintenance in accordance with the O&M Requirements.

19.1.3 The Concessionaire shall perform the Operation and Maintenance within the O&M Time For Completion and hereby undertakes to perform and complete each Project O&M Milestone on or prior to its Project O&M Milestone Date.

19.1.4 The Concessionaire shall perform the Operation and Maintenance either itself, or through the O&M Contractor appointed in accordance with the terms of this Agreement; provided, however, the Concessionaire shall remain solely responsible and liable for performance (within the O&M Time For Completion) and compliance of the Operations and Maintenance with the Applicable Standards irrespective of whether the Operation and Maintenance is undertaken by the Concessionaire or the O&M Contractor.

19.2 **OPERATION AND MAINTENANCE OBLIGATIONS OF THE CONCESSIONAIRE**

19.2.1 The Concessionaire undertakes to perform the Operation and Maintenance of the Concession Assets during the Operations Period in accordance with the provisions of Section 19.1 (Operation and Maintenance) and undertakes to modify, repair and to provide all such improvements and services as may be required for the Operation and Maintenance of the Concession Assets in accordance with the Applicable Standards.

19.2.2 The Concessionaire hereby agrees that the Operation and Maintenance obligations of the Concessionaire hereunder shall include, without limitation, the performance of the following obligations in accordance with the Applicable Standards and Good Industry Practices and within the O&M Time For Completion:

(a) ensuring that during the Operations Period, the Concession Assets are in a condition to permit safe, smooth and uninterrupted flow of traffic during normal operating conditions;

(b) minimizing disruption to traffic in the event of accidents or other incidents affecting the safety and use of the Project and by providing a rapid and effective response and maintaining liaison with emergency services of the Agency;

(c) carrying out routine maintenance and the periodic preventive maintenance of the Concession Assets;
undertaking routine maintenance including prompt repairs of potholes, cracks, joints, drains, embankments, structures, pavement markings, lighting, road signs and other traffic control devices;

preventing, with the assistance of concerned law enforcement agencies, any unauthorized use of the Concession Assets;

preventing, with the assistance of the concerned law enforcement agencies, any encroachments on the Project Site;

protecting the environment (to the extent of the Concessionaire’s activities) and providing equipment and materials therefor;

operation and maintenance of all communication, control and administrative systems necessary for the efficient operation of the Concession Assets;

maintaining a public relations unit to interface with and attend to suggestions from the Users, the Agency, the Government Authorities, media and other agencies;

complying with Safety Requirements;

promptly removing from the Project Site, all surplus construction machinery and materials, waste materials (including hazardous materials and waste water), rubbish and other debris (including, without limitation, accident debris) and keeping the Project Site in a clean, tidy and orderly condition, in each case, in conformity with the Applicable Standards; and

performing all other activities and obligations relating to Operation and Maintenance so as to comply with the Applicable Standards and also so as to result in the Concession Assets complying with the Applicable Standards.

19.3  **Material Breach of O&M Requirements**

19.3.1 The Concessionaire shall be deemed to be in material breach of the O&M Requirements (the **Material Breach of O&M Requirements**) if the Independent Engineer and/or the Agency (through the Independent Engineer), acting reasonably and in accordance with the provisions of this Agreement, has determined that due to breach of its obligations by the Concessionaire:

(a) there has been a failure/undue delay in carrying out scheduled/planned maintenance or the scheduled/planned maintenance has not been carried out in accordance with the O&M Requirements;

(b) there has been a material failure in performance by the Concessionaire of the Operation and Maintenance (or any part thereof) within the O&M Time For Completion which has resulted in a Material Adverse Effect;

(c) the riding quality of the Project or any part thereof has materially deteriorated to a level which is below the acceptance level prescribed by the O&M Requirements;
(d) there has been a serious or persistent let up in adhering to Safety Requirements and thereby the Concession Assets or any part thereof is not safe for operations;

(e) there has been Persistent Breach of O&M Requirements; and

(f) [●]

19.4 AGENCY’ RIGHTS WITH REGARD TO MATERIAL BREACH OF O&M REQUIREMENTS

19.4.1 Upon the occurrence of a Material Breach of O&M Requirements, the Agency shall without prejudice to and notwithstanding any other consequences provided therefor shall have the right and be entitled to Terminate this Agreement in accordance with Section 23 (Termination).

19.5 PRIORITY OF TRAFFIC FLOW

19.5.1 The Concessionaire shall ensure that the Project remains open to traffic and that the traffic flow is safe at all times during the Operations Period in accordance with the Applicable Standards.

19.5.2 The Concessionaire undertakes to conduct the Operation and Maintenance in such manner as to ensure compliance with the obligation set out in Section 19.6.1.

19.6 O&M MANUAL

19.6.1 No later than twenty (20) days prior to the Scheduled Substantial Completion Date the Concessionaire, the Concessionaire Project Engineer and the Independent Engineer shall jointly prepare and submit to Agency, separate operations, repair, maintenance and safety manual (together with arrangements and procedures for conducting safety related measures) in respect of the Concession Assets that shall comply with the Applicable Standards and Good Industry Practices and shall set out, *inter alia*, the regular preventive maintenance and operating procedures for the Concession Assets, as to be performed pursuant to the Applicable Standards and Good Industry Practices. Such operations, repair, maintenance and safety manual shall include provisions for operation and maintenance of the Concession Assets and shall, *inter alia*, provide for life cycle maintenance, routine maintenance and reactive maintenance which may be reasonably necessary for maintenance and repair of the Concession Assets, including replacement thereof, such that their overall condition conforms to the Applicable Standards. The operations, repair, maintenance and safety manual shall also set out certain Project O&M Milestones and their respective Project O&M Milestone Dates.

19.6.2 The operations, repair, maintenance and safety manual jointly prepared by the Concessionaire, the Concessionaire Project Engineer and the Independent Engineer shall be subject to approval of the Agency; provided, however, such approval shall be granted by Agency within fifteen (15) days of the Concessionaire’s request for such approval if the operations, repair, maintenance and safety manual is recommended by the Independent Engineer for approval after addressing any comments and observations

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4 to advise if any further requirements are to be added;
of the Agency on the same. The operations, repair, maintenance and safety manual, as approved by the Agency, shall be binding on the Parties (the **O&M Manual**).

19.6.3 Four (4) copies of the O&M Manual shall be provided by the Concessionaire to each of Agency and the Independent Engineer.

19.6.4 The O&M Manual shall be revised and updated on third (3rd) anniversary of its initial preparation and subsequently every three (3) years thereafter, in each case, with mutual consent of the Parties and in consultation with the Independent Engineer; provided, however, the Parties may revise, update and/or amend the O&M Manual with mutual consent at any time.

19.7 **O&M PROGRAMME**

19.7.1 Ninety (90) days prior to commencement of the Operations Period and thereafter thirty (30) days prior to the commencement of each Operational Year during the Operations Period, the Concessionaire, the Concessionaire Project Engineer and the Independent Engineer shall jointly prepare and provide to the Agency, a proposed annual program, to be prepared in compliance with the Applicable Standards and Good Industry Practices, of Operation and Maintenance during the upcoming each Operational Year (including preventive, urgent and other scheduled maintenance of the Concession Assets) (the **Proposed O&M Programme**). The Proposed O&M Programme shall include, (without limitation) the following:

(a) the Project O&M Milestones to be achieved during the upcoming each Operational Year and the respective Project O&M Milestone Dates for each of the same;

(b) routine maintenance and preventive maintenance schedule;

(c) arrangements and procedures for carrying out urgent repairs in respect of the Concession Assets;

(d) criteria to be adopted for determining and ascertaining the Maintenance Requirements of the Concession Assets;

(e) the timelines, intervals and procedures for conducting the inspection of all elements of the Concession Assets;

(f) the timelines and intervals at which the Concessionaire shall conduct periodic maintenance in respect of the Concession Assets;

(g) arrangements and procedures for conducting safety related measures in relation to the Concession Assets;

(h) timelines and intervals for maintenance works and the scope thereof; and

(i) all major events and activities in the preparation of the O&M Documents and submission of the same to the Agency, the Independent Engineer and/or the Independent Auditor (as applicable) for the review and approval (as applicable);
19.7.2 The Proposed O&M Programme jointly prepared by the Concessionaire, the Concessionaire Project Engineer and the Independent Engineer shall be subject to approval of the Agency; provided, however, that such approval shall be granted by the Agency within twenty one (21) days of the Concessionaire’s request for such approval if the Proposed O&M Programme is recommended by the Independent Engineer for approval after addressing any comments and observations of the Agency on the same. The Proposed O&M Programme prepared in respect of each Operational Year, as approved by the Agency on the Independent Engineer’s recommendation, shall be binding on the Parties for such Operational Year (the O&M Programme).

19.7.3 The Concessionaire shall, whenever required by the Agency, the Independent Engineer and/or the Independent Auditor, provide in writing, a general description of the arrangements and methods which the Concessionaire proposes to adopt for the execution of the Operation and Maintenance. Any alteration to the O&M Programme or to such arrangements and methods shall be made by the Concessionaire with prior written consent of the Independent Engineer.

19.7.4 Any reports (including the O&M Monthly Status Reports) submitted by the Concessionaire and covering the execution of the Operation and Maintenance shall emphasize any delays in the O&M Time For Completion.

19.8 **SAFETY, VEHICLE BREAKDOWN AND ACCIDENTS**

19.8.1 The Concessionaire shall ensure safe conditions for the Users, and in the event of unsafe conditions, lane closures, diversions, vehicle breakdowns and accidents, it shall follow the relevant Applicable Standards including the setting up of temporary traffic cones and lights, and removal of obstruction and debris without delay, in each case, in accordance with the Applicable Standards. Occurrence of such unsafe conditions, lane closures, diversions, vehicle breakdowns and/or accidents shall be included in the O&M Inspection Report.

19.9 **O&M DOCUMENTS**

19.9.1 The Concessionaire shall prepare the O&M Documents in accordance with the Applicable Standards and shall complete and deliver the same to the Agency, the Independent Engineer and the Independent Auditor (as applicable) from time to time within the O&M Time for Completion. Further, the Concessionaire hereby undertakes that the O&M Documents shall comply with the Applicable Standards.

19.9.2 The Agency, the Independent Engineer and the Independent Auditor (as applicable) shall have the right to review and inspect all O&M Documents. The Concessionaire shall provide all such O&M Documents that the Agency, the Independent Engineer and the Independent Auditor may reasonably require to inspect in respect of the Operation and Maintenance. It is made clear that nothing in the above shall diminish the Concessionaire’s responsibility to provide the Agency, the Independent Engineer and the Independent Auditor with sufficient information to enable the same to satisfy themselves regarding the Operation and Maintenance.

19.9.3 For each part of the Operation and Maintenance, if the Agency, the Independent Engineer and the Independent Auditor (as applicable) wish to modify any O&M Documents, the Agency, the Independent Engineer and the Independent Auditor (as
applicable) shall immediately submit their proposal for modification to the Concessionaire. Subject to Section 19.12.4, performance of such modification shall be subject to mutual agreement between the Parties.

19.9.4 Defects & Deficiencies, errors, omissions, ambiguities, inconsistencies, inadequacies and other defects in the O&M Documents or arising therefrom shall be rectified by the Concessionaire at its sole cost and risk.

19.9.5 The Agency, the Independent Engineer and the Independent Auditor (as applicable) may use the O&M Documents for such purposes as it may require for the purposes of the Project.

19.10 MODIFICATIONS TO THE PROJECT

19.10.1 The Concessionaire shall not carry out any material modifications to the Concession Assets, save and except where such modifications are necessary for: (a) the Operation and Maintenance of the Concession Assets in conformity with the Applicable Standards; and (b) compliance by the Concession Assets with the Applicable Standards; provided, however, the Concessionaire shall Notify the Independent Engineer and the Agency of the proposed modifications along with particulars thereof at least thirty (30) business days before commencing work on such modifications and shall only implement such modifications upon receipt of the Independent Engineer's and/or Agency's approval of the same, which approval shall be provided or declined by the Independent Engineer and/or the Agency within fifteen (15) days of its receiving the Concessionaire's proposal. For the avoidance of doubt, all modifications made hereunder shall comply with the Applicable Standards.

19.11 BARRIERS AND DIVERSIONS

19.11.1 The Agency shall procure that during the Operations Period, no barriers are erected or placed by any Government Agency and/or the Agency on the Concession Assets, except for reasons of Emergency, national security, law and order; provided, that all such barriers shall be in accordance with the Applicable Standards (including the Safety Requirements).

19.12 O&M MONTHLY STATUS REPORT

19.12.1 During the Operations Period Operations Period, the Concessionaire shall, no later than seven (7) days after the end of each calendar month of the Operations Period, furnish to the Agency and the Independent Engineer a monthly report (the O&M Monthly Status Report) stating in reasonable detail the condition of the Concession Assets including its compliance or otherwise with the Applicable Standards and shall promptly give such other relevant information as may be required by the Independent Engineer, the Independent Auditor and/or the Agency. In particular, the O&M Monthly Status Report shall separately identify and state in reasonable detail the Defects & Deficiencies in the Concession Assets and/or the Operation and Maintenance that require rectification and any delays in the performance of its obligations by the Concessionaire set out in the O&M Programme. The O&M Monthly Status Report shall also expressly highlight all Defects & Deficiencies in the Operation and Maintenance and/or the Concession Assets identified by the Independent Engineer in its O&M
Inspection Report and shall set out all actions taken, and arrangements made by the Concessionaire for remediying the same.

19.12.2 Each O&M Monthly Status Report shall be updated by the Concessionaire based on any observations and comments made by the Independent Engineer and shall be provided again to each of the Agency and the Independent Engineer until such time that it is approved by the Independent Engineer; provided, that the Independent Engineer shall not accord its approval of the O&M Monthly Status Report until it is satisfied that all reasonable comments and observations of the Agency on the O&M Monthly Status Report are addressed.

19.12.3 The O&M Monthly Status Report shall be in the form and substance approved by the Independent Engineer from time to time.

19.13 O&M INSPECTION REPORT

19.13.1 During the Operations Period, the Concessionaire shall enable the Independent Engineer to inspect the Operation and Maintenance and the Concession Assets at least once a month and the Concessionaire shall make all arrangements for the same. In addition, the Independent Engineer shall be entitled to undertake spot checks from time to time to inspect the Operation and Maintenance and the Concession Assets, without prior notice to the Concessionaire.

19.13.2 The Independent Engineer shall make a report of such inspection (the O&M Inspection Report) stating in reasonable detail the Defects & Deficiencies, if any, in the Operation and Maintenance and/or the Concession Assets with particular reference to the Applicable Standards.

19.13.3 The Independent Engineer shall, within seven (7) days of commencement of a month, provide a copy of the O&M Inspection Report to the Concessionaire and the Agency.

19.13.4 The Concessionaire hereby undertakes that, within fifteen (15) days from receipt of the O&M Inspection Report, it shall rectify and remedy the Defects & Deficiencies, if any, stated in the O&M Inspection Report, on its own cost and expense.

19.13.5 The inspection or submission of the O&M Inspection Report by the Independent Engineer shall not relieve or absolve the Concessionaire of its obligations and liabilities hereunder in any manner whatsoever.

19.14 O&M TESTS

19.14.1 The Concessionaire shall conduct or procure to be conducted such tests, as specified in SCHEDULE G (List of Tests & Completion Tests) and the AASHTO Standards (to the extent adopted by the National Highway Authority in the “NHA General Specifications of 1998”) in order to determine whether the Operation and Maintenance and/or the Concession Assets conform to the Applicable Standards (the O&M Tests). The O&M Tests shall be conducted at such time and frequency and in such manner as may be specified by the Independent Engineer and the Agency. In the event the timing and frequency of any O&M Tests is specified by the Agency and it is determined that the Operation and Maintenance is not in accordance with the O&M Requirements (as
determined by the Independent Engineer), the cost of such O&M Tests shall be borne by the Concessionaire; provided, however, in the event it is determined that the Operation and Maintenance are in accordance with the O&M Requirements (as determined by the Independent Engineer), the cost of such O&M Tests shall be borne by the Agency.

19.14.2 Subject to Section 19.14.1, the Concessionaire hereby undertakes to conduct the O&M Tests under the supervision of the Independent Engineer (in consultation with the Agency) and in accordance with the Applicable Standards at its own cost and expense.

19.14.3 The Concessionaire hereby undertakes to carry out, at its sole cost, the necessary remedial measures required to rectify the Defects & Deficiencies in the Operation and Maintenance and/or the Concession Assets that are identified in the O&M Tests and to ensure that as a consequence of such remedial measures the Operation and Maintenance and the Concession Assets conform to the Applicable Standards. The Concessionaire further undertakes that the remedial measures required to be undertaken by the Concessionaire pursuant to this Section 19.14.3 shall be repeated by the Concessionaire at its sole cost till such time as the Operation and Maintenance and the Concession Assets conform to the Applicable Standards to the satisfaction of the Independent Engineer. In the afore stated circumstances, the Independent Engineer may require the Concessionaire to conduct additional tests to determine whether the Defects & Deficiencies are rectified and in such case the costs of such additional tests shall be borne by the Concessionaire.

19.14.4 The Concessionaire shall maintain proper record of the O&M Tests and the remedial measures taken to cure the Defects & Deficiencies, if any, indicated by the O&M Test results.

19.14.5 Results of all O&M Tests shall be jointly recorded by the Independent Engineer and the Concessionaire.

19.15 REMEDIAL MEASURES

19.15.1 The Concessionaire shall repair or rectify the Defects & Deficiencies, if any, set forth in the O&M Inspection Report or in the O&M Tests results referred to in Section 19.15 (O&M Tests) and furnish a report in respect thereof to the Independent Engineer and the Agency within seven (7) days of receiving the O&M Inspection Report or the O&M Tests results, as the case may be; provided, that where the remedying of such Defects & Deficiencies is likely to take more than seven (7) days, the Concessionaire shall submit progress reports of the repair works once every week until such works are completed in conformity with this Agreement.

19.15.2 The Independent Engineer shall require the Concessionaire to carry out or cause to be carried out the O&M Tests, at its own cost, to determine that such remedial measures have brought the relevant Concession Assets into compliance with the Applicable Standards and the procedure set forth in this Section 19.15 (Remedial Measures) shall be repeated until the Concession Assets conform to the Applicable Standards.

19.15.3 The provisions of this Section 19.15 (Remedial Measures) shall not in any manner limit the obligations of the Concessionaire relating to remedying of Defects & Deficiencies set out elsewhere in this Agreement.
20. **INSURANCES**

20.1 **CONSTRUCTION PERIOD INSURANCES**

20.1.1 The Concessionaire shall, at its sole cost and expense, procure and maintain during the Construction Period all such Insurances, as described in PART I (Construction Period Insurances) - SCHEDULE I (Insurances), that are necessary and required to be procured by the Concessionaire in accordance with the Financing Documents and the Applicable Laws.

20.2 **OPERATIONS PERIOD INSURANCES**

20.2.1 The Concessionaire shall, at its sole cost and expense, procure and maintain during the Operations Period all such Insurances, as described in PART II (Operations Period Insurances) - SCHEDULE I (Insurances), that are necessary and required to be procured by the Concessionaire in accordance with the Financing Documents and Applicable Laws.

20.3 **INSURANCE COMPANIES**

20.3.1 The Concessionaire agrees that it shall procure the Insurances from such insurance companies that are acceptable to the Agency and further agrees that the Concessionaire shall only procure Insurances through foreign insurance companies if the relevant Insurances are not being offered by local companies at comparable rates, subject always to the prior consent of the Agency.

20.3.2 Further, the Insurances to be maintained in terms of this Agreement and in accordance with the terms set out herein shall be maintained throughout until the Trigger Date notwithstanding the expiry of the Financing Documents.

20.4 **EVIDENCE OF INSURANCES**

20.4.1 The Concessionaire shall, from time to time, provide to the Agency copies (duly attested as certified to be a true and correct copy by the relevant insurance company) of all insurance policies (or appropriate endorsements, certifications or other satisfactory evidence of insurance) obtained by the Concessionaire in accordance with this Agreement.

20.4.2 Failure by the Concessionaire to obtain the Insurance coverage or certificates of Insurance required by this Article 20 (Insurances) shall not in any way relieve or limit the Concessionaire’s obligations and liabilities under any provision of this Agreement.

20.4.3 In case the Concessionaire fails to procure or maintain any Insurance required pursuant to this Article 20 (Insurances), then the Agency shall have the right to procure such Insurance in accordance with the requirements of SCHEDULE I (Insurances) and shall be entitled to offset the premiums paid for such Insurance against any amounts owed to the Concessionaire pursuant to the terms of this Agreement and the Agency Agreements. The Concessionaire shall be named as the loss payee on any such Insurance procured by the Agency pursuant to this Section 20.4.3.
20.4.4 The Concessionaire shall provide the Agency with copies of any underwriters’ reports or other reports received by the Concessionaire from any insurance company; provided, that the Agency shall not disclose such reports to any other person except as necessary in connection with administration and enforcement of this Agreement or any other Agency Agreement or as may be required by any Government Authority and shall use and internally distribute such reports only as necessary in connection with the administration and enforcement of this Agreement.

20.5 APPLICATION OF INSURANCE PROCEEDS

20.5.1 Subject to the terms of the Financing Documents (which shall be in accordance with the approved Financing Term Sheet), all moneys received under the Insurance shall be promptly applied by the Concessionaire towards repair, renovation, restoration and/or substitution of the Concession Assets or any part thereof which may have been damaged or destroyed; provided, that all costs relating to such repair, renovation, restoration and/or substitution shall be duly certified by the Independent Engineer and the Independent Auditor.

20.5.2 The Concessionaire may, with the prior approval of the Agency, designate the Financiers as the loss payees under the Insurance and/or assign the Insurance in their favor as security for the Financing availed by the Concessionaire from the Financiers pursuant to the Financing Documents (as contemplated in the Financing Term Sheet).

20.5.3 The Concessionaire shall carry out the repair, renovation, restoration and/or substitution to the extent possible in such manner that the Concession Assets or any part thereof, shall, after such repair, renovation, restoration and/or substitution be as far as possible in the same condition as they were before such damage or destruction, normal wear and tear excepted.

20.6 VALIDITY OF INSURANCES

20.6.1 The Concessionaire hereby undertakes to promptly pay the insurance premium in respect of the Insurances and to keep the policies in force and valid during the entire Concession Period. The Concessionaire shall provide to the Agency, copies of the renewed policies and other documentary evidence of the payment of the insurance premium in respect of the Insurances.

20.6.2 The Concessionaire shall ensure, subject to market availability, that each instrument, contract and/or policy issued in respect of the Insurances shall provide that the Insurance may not be cancelled and/or terminated without at least ten (10) days prior written notice to the Agency of such cancellation and/or termination.

20.6.3 Notwithstanding anything contained herein, in the event the Concessionaire fails to comply with its obligations to procure the Insurances in accordance with Section 20.1 (Construction Period Insurances) and/or Section 20.2 (Operations Period Insurances), then the Agency may, without prejudice to its other rights and remedies for breach, at its option, obtain and maintain such Insurance and all sums incurred by the Agency therefor shall be reimbursed by the Concessionaire to the Agency within seven (7) days from the receipt of a claim by the Concessionaire in respect thereof from the Agency.

20.6.4 The Concessionaire shall notify the Agency in advance, prior to any material variation of the Insurances.
20.7 MAINTENANCE OF “_OCCURRENCE” FORM POLICIES

20.7.1 A coverage required under this Article 20 (Insurances) and SCHEDULE I (Insurances) and any “umbrella” or excess coverage shall be “occurrence” form policies. In the event the Concessionaire has “claims-made” form coverage, the Concessionaire must obtain prior approval of all “claims-made” policies from the Agency.

20.8 POLICY ENDORSEMENTS

20.8.1 The Concessionaire shall cause the insurance companies to provide the following endorsement items in the commercial general liability and, if applicable, umbrella or excess liability policies relating to the construction, Operation and Maintenance of the Concession Assets provided pursuant to this Article 20 (Insurances) and SCHEDULE I (Insurances):

(a) the Agency, its officers, servants and agents shall be additionally insured under such policies with respect to claims arising out of or in connection with this Agreement;

(b) the insurance shall be primary with respect to the interest of the Agency, its officers, servants and agents and any other insurance maintained by them is excess and not contributory with such policies;

(c) the following separation of interests’ clause shall be made a part of the policy:

“In the event of claims being made by reason of (i) personal and/or bodily injuries suffered by any employee or employees of one insured hereunder for which another insured hereunder is or may be liable, or (ii) damage to property belonging to any insured hereunder for which another insured is or may be liable, then this policy shall cover such insured against whom a claim is made or may be made in the same manner as if separate policies have been issued to each insured hereunder, except with respect to the limits of insurance.”;

(d) the insurer shall waive all rights of subrogation against the Agency, its officers, servants and agents; and

(e) notwithstanding any provision of the policy, the policy may not be canceled or not renewed without the insurer endeavoring to give thirty (30) days written notice to the Agency except in the case of non-payment, in which case it shall be ten (10) days with prior written notice to the Agency. All other terms and conditions of the policy shall remain unchanged.
21. **FORCE MAJEURE**

21.1 **FORCE MAJEURE EVENT**

21.1.1 A **Force Majeure Event** means any event or circumstance or combination of events or circumstances (including the effects thereof) that is beyond the reasonable control of a Party and that on or after the Commencement Date materially and adversely affects the performance by such affected Party (the **Affected Party**) of its obligations under or pursuant to this Agreement; provided, however, that, such material and adverse effect could not have been prevented, overcome or remedied in whole or in part by the Affected Party through the exercise of diligence and reasonable care, it being understood and agreed that reasonable care includes acts and activities to protect the Concession Assets from a casualty or other event that are reasonable in light of the probability of the occurrence of such event, the probable effect of such event if it should occur, and the likely efficacy of the protection measures. Without limiting the generality of the foregoing, “**Force Majeure Events**” hereunder shall include each of the following events and circumstances (including the effects thereof), but only to the extent that each satisfies the requirements above:

(a) the following political events that occur inside or directly involve Pakistan (each a **Political Event**):

(i) any act of war (whether declared or undeclared), invasion, armed conflict or act of foreign enemy, blockade, embargo, revolution, riot, insurrection, civil commotion, or act or campaign of terrorism or political sabotage; or

(ii) any Lapse of Consent of which report to the Agency, the Independent Engineer and the Independent Auditor shall have been given under Section 7.6.2 and that shall have existed for thirty (30) consecutive days or more; or

(iii) any strike, work-to-rule, go-slow, or analogous labour action that is politically motivated or is widespread or nationwide and that (or its effects) shall have existed for thirty (30) consecutive days or more;

(b) the following events beyond the reasonable control of the Affected Party (each a **Non-Political Event**), including, (without limitation)

(i) lightning, fire, earthquake, tsunami, flood, storm, cyclone, typhoon, or tornado, which has, in each case, affected the work or operations for more than fifteen (15) consecutive days; or

(ii) any Lapse of Consent of which report to Agency, the Independent Engineer and the Independent Auditor shall have been given under Section 7.6.2 and that shall have existed for less than thirty (30) consecutive days; or

(iii) any strike, work-to-rule, go-slow, or analogous labour action that is not politically motivated or is not widespread or nationwide and that shall have existed for thirty (30) consecutive days or more; or
(iv) explosion, chemical contamination, radioactive contamination or ionizing radiation; or

(v) epidemic or plague.

(c) Force Majeure Events shall expressly not include the following conditions, events or circumstances:

(i) late delivery or interruption in the delivery of machinery, equipment materials, spare parts or consumables;

(ii) a delay in the performance of any Contractor;

(iii) a breakdown in machinery and/or equipment;

(i) normal wear and tear or random flaws in materials and equipment; and

(ii) a delay caused by rains and monsoons;

provided, that each of the events described in clauses (c)(i), (ii), (iii) or (iv) shall constitute a Force Majeure Event to the extent that such events or circumstances are caused by an event or circumstance that is in itself a Force Majeure Event whether experienced directly by the Concessionaire or by one of its Contractors.

21.2 **OBLIGATION TO NOTIFY**

21.2.1 Notwithstanding anything contained herein, the Affected Party shall, as soon as practicable, and in any case within seven (7) days of the date of occurrence of a Force Majeure Event or from the date of having knowledge thereof, Notify the Independent Engineer, the Independent Auditor and the other Party, of the occurrence of the Force Majeure Event by the issuance of a notice in writing (the *Force Majeure Notice*).

21.2.2 The Affected Party shall provide all relevant details in respect of the Force Majeure Event in the Force Majeure Notice, including but not restricted to the following:

(a) the nature and extent of the Force Majeure Event;

(b) the estimated Force Majeure Period;

(c) the nature of and the extent to which, performance of any of the Affected Party’s obligations under this Agreement are affected by the Force Majeure Event;

(d) the measures which the Affected Party has taken or proposes to undertake to alleviate/mitigate the impact of the Force Majeure Event and to resume performance of such of its obligations that are affected by the Force Majeure Event; and

(e) any other relevant information concerning the Force Majeure Event, and /or the rights and obligations of the Parties under this Agreement.
21.2.3 The Parties shall, as soon as practicable upon the receipt of the Force Majeure Notice and in any case within five (5) days from the date of receipt of the same, convene a meeting, along with the Independent Engineer for the purpose of conducting discussions, in good faith, and where necessary the Parties shall agree to conduct inspections and/or surveys of the Project in order to:

(a) assess the impact of the underlying Force Majeure Event;
(b) to determine the likely duration of the Force Majeure Period; and
(c) to formulate damage mitigation measures and the steps to be undertaken by the Parties for resumption of the obligations, the performance of which had been affected by the Force Majeure Event.

21.2.4 The Affected Party shall during the Force Majeure Period provide to the other Party with regular (not less than weekly) reports in respect of the matters set out Section 21.2.3 and such other information, details and/or documents that the other Party may reasonably require.

21.3 CONSEQUENTIAL OF FORCE MAJEURE EVENT

21.3.1 Upon occurrence of a Force Majeure Event, the following shall apply:

(a) there shall be no Termination of this Agreement except in accordance with the provisions of Section 21.5 (Termination Notice for Force Majeure Event), Section 21.6 (Termination Payment for Force Majeure Event) and Article 23 (Termination);

(b) in the event of occurrence of a Force Majeure Event:

(i) subject to Section 21.8, the Concessionaire shall have the right to apply for a Relief Order Request with respect to the extension of the Project Milestone Dates for the Project Milestones (affected by the Force Majeure Event), to be performed (together with the timelines for performance by the Concessionaire of its relevant obligations to be performed) shall be extended by the Force Majeure Period (as determined by the Independent Engineer and the Independent Auditor in accordance with the provisions of Article 15 (Relief Extensions & Relief Compensations);

(ii) all costs, fees, expenses and charges arising from and relating to the Force Majeure Event shall be allocated in accordance with Section 21.4 (Allocation of Costs Arising out of Force Majeure).

provided, however, that no relief, including extension of Time For Completion, shall be granted to the Affected Party to the extent that such failure or delay would nevertheless have been experienced by the Affected Party had the Force Majeure Event not occurred.

21.4 ALLOCATION OF COSTS ARISING OUT OF FORCE MAJEURE

21.4.1 Upon occurrence of a Force Majeure Event, the allocation of costs, expenses and/or Losses attributable to such Force Majeure Event shall be as follows:
(a) upon occurrence of a Non-Political Event, all costs, expenses and/or Losses attributable to such Non-Political Event shall be on the account of the Concessionaire and the Agency shall not be liable or responsible for the same in any manner;

(b) upon occurrence of a Political Event, the Agency shall fund and bear the Force Majeure Costs (as set out in a Relief Order) and in such case, the provisions of Article 15 (Relief Extensions & Relief Compensations) shall apply.

21.4.2 Further, in the event during the Operations Period:

(a) the Actual Availability is less than the Assured Availability as a result of a Non-Political Event, the same shall be an Annuity Amount Payment Damages Event and result in, inter alia, reduction in the Annuity Amount Payments in accordance with Section 17.2.

(b) the Actual Availability is less than the Assured Availability as a result of a Political Event, the same shall neither be an Annuity Amount Payment Damages Event nor result in, inter alia, any reduction in the Annuity Amount Payments during the Force Majeure Period.

21.4.3 Save and except as expressly provided in this Section 21.4 (Allocation of Costs Arising out of Force Majeure) and, if applicable, Section 21.5 (Termination Notice For Force Majeure Event) and Section 21.6 (Termination Payment For Force Majeure Event), neither Party shall be liable in any manner whatsoever to the other Party in respect of any loss, damage, cost, expense, claims, demands and proceedings relating to or arising out of occurrence or existence of any Force Majeure Event or exercise of any right pursuant hereto.

21.5 **Termination Notice for Force Majeure Event**

21.5.1 If:

(a) a Force Majeure Event subsists for a continuous period of one hundred and twenty (120) days, either Party may in its discretion Terminate this Agreement by issuing a Termination Notice to the other Party; or

(b) in case of a Political Event, the Agency determines that the Relief Compensation relating the same are unacceptable then the Agency may in its discretion Terminate this Agreement by issuing a Termination Notice to the Concessionaire,

in each case above, without being liable in any manner whatsoever, save as provided in this Section 21.5 (Termination Notice for Force Majeure) and Section 21.6 (Termination Payments for Force Majeure Event), and upon issuance of such Termination Notice, this Agreement shall, notwithstanding anything to the contrary contained herein, stand Terminated forthwith; provided, that before issuing such Termination Notice, the Party intending to issue the Termination Notice shall inform the other Party of such intention.
and grant fifteen (15) days’ time to make a representation, and may after the expiry of such fifteen (15) days period, whether or not it is in receipt of such representation, in its sole discretion issue the Termination Notice.

21.6 **TERMINATION PAYMENTS FOR FORCE MAJEURE EVENT**

21.6.1 If Termination is on account of a Non-Political Event, the Agency shall make a Termination Payments to the Concessionaire on or prior to the Termination Payment Date in an amount equal to the Non-Political Event Termination Amount.

21.6.2 If Termination is on account of a Political Event, the Agency shall make a Termination Payments to the Concessionaire on or prior to the Termination Payment Date in an amount equal to the Political Event Termination Amount.

21.7 **FORCE MAJEURE DISPUTE RESOLUTION**

21.7.1 In the event the Parties are unable to agree in good faith about the occurrence or existence of a Force Majeure Event, such Dispute shall be finally settled in accordance with the Dispute Resolution Procedure; provided, that the burden of proof as to the occurrence or existence of such Force Majeure Event shall be upon the Party claiming relief and/or excuse on account of such Force Majeure Event.

21.8 **EXCUSE FROM PERFORMANCE OF OBLIGATIONS**

21.8.1 If the Affected Party is rendered wholly or partially unable to perform its obligations under this Agreement because of a Force Majeure Event, it shall be excused from performance of such of its obligations (except payment obligations) to the extent it is unable to perform on account of such Force Majeure Event; provided, that:

(a) the suspension of performance shall be of no greater scope and of no longer duration than is reasonably required by the Force Majeure Event and/or the effects of the same;

(b) the Affected Party shall make all reasonable efforts to mitigate or limit damage to the other Party arising out of or as a result of the existence or occurrence of such Force Majeure Event and to cure the same with due diligence; and

(c) when the Affected Party is able to resume performance of its obligations under this Agreement, it shall give to the other Party (with a copy to the Independent Engineer and the Independent Auditor) notice to that effect and shall promptly resume performance of its obligations hereunder.
22. **EVENTS OF DEFAULT**

22.1 **CONCESSIONAIRE EVENT OF DEFAULT**

22.1.1 Any of the following events shall constitute an event of default by the Concessionaire (the **Concessionaire Event of Default**) unless such event has occurred as a consequence of Permitted Events and/or as a consequence of events or circumstances for which the Concessionaire is relieved of its obligations under this Agreement:

(a) any Material Breach by the Concessionaire or the Sponsor of any Agency Agreement for which Material Breach has not been cured within sixty (60) days from the date of written notice thereof by the Agency, or within such time period as provided in the relevant Agency Agreement, respectively;

(b) the Concessionaire fails to commence the Site Construction Works within thirty (30) days from the Commencement Date;

(c) the Concessionaire fails to achieve Substantial Completion by the date falling sixty (60) days following the Scheduled Substantial Completion Date;

(d) any statement, representation or warranty made by the Concessionaire in this Agreement proving to have been incorrect, in any material respect, when made or when reaffirmed and such incorrect statement, representation or warranty having a Material Adverse Effect on the Concessionaire’s ability to perform its obligations under this Agreement and/or on the Project or having a Material Adverse Effect on the rights and/or obligations of the Agency hereunder or under the Agency Agreements;

(e) the Concessionaire creates any Encumbrance on the Concession Assets in favor of any Person save and except as otherwise expressly permitted in terms of this Agreement;

(f) the transfer of the rights and/or obligations of the Concessionaire under this Agreement, save and except as permitted in terms of this Agreement; and/or

(g) except for the purpose of amalgamation or reconstruction (provided, that such amalgamation or reconstruction does not affect the ability of the amalgamated or reconstructed entity, as the case may be, to perform its obligations under this Agreement and further; provided, that such amalgamation has been agreed to by the Agency), the occurrence of any of the following events:

(i) the passing of a resolution for the dissolution or winding up of the Concessionaire;

(ii) the voluntary filing by the Concessionaire of a petition of bankruptcy, moratorium, winding up, or other similar relief;

(iii) the appointment of a provisional liquidator in a proceeding for the winding up of the Concessionaire after notice to the Concessionaire and due hearing, which appointment has not been set aside or stayed within
ninety (90) days of such appointment;

(iv) the making by a court with jurisdiction over the Concessionaire of an order winding up the Concessionaire that is not stayed or reversed by a court of competent authority within ninety (90) days; and/or

(v) any proceeding being validly instituted under the Applicable Laws for the dissolution of the Concessionaire or attachment of the Concession Assets in accordance with the Applicable Laws that has a Material Adverse Effect and that is not stayed or suspended in ninety (90) days; provided, that, if, within seven (7) business days of the Concessionaire becoming aware of such proceedings being filed, the Concessionaire:

(A) confirms to the Agency that such proceedings relate to the recovery of a claim against the Concessionaire that is disputed bona fide by the Concessionaire as payable, and

(B) furnishes a certificate by the Independent Auditor to the effect that the Concessionaire is and shall remain solvent despite the payment of the claim subject to the said insolvency proceedings,

then, in such case, the Concessionaire Event of Default set forth in Section 22.1.1(g)(v) shall not constitute a Concessionaire Event of Default until such time that the said certificate by the Independent Auditor is revoked or otherwise ceases to remain accurate;

(h) an Abandonment by the Concessionaire, without the prior written consent of the Agency, for a period of thirty (30) consecutive days or for an aggregate period of sixty (60) days during any Accounting Year; provided, however, that the Concessionaire shall not be deemed to have Abandoned the Concession Assets so long as it is using all reasonable efforts (as determined by the Independent Engineer) to regain control of the Concession Assets and reinstate its construction and/or Operation and Maintenance, as applicable;

(i) the Concessionaire is in Material Breach of O&M Requirements;

(j) any other events or circumstances expressly set out in this Agreement as a Concessionaire Event of Default;

(k) the Construction Performance Security or the O&M Performance Security in each case, is not issued, renewed, replaced or provided (as the case may be) in accordance with this Agreement or becomes inoperative or ceases to remain valid or in force in breach of the relevant provisions of this Agreement;

(l) a breach by the Concessionaire of its obligation to take out and maintain the required insurances in accordance with Article 20 (Insurances);

(m) a Change in Complete Control, Change in Control and/or Change in Shareholding has occurred in breach of this Agreement;
the Concessionaire or the Sponsor repudiate/terminate any of the Agency Agreements or otherwise evidence an intention not to be bound by the same;

(o) termination of the Project Site Licence Agreement as a result of a material breach by the Concessionaire that is not remedied in accordance with the terms of the Project Site Licence Agreement;

(p) the Concessionaire has delayed any payment that has fallen due and payable under this Agreement and/or any of the Agency Agreements and if such delay exceeds sixty (60) days, save where such payment is duly Disputed by the Concessionaire in accordance with this Agreement;

(q) the enforcement of any security or exercise by the Financiers of their remedies under the Financing Agreements and/or the failure by the Financiers (or the agent of the same) to comply with the Concession Direct Agreement;

(r) a material breach by the EPC Contractor(s), the O&M Contractors or any other subcontractor or any of the parties to the Agency Agreements or any of their respective contracts with the Concessionaire having a Material Adverse Effect;

(s) the Concessionaire fails to achieve the Construction Completion in accordance with the Applicable Standards and/or the timelines set-out in the Applicable Standards (in each case, as certified by the Independent Engineer), which failure continues for a period of thirty (30) days; and

(t) the right of the Agency to terminate this Agreement in accordance with Section 3.5.1.

22.2 **AGENCY EVENT OF DEFAULT**

22.2.1 The following events shall constitute events of default by the Agency (the *Agency Event of Default*), unless the same has occurred and/or results from a Concessionaire Event of Default or a Force Majeure Event:

(a) any Material Breach by the Agency of any Agency Agreement and the same has not been cured within forty-five (45) days from the date of written notice thereof by the Concessionaire, or within such time period as provided in the relevant Agency Agreement, respectively;

(b) any statement, representation or warranty made by the Agency in any Agency Agreement proving to have been incorrect, in any material respect, when made or when reaffirmed and such incorrect statement, representation or warranty having a Material Adverse Effect on the Concessionaire’s ability to perform its obligations under this Agreement and/or on the Project;

(c) any termination, cancellation, resumption or revocation of the Concessionaire’s interest established under the Project Site Licence Agreement in respect of the Project Site (otherwise than for a breach of the conditions of the Project Site Licence Agreement by the Concessionaire entitling such termination, cancellation, resumption or revocation);
(d) any change in any Applicable Laws:

(i) making unenforceable, invalid, or void any material undertaking of the Agency under the Agency Agreements; and/or

(ii) making:

(A) it unlawful for the Concessionaire, the Financiers or the Sponsors to make or receive any payment, to perform any material obligation or to enjoy or enforce any material right under any Agency Agreement (other than a Change in Law for which compensation is provided in accordance with this Agreement); or

(B) any payment, the performance of any material obligation or the enjoyment or enforcement of any material right unenforceable under any Agency Agreement, invalid or void as a result of any such change in Applicable Laws (other than a Change in Law for which compensation is provided in accordance with this Agreement);

(e) the expropriation, compulsory acquisition, or nationalization by the Agency or any Government Authority of: (i) any Class A Shares in the Concessionaire; or (ii) of any Concession Assets or rights of the Concessionaire;

(f) any change in, or any change in the interpretation of, any of the Applicable Laws (including the Constitution of Pakistan and any other Applicable Laws that gives effect to the injunctions of Islam, being in the case of a decision of a court, a decision which is no longer in suspense as a result of an appeal) from and after the date of this Agreement having the effect of making:

(i) unlawful, unenforceable, invalid, or void any material undertaking of the Agency under any Agency Agreement; or

(ii) unlawful for the Concessionaire to make or receive or the Financiers or the Sponsors to receive any payment (including interest or return), for the Concessionaire to perform any material obligation or to enjoy or enforce any material right under this Agreement or any other Project Agreement in relation to the Project; or

(iii) any such payment, the performance of any such material obligation or the enjoyment or enforcement of any such material right becoming unenforceable, invalid or void as a result of any such change in the Applicable Laws,

which in the case of (i) (ii) or (iii) above, has a continuing effect for more than one hundred and eighty (180) days without an arrangement being provided to exempt the affected party from the effect of such Change in Law (other than a Change in Law for which compensation is provided in accordance with this Agreement);

(g) a Change in Law for which no relief is provided under Article 28 (Change in Law) provided however, the afore stated shall not constitute an Agency Event of
Default if as a result of Change in Law, the Concessionaire suffers an increase in costs or reduction in net after-tax return or other financial burden beyond that contemplated in the Financial Model, the aggregate financial effect of which is less than PKR 5,000,000/- (Pak Rupees Five Million only) in any Accounting Year (as determined by the Independent Auditor and the Independent Engineer);

(h) the Agency has delayed any payment that has fallen due and payable under this Agreement and/or any of the Agency Agreements and if such delay exceeds ninety (90) days, save where such payment is duly Disputed by the Agency in accordance with this Agreement and/or Agency Agreements; provided, however, this sub-section (h) is only applicable to such payments in respect of which there is no bona fide Dispute and/or conflict between the Parties;

(i) the right of the Concessionaire to terminate this Agreement in accordance with Section 3.5.2; and

(j) failure by the Agency to fund the Agency Annuity Amount Payment Account in an amount equal to the payable Annuity Amount Payment on its relevant Annuity Amount Payment Date, which failure remains un-rectified by the Agency after the date falling sixty (60) days following Agency’s receipt of a Notice issued by the Concessionaire to this effect.
23. **Termination**

23.1 **Termination for Concessionaire Event of Default**

23.1.1 Without prejudice to any other right or remedy which the Agency may have in respect thereof under this Agreement, upon the occurrence and continuation of a Concessionaire Event of Default, the Agency shall be entitled to Terminate this Agreement by issuing a Termination Notice to the Concessionaire; provided, that before issuing the Termination Notice, the Agency shall by a notice in writing inform the Concessionaire of its intention to issue the Termination Notice (the **Agency Preliminary Notice**).

23.1.2 In the event the underlying Concessionaire Event of Default is not cured within the Cure Period and the same is subsisting at the expiry of the Cure Period, the Agency shall be entitled to:

(a) Terminate this Agreement by issuing the Termination Notice upon expiry of the Cure Period; and

(b) encash the Construction Performance Security or the O&M Performance Security, as applicable and in effect as such time, on or following the issuance of the Termination Notice.

23.1.3 The following shall apply in respect of the Cure Period relating to a Concessionaire Event of Default:

(a) the Cure Period provided in this Agreement shall not relieve the Concessionaire from liability for damages (as expressly set out in this Agreement), if any, caused by its underlying breach or default giving rise to the Agency Preliminary Notice;

(b) the Cure Period shall not in any way be extended by any period of Suspension under this Agreement;

(c) if the cure of any breach by the Concessionaire requires any reasonable action by the Concessionaire that must be approved by the Agency and/or the Government Authority hereunder, the applicable Cure Period shall be extended from the date the Concessionaire notifies the Agency of the same until the date that the Agency, and/or the Government Authority, as the case may be, accords the required approval;

(d) during any period when any Financing Due is outstanding, the rights of the Parties and the Financiers during the pendency of the Cure Period shall be as set out in the Financing Documents.

23.1.4 Upon issuance of a Termination Notice by the Agency (following expiry of the Cure Period) on account of occurrence and continuation of a Concessionaire Event of Default during the Operations Period, the right of the Concessionaire to receive Annuity Amount Payments shall stand terminated, with immediate effect and no Annuity Amount Payments shall accrue and/or be payable to the Concessionaire from the date of
occurrence of the Concessionaire’s receipt of the Termination Notice; provided, however, the Agency shall effect payment of the undisputed, accrued and unpaid Annuity Amount Payments up to the date of the Concessionaire’s receipt of the Termination Notice.

23.1.5 In the event of Termination due to a Concessionaire Event of Default, the Agency shall pay to the Concessionaire on or prior to the Termination Payment Date, by way of Termination Payments, an amount equal to the Concessionaire Default Termination Amount.

23.2 **TERMINATION FOR AGENCY EVENT OF DEFAULT**

23.2.1 Without prejudice to any other right or remedy which the Concessionaire may have in respect thereof under this Agreement, upon the occurrence and continuation of any of the Agency Event of Default, the Concessionaire shall by a notice in writing inform the Agency of its intention to issue the Termination Notice (the Concessionaire Preliminary Notice).

23.2.2 In the event the underlying Agency Event of Default is not cured by the Agency within the Cure Period and the same is subsisting at the expiry of the Cure Period, the Concessionaire shall be entitled to terminate this Agreement by issuing the Termination Notice upon expiry of the Cure Period.

23.2.3 In the event of Termination due to the Agency Event of Default, the Agency shall pay to the Concessionaire on or prior to the Termination Payment Date, by way of Termination Payments, an amount equal to the Agency Default Termination Amount.

23.3 **TERMINATION FOR CORRUPT ACTS**

23.3.1 The Concessionaire warrants that in entering into this Agreement it has not committed any Corrupt Act.

23.3.2 If any Corrupt Act is committed, then the Agency shall be entitled to act in accordance with the following provisions of this Section 23.3; provided, that at all times the Agency shall bear the burden of proof for establishing that a Corrupt Act has been committed:

(a) if the Corrupt Act is committed by the Concessionaire or any Associate of the Concessionaire, as the case may be, then in any such case, the Agency may issue a notice to the Concessionaire of its intent to issue a Termination Notice;

(b) if the Corrupt Act is committed by an employee of the Concessionaire, then in such case, the Agency may give written notice to the Concessionaire of its intention to issue a Termination Notice; provided, however, the Agency shall not be entitled to issue a Termination Notice in the event the Concessionaire, within forty-five (45) days of its receipt the Agency’s notice stating its intention to issue a Termination Notice, terminates such employee’s involvement in the Project and (if necessary) provides evidence to the Agency of the performance of any part of the Project deliverables previously performed by such employee by another person;
(c) if the Corrupt Act is committed by any other person not specified in sub-section (b) above but involved in the Project as a subcontractor or supplier to any Contractor or to the Concessionaire, then the Agency may give notice to the Concessionaire of its intention to issue a Termination Notice; provided, however, that the Agency shall not be entitled to issue a Termination Notice in the event the Concessionaire, within thirty (30) days of its receipt of the Agency's notice stating its intention to issue a Termination Notice, procures the termination of such person's involvement in the Project and (if necessary) procures the performance of the relevant contract and procures the performance of the relevant part of the Project Works by another person.

23.3.3 Any notice of intention to issue a Termination Notice by the Agency under this Section 23.3 shall specify:

(a) the nature of the Corrupt Act;

(b) the identity of the party or parties who the Agency believes has committed the Corrupt Act; and

(c) the date on which the Termination Notice shall be issued, which date shall be subject to the timelines provided in Section 23.3.2(b) and (c), as applicable.

23.3.4 Without prejudice to its other rights or remedies under this Section, the Agency shall be entitled to recover from the Concessionaire, the greater of:

(a) the amount or value of the gift, consideration or commission which is the subject of the Corrupt Act; and

(b) any direct losses (including Losses) sustained by the Agency in consequence of any breach of this Section by the Concessionaire.

23.3.5 Nothing contained in this Section shall prevent the Concessionaire from paying any proper commission or bonus to its employees within the agreed terms of their employment.

23.3.6 In the event of Termination due to a Corrupt Act in accordance with this Section 23.3, the Agency shall pay to the Concessionaire on or prior to the Termination Payment Date, by way of Termination Payments, an amount equal to the Corrupt Act Termination Amount.

23.4 **Rights of the Agency on Termination and/or Final Expiry Date**

23.4.1 In case of Termination of this Agreement for any reason whatsoever and subject to receipt by the Concessionaire of the Termination Payments on or prior to the Transfer Date or in case of expiry of this Agreement on the Final Expiry Date, the Agency shall, on the Transfer Date, have the power and authority to:

(a) take possession and control of the Concession Assets; and

(b) prohibit the Concessionaire and any person claiming through or under the Concessionaire from entering upon the Concession Assets or dealing with any
part thereof except in the case where the Concessionaire and any person claiming through or under the Concessionaire enters the Concession Assets or deals with or any part thereof as a User.

23.5 **TERMINATION PAYMENTS**

23.5.1 The Termination Payment shall be payable to the Concessionaire by the Agency on or prior to the Termination Payment Date in accordance with a demand being made by the Concessionaire in writing, subject to the same being duly certified by the Independent Engineer and Independent Auditor. If the Termination Payment becomes subject to any tax (corporate tax, minimum tax or alternate corporate tax), the Agency shall pay to the Concessionaire such additional compensation (as determined by the Independent Auditor) such that the net amount received by the Concessionaire after deduction of any tax shall be equal to the total Termination Payment that would have been received had no such tax been paid or incurred.

23.5.2 The recipients of the Termination Payment shall be shareholders of the Class A Shares, provided however, for the purposes of calculating the Termination Payment, the term Sponsor Equity Funding Amount shall exclude all amounts comprising injections to the equity effected after Construction Completion Date; provided, that such amounts shall constitute Base Equity Funding Amount to the extent the same are part of the Pre-Estimated Project Cost and determined by the Independent Auditor to be part of the Total Project Cost.

23.5.3 To the extent:

(a) the Termination Equity and/or Termination Dividend Amount is payable by the Agency to the Concessionaire upon Termination of this Agreement; and

(b) the Agency fails to make payment of such due and payable Termination Equity and/or Termination Dividend Amount (the **Unpaid Termination Equity Amount**) by the date falling fifty (50) days following the Termination Payment Date,

then, the Agency shall (in addition to the payment of the due and payable Unpaid Termination Equity Amount) make payment to the Concessionaire of late payment interest on the Unpaid Termination Equity Amount at the rate of Delayed Payment Rate, such interest commencing to accrue on the date falling fifty (50) days following the Termination Payment Date and ending on the actual date on which the Agency makes payment of the Unpaid Termination Equity Amount. The stipulation regarding additional amounts payable in respect of delayed Unpaid Termination Equity Amount contained in this Section 23.5.3 shall not be construed nor be deemed to authorize any delay in payment of any amount due to the Concessionaire nor be construed or deemed to be a waiver of the underlying breach of payment obligations, in each case, in the afore-stated circumstances.

23.6 **MODE OF PAYMENT**

23.6.1 Notwithstanding any instructions to the contrary issued or any dispute raised by the Concessionaire, the Termination Payments, and all other payments that are or may be payable by the Agency under any of the provisions of this Agreement shall, so long as the Financing Due is outstanding, be made only by way of credit directly to a bank
account designated therefor by the Financiers and advised to the Agency and the Concessionaire in writing and in the event the Financing Due is not outstanding, to a bank account notified by the Concessionaire.

23.6.2 Notwithstanding anything to the contrary contained in this Agreement, any Termination pursuant to the provisions of this Agreement shall be without prejudice to accrued rights of either Party including its right to claim and recover money damages and other rights and remedies which it may have in law or contract. All rights and obligations of either Party under this Agreement, including (without limitation) Termination Payments, shall survive the Termination of this Agreement to the extent such survival is necessary for giving effect to such rights and obligations.
24. **DIVESTMENT OF RIGHTS AND INTEREST**

24.1 **REQUIREMENTS FOR DIVESTMENT**

24.1.1 In case of (as applicable):

(a) Termination of this Agreement prior to Final Expiry Date and subject to the Agency fully complying with all its obligations in respect of making Termination Payments on or prior to the Termination Payment Date; or

(b) one (1) year prior to expiry of this Agreement on the Final Expiry Date,

the Concessionaire shall comply with and conform complete compliance with the following requirements by the Transfer Date (the Divestment Requirements):

(i) Notify to the Agency forthwith the location and particulars of all Concession Assets;

(ii) deliver forthwith the actual or constructive possession of the Concession Assets, free and clear of all Encumbrances;

(iii) unless this Agreement is Terminated due to a Permitted Event (excluding Non-Political Event), cure all Concession Assets of all Defects & Deficiencies in accordance with the Handover List; provided, that in the event of Termination during the Construction Period, all Concession Assets shall be handed over on 'as is where is' basis after bringing them to a safe condition;

(iv) deliver and transfer all relevant records, reports, intellectual property and other Licence pertaining to the Concession Assets and its design, engineering, construction, Operation and Maintenance, including all programs and manuals pertaining thereto, and complete 'as built' Construction Drawings, other Construction Drawings and the O&M Documents as on the Transfer Date;

(v) transfer and/or deliver to the Agency, all Concessionaire Permits to the extent permissible under the Applicable Laws;

(vi) execute such deeds of conveyance, documents and other writings as the Agency may reasonably require for conveying, divesting and assigning all the rights, title and interest of the Concessionaire in the Concession Assets, including manufacturers’ warranties in respect of any plant or equipment and the right to receive outstanding insurance claims, absolutely unto the Agency or its nominee;

(vii) train all staff notified by the Agency for Operations and Maintenance in accordance with the O&M Manual; and

(viii) comply with all other requirements as may be prescribed or required under Applicable Laws for completing the divestment and assignment of
all rights, title and interest of the Concessionaire in the Concession Assets, free from all Encumbrances, absolutely unto the Agency or to its nominee.

24.1.2 The Agency may, in its sole discretion, waive any of the Divestment Requirements set forth in Section 24.1.1.

24.2 Inspection and Cure

24.2.1 In case of:

(a) Termination during the Operations Period, not earlier than thirty (30) days prior to Termination but not later than fifteen (15) days prior to the Transfer Date; or

(b) expiry of this Agreement on the Final Expiry Date, not earlier than twelve (12) months prior to Transfer Date but not later than six (6) months prior to the Transfer Date,

the Independent Engineer shall verify, after giving due notice to the Concessionaire of the time, date and venue of such verification, compliance by the Concessionaire with the Applicable Standards, and if required, cause appropriate tests to be carried out. In the event of Termination (excluding Termination due to Political Event or the Agency Event of Default) or expiry of this Agreement on the Final Expiry Date, the Concessionaire shall bear the cost for this purpose. In the event of Termination due to Agency Event of Default or Political Event, the Agency shall bear the cost for this purpose. All Defects & Deficiencies shall be cured by the Concessionaire at its cost unless the same is due to a Political Event or the Agency Event of Default in which case, the Agency shall bear such costs.

24.2.2 Until the Transfer Date, all risks shall vest with the Concessionaire for loss of or damage to the whole or any part of the Concession Assets and following the Transfer Date, all risks in relation to the same shall be deemed to have been transferred to and vest with the Agency.

24.3 Cooperation and Assistance for Transfer of the Concession Assets

24.3.1 The Parties shall cooperate on a best effort basis and take all necessary measures, in good faith, to achieve a smooth transfer of the Concession Assets in accordance with the provisions of this Agreement so as to protect the safety of and avoid undue delay or inconvenience to the Users, other members of the public or the lawful occupiers of any part of the Project Site and the Concession Assets.

24.3.2 The Parties shall provide to each other (as applicable):

(a) in case of Termination of this Agreement, two (2) months prior to the Termination Payment Date in the event of Termination and immediately in the event of either Party conveying to the other Party its intent to issue a Termination Notice, as the case may be; or

(b) in case of expiry of this Agreement on the Final Expiry Date, six (6) months prior to the Final Expiry Date,
as much information and advice as is reasonably practicable regarding the proposed arrangements for operation of the Project following the Transfer Date. The Concessionaire shall further provide such reasonable advice and assistance as the Agency, its appointed concessionaire or agent may reasonably require for operation of the Project until the Transfer Date.

24.4 VESTING CERTIFICATE

24.4.1 Subject to:

(a) in case of Termination of this Agreement, the Agency fully complying with all its obligations in respect of making Termination Payments on or prior to the Termination Payment Date; or

(b) expiry of this Agreement on the Final Expiry Date,

the divestment of all rights, title and interest in the Project shall be deemed to be complete on the Transfer Date, and the Independent Auditor and the Independent Engineer shall jointly, without unreasonable delay, thereupon issue a certificate (the Vesting Certificate) substantially in the form and substance set forth in SCHEDULE O (Form of Vesting Certificate), which shall have the effect of constituting evidence of divestment by the Concessionaire of all of its rights, title and interest in the Concession Assets, and their vesting in the Agency pursuant hereto.

24.5 TRANSFER CONSIDERATION

24.5.1 The Parties agree that the Concession Assets shall be transferred to the Agency on the Transfer Date for a sum of (as consideration) Pak Rupees One only (PKR 1/-).

24.6 DIVESTMENT COSTS

24.6.1 Subject to Section 24.6.2, the Concessionaire shall bear and pay, in case of Termination due to a Concessionaire Event of Default and/or due to Corrupt Act and/or due to a Non Political Event or in case of expiry of this Agreement on the Final Expiry Date, all costs incidental to divestment of all of the rights, title and interest of the Concessionaire in the Concession Assets in favor of the Agency, save and except that all stamp duties payable on any deeds or documents executed by the Concessionaire in connection with such divestment shall be borne by the Agency. In the event of Termination due to a Force Majeure Event and/or the Agency Event of Default, the Agency shall bear and pay all the above-mentioned costs.

24.6.2 The Agency shall be responsible for the costs and expenses, including stamp duties, taxes, legal fees and expenses incurred in connection with the transfer of the Concession Assets to the Agency or its nominated agency on the Transfer Date. The Agency shall at its own cost obtain or effect all clearances, permits, authorizations, consents and approvals under or pursuant to the Applicable Laws and take such other actions as may be necessary for such transfer.

24.6.3 In the event of any Dispute relating to matters covered by and under this Article 24 (Divestment of Rights and Interest), the Dispute Resolution Procedure shall apply.
25. **DEFECTS LIABILITY DURING EXIT IMPLEMENTATION PERIOD**

25.1 **LIABILITY FOR DEFECTS DURING EXIT IMPLEMENTATION PERIOD**

25.1.1 Without prejudice to any obligation of the Concessionaire in this Agreement, the Concessionaire shall be responsible for all Defects & Deficiencies in the Concession Assets during the Exit Implementation Period in accordance with this Section 25.1.1 and it shall have the obligation to repair or rectify all Defects & Deficiencies observed by the Independent Engineer in the Concession Assets during the aforesaid period, as set out in a list jointly prepared by the Independent Engineer and the Concessionaire (the **Handover List**) within:

(a) in case of Termination of this Agreement, one (1) year of the issuance of a Termination Notice;

(b) in case of expiry of this Agreement on the Final Expiry Date, one (1) year after the Final Expiry Date;

25.1.2 Notwithstanding anything to the contrary set out herein, the provisions of this Article 25 (**Defects Liability During Exit Implementation Period**) shall not apply to any Defects & Deficiencies caused by an Agency Event of Default or a Political Event that has resulted in Termination.
26. **DISCLAIMER**

26.1 **DISCLAIMER**

26.1.1 Subject to the terms of this Agreement, the Concessionaire acknowledges that prior to the execution of this Agreement, the Concessionaire has, after a complete and careful examination, made an independent evaluation of the RFP, Scope of the Project, Project Requirements, the Project Site, existing structures, local conditions, physical qualities of ground, subsoil and geology, traffic volumes and all information provided by the Agency or obtained, procured or gathered otherwise, and has determined to its satisfaction the accuracy or otherwise thereof and the nature and extent of difficulties, risks and hazards as are likely to arise or may be faced by it in the course of performance of its obligations hereunder and on the basis of such examination and determinations is entering into this Agreement for the purpose of accepting the Concession for the implementation of the Project in accordance with the terms and conditions of this Agreement. Except as expressly provided in this Agreement, the Agency makes no representation whatsoever, express, implicit or otherwise, regarding the accuracy, adequacy, correctness, reliability and/or completeness of any assessment, assumptions, statement or information provided by it and the Concessionaire confirms that it shall have no claim whatsoever against the Agency in this regard.

26.1.2 Subject to the terms of Agreement, the Concessionaire acknowledges and hereby accepts the risk of inadequacy, mistake or error in or relating to any of the matters set forth in Section 26.1.1 and hereby acknowledges and agrees that the Agency shall not be liable for the same in any manner whatsoever to the Concessionaire, the Sponsor and their Associates or any person claiming through or under any of them.

26.1.3 Any mistake or error in or relating to any of the matters set forth in Section 26.1.1 shall not vitiate this Agreement or render it voidable.

26.1.4 In the event that either Party becomes aware of any mistake or error relating to any of the matters set forth in Section 26.1.1, such Party shall immediately Notify the other Party, specifying the mistake or error; provided, however, it is expressly agreed between the Parties that any such failure on part of the Agency to give any notice pursuant to this Section 26.1.4 shall not prejudice the disclaimer of the Agency contained in Section 26.1.1 and shall not in any manner shift to the Agency any risks assumed by the Concessionaire pursuant to this Agreement.

26.1.5 Except as otherwise provided in this Agreement, all risks relating to the Concession Assets shall be borne by the Concessionaire and the Agency shall not be liable in any manner for such risks or the consequences thereof.
27. **Assignment and Charges**

27.1 **Restriction on Assignment and Charges**

27.1.1 Subject to Section 27.2 (*Permitted Assignment and Charges*), this Agreement shall not be assigned by the Concessionaire to any person, save and except with the prior consent in writing of the Agency, which consent the Agency shall be entitled to decline without assigning any reason.

27.1.2 Subject to the provisions of Section 27.2 (*Permitted Assignment and Charges*), the Concessionaire shall not:

(a) create nor permit to subsist any Encumbrance, or otherwise transfer or dispose of all or any of its rights and benefits under this Agreement; or

(b) create or permit to subsist any Encumbrance on the Concession Assets or otherwise transfer or dispose of the Concession Assets;

in each case above, except with prior consent in writing of the Agency, which consent the Agency shall be entitled to decline without assigning any reason.

27.2 **Permitted Assignment and Charges**

27.2.1 The restriction set forth in Section 27.1.2 shall not apply to:

(a) liens and Encumbrances arising by operation of law (or by an agreement evidencing the same) in the ordinary course of business of the Project;

(b) assignment of rights, interest and obligations of the Concessionaire under this Agreement, the Agency Agreements, and/or the Project Agreements, Encumbrances, pledges/hypothecation of goods/assets, a charge on the Concessionaire Annuity Amount Payment Account, Agency Annuity Amount Payment Account, and any and all other bank accounts of the Concessionaire, a mortgage/charge in relation to the Construction Works and the Concession Assets (excluding the Project Site), a charge on the present and future movable, immovable and intellectual property of the Concessionaire, in each case, arising or created as security only for indebtedness to the Financiers under the Financing Documents in accordance with the Financing Term Sheet or the Financing Amendment Term Sheets, as the case may be.

(c) pledge of Class A Shares, as security only for indebtedness to the Financiers under the Financing Documents in accordance with the Financing Term Sheet or the Financing Amendment Term Sheets, as the case may be. Furthermore, any enforcement of such share pledge shall be subject to the share transfer restrictions under Clause 10.3 (*Change in Complete Control, Change in Control and Change in Shareholding*) and require prior Agency approval for share transfer thereunder which shall not be unreasonably withheld or delayed by the Agency.
27.3 **FINANCING TERM SHEET & FINANCING AMENDMENT TERM SHEETS**

27.3.1 Prior to Financial Close, the Concessionaire shall deliver to the Agency and the Independent Auditor a schedule or a copy of the term sheet reflecting the proposed material terms of the Financing Documents, and setting forth a principal repayment schedule that provides for debt repayment that is not greater than the aggregate of the Financing Component set out in the Financial Model using the assumptions of the Financial Model, together with the maximum principal amounts and interest (or markup) rate or rates and any schedules or formulae that shall be included in the Financing Documents for the computation of principal and interest (or markup), fees and charges payable to the Financiers upon the winding up for early termination of the Financing under the Financing Documents, and shall also identify the equity commitments, individually and in total, of the Sponsors (the Specific Term Sheet Parameters). The Agency and the Independent Auditor shall evaluate the Specific Term Sheet Parameters to ensure that the principal financial terms are not greater than the aggregate of the Financing Component set out in the Financial Model using the assumptions of the Financial Model, and to evaluate the impact on the Agency’s obligations upon any Termination of this Agreement. If Agency and/or the Independent Auditor has any objections to the terms specified in such term sheet or schedule, it shall inform the Concessionaire thereof within thirty (30) days of its receipt thereof; otherwise, the Agency and the Independent Auditor shall be deemed not to have objected to those terms (the Financing Term Sheet) and the Concessionaire shall be entitled thereafter to execute the Financing Documents, consistent with those terms and a principal repayment schedule of the specified term or a shorter term without further notice to or approval by Agency and/or the Independent Auditor. The Concessionaire shall provide the Agency, the Independent Engineer and the Independent Auditor with a copy of the Financing Documents no later than fifteen (15) business days of its execution (provided that, to the extent that the commercial terms of these executed Financing Documents do not materially deviate from the Financing Term Sheet, the Agency and the Independent Auditor shall have no further right to raise any objection in respect of these Financing Documents).

27.3.2 Following Financial Close, the Concessionaire shall deliver to the Agency and the Independent Auditor, copies of all amendments to the executed Financing Documents within ten (10) business days after the execution of each such document. The Concessionaire shall not execute any amendment or modification changing or affecting the repayment of principal (including any refinancing or restructuring of payment obligations under any Financing Document) or enter into any loan agreement for secured debt or otherwise incur any additional secured debt without submitting to the Agency and the Independent Auditor, no less than thirty (30) business days prior to execution of such amendment or modification to the loan documents or new loan agreements, a schedule or term sheet setting forth the proposed revised principal repayment schedule and the other key financial terms or material modifications related thereto.

27.3.3 The Agency and the Independent Auditor shall notify the Concessionaire of any objections to the term sheet or schedule related to the proposed modification to the principal repayment schedule as soon as reasonably possible, and in any case within thirty (30) days of receipt of the term sheet or schedule. In case no objection has been received by the Concessionaire on or before the expiry of the thirty (30) days after receipt of the term sheet or schedule related to the proposed modification, the Agency
and the Independent Auditor shall be deemed not to object to those amendments or terms (the **Financing Amendment Term Sheets**). At the request of the Agency and the Independent Auditor, prior to the execution of such amendments or modifications to the Financing Documents or new Financing Documents, the Concessionaire shall deliver to Agency and the Independent Auditor, in a form satisfactory to Agency, assurances, undertakings or agreements that no alteration or enhancement as a result of such refinancing or new or additional debt financing shall increase in any respect the financial obligations of the Agency hereunder or under any Agency Agreement or affect in any way the right of the Agency to acquire the Concession Assets free and clear of all Encumbrances upon the Agency’s payment of the applicable Termination Payment.

27.3.4 Notwithstanding anything to the contrary, the Concessionaire shall not make any addition, replacement or amendments to any of the Financing Documents without the prior written consent of the Agency if such addition, replacement or amendment has, or may have, the effect of imposing or increasing any financial liability or obligation on the Agency, and in the event that any replacement or amendment is made without such consent, the Concessionaire shall not enforce such replacement or amendment nor permit enforcement thereof against the Agency.

27.4 **FINANCING TERM**

27.4.1 The Parties agree that the Financing shall be arranged by the Concessionaire having the terms for the Financing shall not exceed a period of more than eight (8) years (exclusive of the grace period/Construction Period) at the rate of six (6) month KIBOR plus the Base Case Spread.

27.4.2 In the event the Actual Spread is higher than the Base Case Spread, the financial impact of difference between the Actual Spread and the Base Case Spread shall be solely funded and borne by the Concessionaire.

27.4.3 In the event the Concessionaire is able to negotiate a better pricing from Financiers in the form of the Actual Spread being less than the Base Case Spread, the fifty percent (50%) of that relevant saving acquired will be paid to the Concessionaire by the Agency and the resultant tax amount will be borne by the Agency. This will be covered in the Financing Component forming part of the Annuity Amount Payments.

27.4.4 The KIBOR and CPI are fixed, for Bid evaluation purposes, at 8% and 10% respectively, however, in case of variation in KIBOR, CPI and/or WPI, either upwards or downwards, the same will be actualized at the prevailing rates and the same will be paid by the Agency as a part of the Financing Component and O&M Cost Component forming part of the Annuity Amount Payments. Moreover, the resultant tax amount (delta due to actualization of KIBOR, CPI and/or WPI) will be borne by the Agency. It is abundantly made clear that in case the tax amount asked in the Bid Price by the Concessionaire is incorrect, the Agency shall not be responsible, and the Concessionaire shall solely bear that tax deficit amount/obligation.
27.4.5 The Parties agree that the Financing shall be arranged by the Concessionaire. The Concessionaire agrees that the terms for the Financing shall not exceed a period of more than eight (8) years, provided that the Concessionaire shall at least ninety (90) days prior to the Financial Close seek written approval from the Agency and the Independent Auditor, which approval and/or disapproval (as the case may be) shall be provided by the Agency and the Independent Auditor within thirty (30) days of receipt of such approval request prior to Financial Close for such extension, at a rate of KIBOR plus the Base Case Spread.

27.4.6 In case, the interest during construction, being part of the Financing, increases due to increase in the rate of KIBOR then the Parties shall equally bear and fund such costs.

27.4.7 In case, the interest during construction, being part of the Financing, decreases due to decrease in the rate of KIBOR (as determined by the Independent Auditor), such savings shall be shared between the Parties and Financiers, in proportion to their funding percentage in relation to the Pre-Estimated Project Cost set out in the Base Case Financial Model and the Equity Funding & Utilization Agreement, in each case, only upon the Independent Auditor duly verifying such savings, as further detailed in the Equity Funding & Utilization Agreement.

27.5 **Financial Close**

27.5.1 Upon achievement of Financial Close, the Concessionaire shall procure issuance by the Financiers (or an agent of the same) of a Notice issued to the Agency (with a copy to the Independent Auditor and the Independent Engineer) certifying the achievement of Financial Close (the Financial Close Achievement Notice).

27.6 **Assignment by the Agency**

27.6.1 Notwithstanding anything to the contrary contained in this Agreement or any other Agency Agreement, the Agency shall not assign and/or transfer any of its rights and benefits and/or obligations under this Agreement or any Agency Agreement to an assignee or any Person without the consent of the Concessionaire.

27.7 **Allocation of Financing**

27.7.1 The Project shall be financed through a combination of the Sponsor Equity Funding Amount, the Agency Equity Funding Amount and the Financing in accordance with the Project Funding Percentage.
28. CHANGE IN LAW

28.1 INCREASE IN COSTS

28.1.1 If as a result of Change in Law, the Concessionaire suffers an increase in costs or reduction in net after-tax return or any other financial liability beyond that contemplated in the Financial Model, the aggregate financial effect of which exceeds of PKR 5,000,000/- (Pakistani Rupees Five Million only) in any Accounting Year (as determined by the Independent Auditor and the Independent Engineer), the Concessionaire may so Notify the Agency and propose amendments to this Agreement so as to place the Concessionaire in the same financial position as it would have enjoyed had there been no such Change in Law resulting in the cost increase, reduction in return or other financial burden as aforesaid. Upon Notice by the Concessionaire, the Parties shall meet, as soon as reasonably practicable but no later than thirty (30) days from the date of Notice, and either agree on amendments to this Agreement or on any other mutually agreed arrangement; provided, that if no agreement is reached within sixty (60) days of the aforesaid Notice, the Concessionaire may by Notice to Agency (as certified by the Independent Engineer and the Independent Auditor) require the Agency to pay the Additional Costs (as determined and certified by the Independent Engineer and the Independent Auditor), and within thirty (30) days of receipt of such Notice, along with particulars thereof, the Agency shall pay the amount specified therein.

28.1.2 In the event as a result of a Change in Law the Concessionaire is delayed in performance of any of its obligations under this Agreement, then the Concessionaire shall be entitled to and shall be granted an extension in the timelines for performance of its obligations under this Agreement, in accordance with Article 15 (Relief Extensions & Relief Compensations). Further, the Concessionaire shall be excused from performance of its obligations to the extent it is unable to perform on account of such Change in Law.

28.1.3 Notwithstanding anything contained to the contrary in this Agreement, in the event:

(a) of failure by the Agency to pay the Additional Costs (as determined by the Independent Engineer and the Independent Auditor) within thirty (30) days of receipt of a Notice (as certified by the Independent Engineer and the Independent Auditor) issued by the Concessionaire in accordance with Section 28.1.1; and/or

(b) the Change in Law (together with its effects) subsists for a period of sixty (60) days or more,

the Concessionaire shall have the right to issue a Concessionaire Preliminary Notice to Agency of its intent to Terminate this Agreement and, subsequently (at any time after the date falling thirty (30) days from the date of issuance by the Concessionaire of the aforesaid Concessionaire Preliminary Notice) immediately Terminate this Agreement by issuance of a Termination Notice.

28.1.4 If Termination is on account of a Change in Law, the Agency shall pay a Change in Law Termination Amount to the Concessionaire.
28.2 **Reduction in Costs**

28.2.1 If as a result of Change in Law, the Concessionaire benefits from a reduction in costs or increase in net after-tax return or other financial gains, the aggregate financial effect of which exceeds PKR 5,000,000/- (Pakistani Rupees Five Million only) in any Accounting Year (as determined by the Independent Auditor and the Independent Engineer), the Agency may so Notify the Concessionaire and propose amendments to this Agreement so as to place the Concessionaire in the same financial position as it would have enjoyed had there been no such Change in Law resulting in the decreased costs, increase in return or other financial gains as aforesaid. Upon Notice by the Agency, the Parties shall meet, as soon as reasonably practicable but no later than thirty (30) days from the date of Notice, and either agree on such amendments to this Agreement or on any other mutually agreed arrangement; provided, that if no agreement is reached within sixty (60) days of the aforesaid Notice, the Agency may by Notice require the Concessionaire to pay an amount that would place the Concessionaire in the same financial position that it would have enjoyed had there been no such Change in Law, and within fifteen (15) days of receipt of such Notice, along with particulars thereof, the Concessionaire shall pay the amount specified therein to the Agency; provided, that if the Concessionaire shall Dispute such claim of the Agency, the same shall be settled in accordance with the Dispute Resolution Procedure. For the avoidance of doubt, it is agreed that this Section 28.2 (Reduction in Costs) shall be restricted to such Change in Law directly affecting the Concessionaire’s costs of performing its obligations under this Agreement.

28.3 **Restriction on Cash Compensation**

28.3.1 The Parties acknowledge and agree that the demand for cash compensation under this Article 28 (Change in Law) shall be restricted to the effect of Change in Law during the respective Accounting Year and shall be made at any time after commencement of such year, but no later than one (1) year from the close of such Accounting Year. Any demand for cash compensation payable for and in respect of any subsequent Accounting Year shall be made after the commencement of the Accounting Year to which the demand pertains, but no later than one (1) year from the close of such Accounting Year.
29. **ADDITIONAL MATTERS**

29.1 **ADVERTISING & ADVERTISING REVENUES**

29.1.1 The Agency shall have a right to propose from time to time a plan for various advertising activities to be implemented on the Concession Assets (the *Agency Advertising Plan*). The Agency shall submit the Agency Advertising Plan to the Independent Engineer and the Independent Auditor for each of their approval.

29.1.2 Upon approval of the Agency Advertising Plan by the Independent Engineer and the Independent Auditor, the Agency shall be fully responsible for the implementation of the Agency Advertising Plan.

29.1.3 The Concessionaire shall have a right to propose, from time to time, a plan for various advertising activities to be implemented on the Concession Assets (the *Concessionaire Advertising Plan*). The Concessionaire shall submit the Concessionaire Advertising Plan to the Agency for their approval. In the event the Agency approves the Concessionaire Advertising Plan within forty-five (45) days of receipt, the Concessionaire shall submit the same to the Independent Engineer and the Independent Auditor for each of their approval.

29.1.4 Upon approval of the Concessionaire Advertising Plan by the Independent Engineer and the Independent Auditor, the Concessionaire shall be fully responsible for the implementation of the Concessionaire Advertising Plan.

29.1.5 The Agency through its Class B Shares or otherwise (as directed by the Agency) exclusively reserves the right to the revenues relating to and/or generated from the implementation of the approved Agency Advertising Plan and the approved Concessionaire Advertising Plan (as determined by the Independent Auditor) (the *Advertising Proceeds*). In case the Advertising Proceeds are paid to the Concessionaire, the same shall be paid to the Agency as dividends for Class B Shares or otherwise as directed by the Agency (including in the event Class B Dividends cannot be paid to Agency because of any Applicable Law).

29.1.6 The Concessionaire shall be entitled to a management fee which shall be twenty percent (20%) of the Advertising Proceeds generated from implementation of the approved Concessionaire Advertising Plan only (as verified by the Independent Auditor) (the *Concessionaire Management Fee*) and where the advertising rights and management proposal emanates from the Agency and/or Agency Advertising Plan, then the Concessionaire will not be entitled to a management fee. Provided, however, Advertising Proceeds generated from the approved Concessionaire Advertising Plan shall be paid by the Concessionaire to the Agency in accordance with Section 29.1.5 after deducting the Concessionaire Management Fee (as verified and approved by the Independent Auditor).

29.1.7 The Parties shall ensure (as verified and certified by the Independent Engineer) that the implementation of the Agency Advertising Plan and/or the Concessionaire Advertising Plan (as applicable), shall be carried out in such a manner so as not to hinder or impair the Operations and Maintenance of the Project, general integrity of the Concession Assets and with full regard for the safety of all Users.
29.2 **COMMERCIAL RIGHTS & ADDITIONAL FACILITIES**

29.2.1 At any time prior to the expiration of the Concession Period, the Agency shall have the right to establish Additional Facilities along the Project Site either through the Concessionaire (with mutual agreement) or any other party at its sole and absolute discretion. Nothing contained in this Agreement shall prevent the Agency from granting Additional Development Rights to any person who is not affiliated with the Concessionaire or its shareholders, provided that the development of any Additional Facilities shall not hinder with any construction and operations and maintenance activities of the Concessionaire.

29.2.2 At any time prior to the expiration of the Concession Period and subject to Agency rights under Section 29.2.1 above, the Concessionaire shall subject to prior approval of the Independent Engineer and provision of a prior notice to the Agency, have Additional Development Rights along the Project Site (and not on the Project Site); provided, however, upon receipt of notice, the Agency shall communicate its objections or reservations (if any) to the Independent Engineer and the Independent Engineer shall ensure that the same are adequately addressed and where necessary form an approval requirement for such Additional Development Rights.

29.2.3 In the event the Additional Facilities are being developed:

(a) by the Concessionaire on privately owned land, then the Concessionaire shall provide access to such Additional Facilities at its own risk, cost and expense;

(b) by the Concessionaire on Agency owned land (with prior approval of the Agency), then the Concessionaire shall provide access to such Additional Facilities at its own risk, cost and expense;

(c) by any party (other than the Concessionaire) on Agency owned land, then the Concessionaire shall provide access to such Additional Facilities at its own risk, cost and expense and such reasonable cost (as approved and determined by the Independent Engineer and Independent Auditor) shall be reimbursed by the Agency.

29.2.4 For the purposes of implementation by the Agency of its Additional Development Rights, the Concessionaire shall enter into all such agreements as may be reasonably required by the Agency to give full effect to the grant of Additional Development Rights.

29.2.5 The Agency shall have a right to propose from time to time a plan for various commercial rights and additional facilities to be implemented on the Concession Assets (the **Agency Additional Facilities Plan**). The Agency shall submit the Agency Additional Facilities Plan to the Independent Engineer and the Independent Auditor for each of their approval.

29.2.6 The Concessionaire shall have a right to propose, from time to time, a plan for commercial rights and additional facilities to be implemented on the Concession Assets (the **Concessionaire Additional Facilities Plan**). The Concessionaire shall submit the
Concessionaire Additional Facilities Plan to the Agency for their approval. In the event the Agency approves the Concessionaire Additional Facilities Plan within forty-five (45) days of receipt, the Concessionaire shall submit the same to the Independent Engineer and the Independent Auditor for each of their approval.

29.2.7 The Agency through its Class B Shares or otherwise (as directed by the Agency) exclusively reserves the right to the revenues relating to and/or generated from the implementation of the approved Additional Facilities and the approved (as determined by the Independent Auditor) (the **Additional Facilities Proceeds**). In case the Additional Facilities Proceeds are paid to the Concessionaire, the same shall be paid to the Agency as dividends for Class B Shares or otherwise as directed by the Agency (including in the event Class B Dividends cannot be paid to Agency because of any Applicable Law).

29.2.8 In the event the Additional Facilities are being developed by the Concessionaire (with prior approval of the Agency):

(a) on Agency owned land and the Agency proposes Agency Additional Facilities Plan, the Concessionaire shall be entitled to a management fee which shall be twenty five percent (25%) of the Additional Facilities Proceeds generated from establishment of the Additional Facilities (as verified by the Independent Auditor);

(b) on Agency owned land and the Concessionaire proposes Concessionaire Additional Facilities Plan, the Concessionaire shall be entitled to a management fee which shall be fifty percent (50%) of the Additional Facilities Proceeds generated from establishment of the Additional Facilities (as verified by the Independent Auditor);

(c) on private owned land and the Concessionaire proposes Concessionaire Additional Facilities Plan, the Concessionaire shall be entitled to a management fee which shall be seventy five percent (75%) of the Additional Facilities Proceeds generated from establishment of the Additional Facilities (as verified by the Independent Auditor);

(d) on private owned land and the Agency proposes Agency Additional Facilities Plan, the Concessionaire shall be entitled to a management fee which shall be fifty percent (50%) of the Additional Facilities Proceeds generated from establishment of the Additional Facilities (as verified by the Independent Auditor);

((a), (b), (c), (d) is hereinafter individually referred to as, as applicable, the **Commercial Rights Management Fee**).

29.2.9 The Parties shall make use of all Additional Development Rights granted to it in such a manner so as not to hinder or impair the Operations and Maintenance of the Project, general integrity of the Concession Assets and with full regard for the safety of all Users, in accordance with Section 19.6.1 and shall implement the Additional Development Rights so as to avoid danger to any such Persons.
29.3 **BRIDGE ON RIVER MALIR, RIVER TRAINING WORKS & CONNECTING ROADS**

29.3.1 The Parties agree and acknowledge that the need for construction of road, bridge; location, length, skew, requirement of river training works (such as guide banks, gunda bunds, cunette, spurs etc.) will be accurately finalized following the recommendations of physical Hydraulic Model Study and Detailed Engineering Design.

29.3.2 Based on the results/recommendations of physical Hydraulic Model Study, the Concessionaire shall propose the detailed designs of the Korangi Link Road Project, relevant approach roads and river training works to the Agency and the Independent Engineer for approval with detailed calculation, software model etc.

29.3.3 Duly approved link road, bridge and river training works shall be submitted by the Concessionaire to the Irrigation Department of Government of Sindh for obtaining No Objection Certificate (NOC) from Irrigation Department of Government of Sindh.

29.3.4 The Parties hereby record their understanding that the Total Project Cost has been forecasted on the estimated lengths of different components of the Project as mentioned in the definition of ‘Korangi Link Road Project’ provided in Section 1.1 of this Agreement.

29.3.5 In the event, the measurements of the Project is changed as a result of the physical Hydraulic Model Study and/or No Objection Certificate (NOC) from Irrigation Department of Government of Sindh, the Total Project Cost for any increase and/or decrease in estimated length will be adjusted according to following:

**FOR BRIDGE APPROXIMATELY 1.0 KM**

Total price quoted by the Concessionaire for 1.0 km long 6-lane bridge shall be divided by 1.0 km to arrive at per km length of bridge, which will be multiplied with actual design/constructed length. However, should the length of the said bridge exceed 1.0 km, the Agency shall fund and bear such costs and such increase shall not form part of the Total Project Cost. However, as a result of the finalization of physical Hydraulic Model Study and upon approval from the Irrigation Department, Government of Sindh, should the length of the said bridge decreases from 1.0 km, the Total Project Cost shall be proportionately reduced and adjusted accordingly.

For river training works (such as guide banks, cunette, spurs etc.) un-priced bill of quantities – BoQ with estimated quantities is provided which shall be priced by the bidder, which shall become part of the Concession Agreement. The actual quantities to be executed will be paid using the rates quoted by the bidder.

Notwithstanding anything to the contrary, in the event the Independent Engineer disapproves bridge and river training works designs or opines that the river training works (or any part thereof) are not required for the Project, the Concessionaire shall not be responsible in any manner for any claims, losses, expenses, damages or costs of any nature whatsoever resulting from non-construction of the river training works and the same shall be deemed to be a Permitted Event. Further, in the event the river training works are constructed in accordance with this Agreement, the Agency (relevant department of Government of Sindh) shall be responsible for the maintenance of the river training works (including bearing all costs relating thereto).
29.4 **RIVER TRAINING WORK AND PROTECTION WORK**

The Concessionaire is required to conduct the river training works and protection works in accordance with the requirements of physical Hydraulic Model Study, the Detailed Engineering Design, the Applicable Standards and the requirements set out in **SCHEDULE Q (Un-priced BoQ for River Training Work And Bund Protection Work)**.
30. **DISPUTE RESOLUTION**

30.1 **DISPUTE RESOLUTION**

30.1.1 Any dispute, difference or controversy of whatever nature howsoever arising under or out of or in relation to this Agreement (including its interpretation) between the Parties, and so notified in writing by either Party to the other Party (the **Dispute**) shall, in the first instance, be attempted to be resolved amicably in accordance with the conciliation procedure set forth in Section 30.2 (**Conciliation**).

30.1.2 The Parties agree to use their best efforts for resolving all Disputes promptly, equitably and in good faith, and further agree to provide each other with reasonable access during normal business hours to all non-privileged records, information and data pertaining to any Dispute.

30.2 **CONCILIATION**

30.2.1 In the event of any Dispute between the Parties, either Party may call upon the Independent Engineer and/or the Independent Auditor, as the case may be, to mediate and assist the Parties in arriving at an amicable settlement thereof. Failing mediation by the Independent Engineer and/or the Independent Auditor as the case may be, either Party may request for their departmental heads to meet to resolve such Dispute. In the event the Parties are unable to resolve the matters through conciliation, within thirty (30) days of commencement of the conciliation process in terms of this Section 30.2.1, either Party may refer the Dispute to arbitration in accordance with the provisions of Section 30.3 (**Arbitration**).

30.3 **ARBITRATION**

30.3.1 Any Dispute that is not resolved amicably by conciliation, as provided in Section 30.2 (**Conciliation**), shall be finally decided by reference to arbitration by a board of arbitrators (the **Board of Arbitrators**) appointed in accordance with Section 30.3.3. Such arbitration shall be held in accordance with the provisions of the Arbitration Act.

30.3.2 The venue and seat of such arbitration shall be Karachi.

30.3.3 There shall be a Board of Arbitrators of three (3) arbitrators, of whom each Party shall select one, and the third arbitrator shall be appointed by the two (2) arbitrators so selected, and in the event the two (2) arbitrators are unable to agree on the third arbitrator, then the same shall be appointed in accordance with the Arbitration Act.

30.3.4 The arbitrators shall make a reasoned award (the **Award**). Any Award made in any arbitration held pursuant to this Article 30 (**Dispute Resolution**) shall be final and binding on the Parties as from the date it is made, and the Concessionaire and the Agency agree and undertake to carry out such Award without delay.

30.3.5 The Concessionaire and the Agency agree that an Award may be enforced against the Concessionaire and/or the Agency, as the case may be, and their respective assets wherever situated.
30.3.6 This Agreement and the rights and obligations of the Parties shall remain in full force and effect, pending the Award in any arbitration proceedings hereunder.
31. MISCELLANEOUS

31.1 GOVERNING LAW AND JURISDICTION

31.1.1 This Agreement shall be construed and interpreted in accordance with and governed by the Applicable Laws and the courts of appropriate jurisdiction in the province of Sindh shall have the exclusive jurisdiction over all Disputes or matters arising out of or relating to this Agreement.

31.1.2 The regulation, rights and responsibilities of the Agency as specified in the West Pakistan Highways Ordinance, 1959 as amended by the West Pakistan Highways (Sindh Amendment) Act, 1973, shall continue to be in force in respect of the Project except in so far as they are removed or amended, explicitly or implicitly, by this Agreement which in all respects shall take precedence (subject to Change in Law and the relevant provisions of this Agreement).

31.2 WAIVER

31.2.1 Waiver by either Party of any default by the other Party in the observance and performance of any provision of or obligations or under this Agreement:

(a) shall not operate or be construed as a waiver of any other or subsequent default hereof or of other provisions or obligations under this Agreement;

(b) shall not be effective unless it is in writing and executed by a duly authorized representative of such Party; and

(c) shall not affect the validity or enforceability of this Agreement in any manner.

31.2.2 Neither the failure by either Party to insist on any occasion upon the performance of the terms, conditions and provisions of this Agreement or any obligation thereunder nor time or other indulgence granted by a Party to the other Party shall be treated or deemed as waiver of such breach or acceptance of any variation or the relinquishment of any such right hereunder.

31.3 SURVIVAL

31.3.1 Termination of this Agreement (a) shall not relieve the Concessionaire or the Agency of any obligations hereunder which expressly or by implication survives Termination hereof; and (b) except as otherwise provided in any provision of this Agreement expressly limiting the liability of either Party, shall not relieve either Party of any obligations or liabilities for loss or damage to the other Party arising out of or caused by acts or omissions of such Party prior to the effectiveness of such Termination or arising out of such Termination.

31.4 AMENDMENTS

31.4.1 This Agreement and the Schedules together constitute a complete and an exclusive statement of the terms of this Agreement between the Parties on the subject hereof and
no amendment or modification hereto shall be valid and effective unless agreed to by all the Parties hereto and evidenced in writing.

31.5 **NOTICES**

31.5.1 Unless otherwise stated, notices to be given under this Agreement including (without limitation) a notice of waiver of any term, breach of any term of this Agreement and Termination of this Agreement, shall be in writing and shall be given by hand delivery, recognized international courier, mail, telex or facsimile transmission and delivered or transmitted to the Parties at their respective addresses set forth below in **SCHEDULE S (Notices)** or such address, telex number, or facsimile number as may be duly notified by the respective Parties from time to time, and shall be deemed to have been made or delivered (a) in the case of any communication made by letter, when delivered by hand, by recognized international courier or by mail (registered, return receipt requested) at that address and (b) in the case of any communication made by telex or facsimile, when transmitted properly addressed to such telex number or facsimile number.

31.6 **CONFIDENTIALITY**

31.6.1 Each of the Parties and their Contractors (including the Concessionaire Engaged Persons), subcontractors, consultants, employees and agents and each of their respective successors and permitted assigns shall hold in confidence all documents and other information, whether technical or commercial, supplied to it by or on behalf of the other Party, relating to the design, construction, insurance, Operation and Maintenance, transfer, management and Financing of the Concession Assets, and all information and documents obtained in accordance with the terms of the Agency Agreements, and shall not, without the consent of the other Party, save as required by the Applicable Laws or appropriate regulatory authorities, prospective lenders to, or investors in the Concessionaire and their professional advisers, publish or otherwise disclose or use the same for its own purposes otherwise than as may be required to perform its obligations under this Agreement. Notwithstanding the above, nothing herein contained shall preclude the use of provisions similar to those contained in the Agency Agreements and the other agreements referred to herein and in agreements prepared and issued or to be prepared and issued in connection with other projects by the Agency.

31.6.2 The provisions of paragraph (a) hereinabove shall not apply to:

(a) any information in the public domain otherwise than by breach of this Agreement or any other Agency Agreement;

(b) information in the possession of the receiving Party thereof before divulgence as aforesaid, and which was not obtained under any obligation of confidentiality.

31.7 **SEVERABILITY**

31.7.1 If for any reason whatsoever any provision of this Agreement is or becomes invalid, illegal or unenforceable or is declared by any court of competent jurisdiction or any other instrumentality to be invalid, illegal or unenforceable, the validity, legality or enforceability of the remaining provisions shall not be affected in any manner, and the Parties shall negotiate in good faith with a view to agreeing upon one or more provisions which may
be substituted for such invalid, unenforceable or illegal provisions, as nearly as is practicable.

31.8 **NO PARTNERSHIP**

31.8.1 Nothing contained in this Agreement shall be construed or interpreted as constituting a partnership between the Parties. Neither Party shall have any authority to bind the other in any manner whatsoever.

31.8.2 Notwithstanding anything to the contrary set out in this Agreement or elsewhere, nothing contained in this Agreement shall be construed or interpreted as the Concessionaire providing designing and/or engineering consulting services to the Agency.

31.9 **LANGUAGE**

31.9.1 All notices required to be given under this Agreement and all communications, documentation and proceedings which are in any way relevant to this Agreement shall be in writing and in the English language.

31.10 **EXCLUSION OF IMPLIED WARRANTIES**

31.10.1 This Agreement expressly excludes any warranty, condition or other undertaking implied at law or by custom or otherwise arising out of any other agreement (except the Agency Agreements) between the Parties or any representation by any Party not contained in a binding legal agreement executed by the Parties.

31.11 **COUNTERPARTS**

31.11.1 This Agreement shall be executed in two counterparts, each of which when executed and delivered shall constitute an original of this Agreement.

31.12 **SET-OFF**

31.12.1 The Agency shall have the right to withhold and set-off against any amount it is liable to pay to the Concessionaire hereunder, the amount of any payment due to the Agency from the Concessionaire under this Agreement.

31.13 **INDEPENDENCE**

31.13.1 In respect of all matters dealing with this Agreement, the Independent Engineer and the Independent Auditor shall be independent and shall ensure that it performs all its obligations in accordance with their respective terms of reference and this Agreement.

31.14 **ENTIRE AGREEMENT**

31.14.1 The Parties hereto acknowledge, confirm and undertake that this Agreement (and Agency Agreements, as applicable), as at the date hereof, constitutes the entire understanding between the Parties regarding the Project and supersedes all previous written and/or oral representations and/or arrangements regarding the Project.
IN WITNESS WHEREOF, the Parties hereto have caused this Agreement to be executed on the day, month and year first above mentioned.

AS THE AGENCY

For and on behalf of

LOCAL GOVERNMENT DEPARTMENT, GOVERNMENT OF SINDH

through its authorised signatory

Name: ........................................................
Designation: .............................................

Name: ........................................................
Designation: .............................................

in the presence of

WITNESSES:

1- Name: ..................................................
   Address: ..........................................  
   CNIC / Passport No: .................................

2- Name: ..................................................
   Address ............................................
   CNIC / Passport No: .................................
AS THE CONCESSIONAIRE

For and on behalf of [●] through its authorised signatory

Name: 
Designation: 

in the presence of

WITNESSES:

1- Name: 
   Address: 
   CNIC / Passport No: 

2- Name: 
   Address: 
   CNIC / Passport No: 

SIGNATURE

………………………………..
List of Schedules

Schedule A – Scope of the Project
Schedule B – Design Requirements
Schedule C – List of Construction Drawings
Schedule D – Project Facilities
Schedule E – Construction Completion Schedule
Schedule F – Project Site
Schedule G – List of Tests & Completion Tests
Schedule H – O&M Requirements
Schedule I – Part I – Construction Period Insurances
Schedule I – Part II – Operation Period Insurances
Schedule J – Specified Concessionaire Permits
Schedule K – Corporate Documents
Schedule L – Form of Construction Performance Security
Schedule M – Form of O&M Performance Security
Schedule N – Part I – Indicative Independent Auditor Terms of Reference
Schedule N – Part II – Indicative Independent Engineer Terms of Reference
Schedule O – Form of Vesting Certificate
Schedule P – Assured Availability Formula
Schedule Q – Un-priced BoQ for River Training Work and Bund Protection Work
Schedule R – Indicative Annuity Amount Payment Schedule
Schedule S – Notices
Schedule T – Termination Payments
Schedule U – Financial Model
Schedule V – Illustrations - Termination Equity Amount & Termination Dividend Amount
Schedule W – Project Management and Implementation Unit Vehicles
Schedule X – Proposed Detailed Design Approval Process
Schedule Y – Conditions Precedent and Conditions Subsequent
Schedule Z – Key Performance Indicators
1. **Detailed Project Scope**

   The scope of the project mainly includes the construction of Korangi Bridge to replace the existing Korangi causeway, Link Road to Korangi Creek and Link Road to PRL.

2. **General**

   Korangi Crossing Road is the main entrance to Korangi creek and the adjoining residential and industrial areas for the traffic from Qayyumabad, DHA and beyond. An Irish causeway across Malir River serves the traffic to/from this densely populated built up area. Several important educational institutions like the College of Business Management (CBM), Ilma University (Formerly Institute of Business Technology), National Textile University and major health care facilities like Indus Hospital, Chiniot General Hospital, LRBT Eye Hospital, Fazle Elahi Hospital for Heart Diseases, etc. are located in close vicinity.

   The existing road also provides access to Korangi Creek Industrial Park (KCIP), Pakistan Refinery Ltd. (PRL) and other industries located in the vicinity. The fishing village/Jetty of Ibrahim Hyderi is also served by this causeway besides the commercial area, hardware tiles and ceramics shops, and the housing colonies including Bhitai Colony, Dar us Salam Cooperative Housing Society, Gilgit Colony, PAF Colony and Airmen Golf Club located along this road.

   During rainy season, existing causeway gets under water and traffic across the river gets disrupted and is rerouted to other longer routes. In addition to a lot of inconvenience to people of this area and those coming here from other areas, this also causes traffic congestion on the other exits from Korangi and on Main Korangi Industrial Area road. Patients visiting major health care facilities, especially Indus Hospital, LRBT Eye Hospital, the Fazle Elahi Hospital for Heart Diseases and the Chiniot General Hospital, etc., and the students and staff of the above mentioned well-known educational institutions like the CBM, IBT, are stuck for hours when the causeway is closed due to heavy flow of water in Malir River.

   Similarly access to many factories, mills and industries and the Korangi Creek Industrial Park (KCIP), Pakistan Refinery Ltd. (PRL) also gets blocked and the industrial activity suffers causing huge loss to the national and regional economy. Unnecessary delays and travel cost are incurred by the road users besides disturbance to the industrial activity as their supply line is badly affected.

   Link road to Korangi creek starts at proposed Korangi bridge and runs parallel to the left bank of Malir river. Since Korangi road is often congested, Link road to Korangi creek will serve as an alternate route for traffic coming to and going from, National Industrial park, proposed sewerage treatment plant, airmen golf club and airmen academy. Initially it was proposed on the existing left bank of Malir river but after comprehensive hydraulic study it was decided to shift the left bank of Malir river to utilize the available land. interchange is
provided between Korangi Bridge and link road to Korangi creek road for uninterrupted flow of traffic.

Link road to Pakistan refinery limited will widen the already existing 1x1 lane road into 2x2 road and will complete the link by connecting it to Korangi creek which will enable the traffic generating from this area to utilize the alternate routes.

Link road is also provided to connect brooks Chowrangi road via shah Muhammad road to access Korangi bridge and link road to Korangi creek.

The project location and proposed alignment is shown in following figures:

Figure 1: Project Location Map – Expressway from Mauripur Road to Y-Junction

Figure 2: Project Location Map
Figure 3: Project Alignment
3. **PROJECT COMPONENTS**

Project Components include detailed design, construction, operation and maintenance of following listed items:

1. 3 + 3 Lane Bridge approximately 1.0 km length over Malir River (between Korangi Causeway and Jam Sadiq Bridge) with all guide (upstream and downstream) bunds, spurs, river training works, culvert, spurs etc. will be constructed (considering the recommendations of Hydraulic/Physical Model study report of Malir River provided by the Agency).

2. To conduct Hydraulic/Physical model study for shifting of Malir Left Bund and proposed bridge considering above mentioned report, river topography, rainfall pattern, catchment area, invert levels of outfall drain(s) of adjacent areas and subsoil conditions and take approval from the relevant Department (Sindh Irrigation Department) with the due support from the Agency.

3. 2 lane Flyover over Korangi Bridge

4. Construction of road over Left Bank of Korangi river to connect Korangi road of approximately 1.5 km length

5. Construction of 2 + 2 lane interchange / loop ramps at Korangi Bridge / Link road to Korangi Creek

6. 2+2 Lane coastal/river road (Link Road to Korangi Creek) with shoulders on either side including revetement and earthwork for embankment / bund of approximately 5.9 km length

7. Construction of Culverts

8. New Construction of PRL road to connect Link Road to Korangi Creek of approximately 1.0 km length

9. Rehabilitation / Widening of Existing PRL road of approximately 1.6 km length

10. Construction of stormwater drain approximately 1.0 km length

11. Realignment of existing Creek Avenue

12. Construction of Roundabout at creek avenue to link with Malir Expressway

13. Rehabilitation of existing bunds.

14. Earthwork for embankment of recreational/commercial area (around 450m x 40m) with entrance and exit lanes and pavement works for car parking areas of 600 to 650 vehicles

15. Street Lights

16. Procure, operate and maintain 1 crane for stranded vehicle

17. Stormwater drainage chamber/pit with its disposal line for pumping stormwater near Attock Petrol Pump

18. Plantation using Miyawaki technique at all available land pockets (but not limited to the areas mentioned below) with in the project area with the approval of the Horticulture Department.
   a. landside embankment slopes of right and left bund of the Malir River
   b. South west side of creek avenue / Korangi causeway road (green belt area near start point),
   c. Rotary area of right turn flyover,
   d. Landside embankment slope of new bund
   e. U turn rotary near Airman Gold course

4. **DETAILED DESIGN OF THE PROJECT**

Detailed design shall be based on preliminary design and its parameters as mentioned in RFP.
4.1 **CONSTRUCTION OF THE PROJECT COMPONENTS**

a. The Concessionaire shall be responsible for all aspects of construction in conformity with AASHTO Design standards, the NHA General Specifications, 1998, ASTM, MUTCD, AASHTO-LRFW, WPHC-1967 and in accordance with the requirements set-out in the Concession Agreement, including the Construction Requirements;
b. During construction, the Concessionaire will be required to comply with the traffic management requirements to minimize the impact of construction on other roads and provide certainty for Users; and
c. The Concessionaire must plan for the Substantial Completion Date.

4.2 **THE CONCESSIONAIRE SHALL NEED TO:**

- Construct the Project within estimated time and the Construction Time for Completion
- Carry-out all quality control tests as per NHA General Specifications, 1998 (AASHTO recommendations) (see SCHEDULE G- List of Tests & Completion Tests of the Concession Agreement as per AASHTO and ASTM references). Records of tests will be signed-off by the Independent Engineer
- Submit Constructions Program of the Project
- Submit road safety plan and issues diversion plan during construction to obtain control of traffic and minimum hindrance to traffic and make proper liaison with the local police and other relevant civil and district administration/authorities of the area before commencement of work
- Construction material will be used from approved sources with appropriate tests and certification
- The Concessionaire has to make sure that the Project Site is clean from any debris, construction material and machinery during Operation Period
- International and local safety standards and best practice procedure should be followed during Construction Period
- The Concessionaire has to submit the ‘As-built drawings’ at completion of Works in accordance with the Concession Agreement

4.3 **Facilities to be provided by Concessionaire:**
The Concessionaire shall be responsible for providing facilities as mentioned in SCHEDULE - D

5. **CONSTRUCTION REQUIREMENTS**
The Construction should be carried out using NHA General Specifications 1998, project specifications established for the project and all other standards mentioned in the RFP. All construction activities will be supervised by the Independent Engineer for which standard procedure of check request forms shall be developed by the Concessionaire for the approval by the Independent Engineer.

6. **OTHER ROLES OF CONCESSIONAIRE**

6.1 **TEMPORARY ROAD, TRAFFIC MANAGEMENT AND CONTROL, GENERAL PROTECTION**

a. Layout plans showing the detailed proposals of temporary diversions and/or access roads to be carried out by the Concessionaire/its Contractor(s) shall be submitted to the Independent Engineer and to concerned district police, civil agencies and local administration for their written approval 10 days before the implantation date;
b. Diversions must be constructed in advance of any interference within the right of way/existing carriage way and shall be maintained in accordance to traffic load in a condition satisfactory to the Independent Engineer

6.2 LOCATION OF UTILITY SERVICES

a. Location and identification of all services, in consultation with relevant utility service provider(s) or company, whether above ground or below the ground shall be Concessionaire’s and its Contractor(s)’ responsibility following transfer of Project Site by Agency to the Concessionaire, free from any encumbrances

6.3 OPERATION AND MAINTENANCE

The Concessionaire is required to carry out the Operation and Maintenance in respect of the Project in conformity with AASHTO standards and in accordance with the Concession Agreement. The Operation and Maintenance - O&M Requirements are set out in the Main Body of the Concession Agreement and SCHEDULE H of the Concession Agreement.

7. FINANCING

a. The Concessionaire is responsible for developing and implementing the financing structure for the Concession including the financing and commercial arrangements for the design, construction, operations and maintenance work in accordance with the Concession Agreement;

b. The Concessionaire shall get incorporated a company exclusively for the purpose of implementing the Project (“Project Company” and/ or “SPV”). The Concessionaire shall not undertake or permit and hereby undertakes to procure that the Sponsors do not undertake or permit any Change in Ownership and/or Control during the Concession Period, except as may be permitted pursuant to the Concession Agreement.

8. HAND-OVER OF THE STRUCTURE

The Concessionaire is responsible for handing over the structures to the Agency in a good working condition at the end of the Concession Period as specified in the Concession Agreement without any further compensation to the Concessionaire at the time of such transfer. These structures are subject to an inspection and correction process in order to ensure that they are handed over in accordance with established terms and conditions.
1. **DETAILED DESIGN OF PROJECT**

a) Carry out map/ satellite photographs study and review of all material/documents/studies/preliminary design/drawings provided/alignment plan / typical cross-sections, supplemented with area reconnaissance and detailed topographic survey.

b) Carry out soil & material investigations to determine the “Subsoil Condition”, other required soil tests and analysis for the authenticity of any available report as the Independent Engineer / Agency will not be liable to any discrepancy.

c) Carry out physical hydrological and hydraulic model studies for Bridge at Malir River and submission of Physical Model Study Report to relevant authorities for approval.

d) Carry out hydrology and hydraulic studies of other structures by determining relevant catchment areas

e) Carry out additional geotechnical investigations for bridges/flyovers/physical hydraulic model (where required).

f) Detailed designing of the Project based on conceptual designs (preliminary designs, drawings and reports with cross-section of road and bridge will be provided to concessionaire by Independent Engineer / Agency). However, the Concessionaire will be responsible for all aspects of design in conformity with Applicable Standards and in accordance with the Concession Agreement, including the design requirements as set out in the Concession Agreement.

g) Detailed Geometric design as per the geometric design criteria for roads given in the AASHTO standards. Also carry out flexible and rigid pavement design, design of retaining/ protection works, abutments, design of erosion protection works, nullah/water body training works and drainage works.

h) Carry out detailed structure design of 3 + 3 Lane Bridge approximately 0.9 km length over Malir River (between Korangi Causeway and Jam Sadiq Bridge) with all upstream/downstream guide bunds (considering the recommendations of Hydraulic Physical Model study report of Malir River carried out by the Contractor), 2 lane flyover over Korangi bridge, structures related to road over Left Bank of Korangi river, 2 + 2 lane interchange / loop ramps at Korangi Bridge / Link road to Korangi Creek, stormwater drains, Street Lights foundations and its ramps, protection bunds, training spars, etc. as per recommendations and in accordance with provisions of ‘AASHTO LRFD Bridge Design Specifications’

i) Carry out detailed Structure Design of other Drain Bridges and Culverts in accordance with provisions of ‘AASHTO LRFD Bridge Design Specifications’

j) Design and construction of other minor structures and intersections (at-grade).

k) Design and construction of road on new embankment/bund and existing embankment/bund including drainage

l) Design and construction of revetment/slope protection on new bunds and existing bunds.

m) Prepare Construction Drawings, of all roadworks, structure works and
drainage & protection works.
n) Stormwater drainage of existing roads near Attock Petrol pump by providing stormwater drainage chamber and stormwater drainage pumps with all arrangement required for operation and maintenance.
o) Construction of commercial area up to embankment level for structures along with construction of car parking and footpaths.
p) Prepare As-Built Drawings of complete project.
q) Preparation of land acquisition and utility/infrastructures relocation folders
r) Carry out Environment Impact Assessment - EIA study and submit report to seek approval from the Sindh Environmental Protection Agency as per their rules and regulations
s) Land acquisition and clearance of encroachment will be the responsibility of the Independent Engineer / Agency
t) Give detailed plan of implementation strategy
u) A summary of the design criteria is provided hereunder, however, to promote innovation, Bidders are encouraged to develop Proposals that differ or vary from the reference design and that comply with the requirements of the Concession Agreement. The general performance requirements for the Project are given below:

8.1 GEOMETRIC DESIGN CRITERIA

Interstate Semi-Trailer, WB 20, have been used as the design vehicle;

However, during the detail design stage the Contractor shall confirm the same from the Independent Engineer/GOS.

8.2 DESIGN SPEED

Following design speed have been considered:

- Link Road to Korangi Creek : 90 kph
- Malir River Bridge : 80 kph
- At interchanges : 30 to 40 kph.

However, during the detail design stage the Contractor shall confirm the same from the Independent Engineer/GOS.

8.3 DESIGN ELEMENTS

The curve radii and the sight distances adopted for the geometric design of the project is given in Table below:

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Description (m)</th>
<th>Speed KPH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Stopping sight distance (m)</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>Passing sight distance (m)</td>
<td>120</td>
</tr>
<tr>
<td>---</td>
<td>----------------------------</td>
<td>-----</td>
</tr>
<tr>
<td>3</td>
<td>Minimum Curve Radius (m)</td>
<td>22</td>
</tr>
<tr>
<td>4</td>
<td>Maximum super-elevation rate</td>
<td>4%</td>
</tr>
<tr>
<td>5</td>
<td>Minimum K (at Crest) for SSD</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Minimum K (at Sag) for SSD</td>
<td>6</td>
</tr>
<tr>
<td>6</td>
<td>Minimum K (at Crest) for PSD</td>
<td>17</td>
</tr>
</tbody>
</table>

**Table: Design Elements**

The maximum upgrade gradient for this project has been taken as 4.5%.

**8.4 CROSS-SECTIONAL ELEMENTS**

- **LANE WIDTH**
  
  Lane width : 3.5 meters

  The Contractor shall provide road widening considering the AASHTO requirement for largest vehicle, where deemed necessary, during the detail design stage after due consultation with the Independent Engineer/GOS.

- **SHOULDER WIDTH**
  
  - Link Road to Korangi Creek
    
    Outer Shoulder : 3.0 meters
    Inner shoulder : 1.2 meters

- **CROSS-SLOPE**
  
  The cross-slope of the alignment has been taken as 2% for the main carriageway, and 2.5% for the shoulder. The cross slope is kept towards sea side.

- **VERTICAL CLEARANCE**
  
  The vertical clearance of the structures from the road level has been taken as minimum 5.1 meters.

**8.5 PAVEMENT DESIGN**

Flexible pavement has been considered for this project.

(a) Design Life
The design life for flexible pavement has been taken as 20 years.

8.6 FOUNDATION

8.7 FOR BRIDGE/FLYOVERS

Successful bidder shall arrange for confirmatory soil investigation before proceeding with the detailed design and construction works. However, piles diameter of 760mm, 900mm, 1200mm and 1500mm have been assumed for designing purpose as per recommendations of Geo-Technical investigation report carried out by NESPAK and as per space & load requirements. Furthermore, design of all structural components of bridge and allied facilities shall be based on the results / recommendations of confirmatory Geo-Technical investigation to be carried out by the contractor.

8.8 FOR POLE FOUNDATIONS (MAX 15M HIGH)

As per recommendations of Geo-Technical investigation report, spread foundation at grade locations of Light Pole have been planned at 1.0m depth below NSL/ FRL with selected material fill.

8.9 SUPERSTRUCTURE

8.10 FLYOVERS

The super-structure for flyovers comprises of pre-cast pre-stressed girders; however, some portions of superstructure at the curvature will be continuous box girders. All girders will be simply supported on laminated elastomeric bearings resting on reinforced concrete transoms, whereas pot bearings have also been proposed to support box-girders.

8.11 LOADING

8.12 TYPES OF LOADS

- Dead Loads
  - Structural Dead Weight : Reinforced Concrete = 24 KN/m³
  - Earth Fill : Compacted Soil = 19 KN/m³
  - Wearing Surfaces (50+50) mm : Load Carpeting = 23 KN/m³
    (50mm Future Provision has been kept in design)
  - Soil Fill : Compacted Soil = 19 KN/m³
  - Concrete Barrier Load : Reinforced Concrete = 24 KN/m³
    (As per actual)
  - Foot Path Load : Concrete/Fill/planks =24/19 KN/m³
    (As per actual)
• Transient Loads

(Except vehicular load, all loads will be applied in accordance with AASHTO LRFD Bridge Design Specifications 2012; such as)

  o Vehicular Dynamic Load Allowance (WPHC)
  o Live Load Surcharge
  o Tractive force
  o Centrifugal force
  o Pedestrian Load : 3.6 kN/m²

• Environmental Loads : Ref: AASHTO LRFD 2012

- Seismic Loads

  o Seismic Zone : 2B as per BCP 2007
  o Soil Profile Type : As per GT report
  o PGA : 0.20 g

- Wind Loads : N/A

Since Seismic analysis is governing the design, therefore case of wind load needs not to be considered for flyover concrete structure, however, pole foundation has been designed for wind loading.

  o Basic wind speed (Fastest mile) : 100mph
  o Exposure : AS per location
  o Wind Importance factor (Iw) : 1.0

- Water Loads : Water loads shall be applied as per AASHTO LRFD article 3.7 wherever required.

- Equipment Loads : N/A

- Piping Loads : N/A

- Construction Loads : As per actual

8.13 LIMIT STATES USED

• Bridge Design

  o STRENGTH – I : Normal vehicular use of Bridge.
- EXTREME – I : Including load due to earthquake.
- SERVICE – I : Normal operational use of bridge.

- **Other Structures’ Design**
  - Strength Combinations : As per UBC-97
  - Alternate Basic Load Combinations : As per UBC-97

### 8.14 Design Methods
- **USD** : Concrete elements
- **WSD** : Checking Bearing Capacity, Design of Bearings and Stress analysis of Pre-stressed Girders

### 8.15 Codes and Standards
- AASHTO LRFD Standard Design Specifications for Highway Bridges 2012
- Building Code of Pakistan (Seismic Provisions-2007)
- American Concrete Institute ACI 318 Building Code requirements for Reinforced Concrete
- American Institute of Steel Construction Specifications AISC.

For Scale of drawings, refer Preliminary Design Drawings. All drawings must be in MKS system.
1. GENERAL DRAWINGS
   - List of Drawings
   - Location Plan
   - General Notes, Abbreviation, Legend
   - List of Traverse & Bench Mark
   - Typical X-sections
   - Setting out Data
   - Geometric Design Criteria & Super-elevation Details
   - Traffic Signs, Pavement Marking, Raised Profile Type Road Stud Details
   - Guard Rail Details
   - Slope protection / Embankment Protection
   - Details of new Bunds
   - Revetment/Stone Pitching details required on new and existing bunds
   - Foot Path, Bus Bays, Service Road etc.
   - Electrical/Street Lights Layouts and Details
   - Stormwater drainage (for gravity and pumping system)
   - Commercial area Parking and footpath arrangement
   - Misc. Details

2. PLAN & PROFILE DRAWINGS
   In plans, complete topography of the area (ROW), details of point of intersections and curve geometry (coordinates, deflection angle, radius, length of curve, tangent length, super elevation, etc. including PI, PC and PT chainage), chainage at every 20m, bridges, culverts etc. should be provided.

   In Profile, chainage, existing ground/road level, finished road level (FRL), grade, “K” value, Vertical Profile data, bridges, culverts etc. should be provided.

   Super-elevation, tangent runout and super-elevation runoff data should also be provided in Plan & Profile drawings.

3. STRUCTURE DRAWINGS
   - General Notes
   - Site Plan of bridges
   - Testing Drawings link Soil Investigation points etc
   - General Arrangement of bridges
   - Abutment/Pier Concrete/reinforcement detail
   - Pile reinforcement Details
   - Girder concrete/reinforcement detail
   - Transom/diaphragms concrete/reinforcement detail
   - Deck Slab, kerb, barrier, railing, expansion joints, bearing pads etc. details
   - Guide Bank, River Training Works, Spars etc.
   - Schedule of culverts
   - General arrangement of box/pipe culverts
   - Dimensional details of box/pipe culvert
   - Reinforcement detail of box culverts
• Details of wing/head wall (concrete & reinforcement)
• Details of retaining wall/protection works
• Details of drains etc.
• Details of retrofitting/rehabilitation of existing bridges/culverts including widening
• etc.

All drawings must be in MKS system
1. **TEMPORARY WATER SUPPLY**

   Where private or government owned water tank and pumps are temporarily removed a supply to the property must be maintained by the Concessionaire.

2. **INDEPENDENT ENGINEER’S FACILITY**

   - The Concessionaire shall provide furnished, equip and maintain site office for the Independent Engineer within sixty (60) days of Approved Detailed Engineering Design. Office provided shall be maintained by the Concessionaire; all times during the duration of the Concession Period including extension period if any.

   - The Concessionaire shall provide following facilities for the Independent Engineer and their staff:
      
      o Provide, furnish, equip and maintain site office
        The office shall be constructed, furnished, equipped and maintained by the Concessionaire, at all times for the duration of the Concession Period including extension period if any.

      o Survey Equipment
        The Survey equipment and accessories shall be provided and maintained by the Concessionaire along with survey helpers and all consumable, at all times for the duration of the Concession Period including extension period if any.

      o Vehicles
        The vehicles shall be provided with driver, fuel, maintenance, insurance, registration etc. by the Concessionaire at all times for the duration of the Concession Period including extension period if any.

3. **LABORATORY FACILITIES WITH TESTING EQUIPMENT**

   The Concessionaire shall furnish the laboratory testing facility with testing equipment, services, supplies, attendants/helpers, furniture and its running maintenance cost for the tests to be conducted.

   The Concessionaire shall also provide for the laboratory one (1) vehicle with one (1) driver to be approved by the Independent Engineer for the sole use of the laboratory to transport testing equipment, testing samples and laboratory technicians, for carrying out inspection and testing on site throughout the same period.

   All the tests shall be executed according to AASHTO and ASTM and all required equipment for facilitation of the tests should be furnished in the lab with two sets
of latest edition of prescribed standards (one to be placed in the laboratory and other for the Independent Engineer).

All Engineer’s Facilities including number of vehicles, survey equipment, laboratory equipment, furniture for office/accommodation/laboratory, etc. will be finalized with the approval of the Independent Engineer.

4. TEMPORARY ROAD, TRAFFIC MANAGEMENT AND CONTROL, GENERAL PROTECTION

Layout plans showing the detailed proposals of temporary diversions to be carried out by the Concessionaire shall be submitted to the Independent Engineer / Agency and to concerned district police and civil agencies and local administration for their written approval 10 days before the implantation date.

Diversion must be constructed in advance of any interference within the existing carriageway/RoW and shall be maintained in accordance with the traffic load in condition satisfactory to the Independent Engineer.

5. LOCATION OF UTILITY SERVICES

Location and identification of all services, in consultation with relevant Utility service providers, companies whether above ground or below the ground shall be Concessionaire and its Contractor(s)’ responsibility following transfer of that utility by Agency and providing the right of way to the Concessionaire, free from any encumbrances.

6. DETAILS OF ENGINEERS FACILITIES

6.1. SCOPE

(a) The Concessionaire shall provide, properly maintained and serviced, facilities for the Independent Engineer (the "Engineer’s Facilities") comprising of an office, (the “Engineer’s Office”), a laboratory (the “Engineer’s Laboratory”), survey equipment (the Engineer’s Survey Equipment") and vehicles (the “Engineer's Vehicles") as specified hereinafter for the exclusive use of the Independent Engineer during the whole Contract period.

(b) The Concessionaire shall provide and pay for all consumables, the consumption of electricity and water, the installation and the use of telephones, and provide and pay for all other incidental and running costs related to the Engineer’s Facilities.

(c) The Engineer’s Facilities shall be available and ready for use within 30 (Thirty) days of the Commencement Date during this period of thirty days the Concessionaire shall make an interim arrangement at his own cost by hiring suitable and acceptable hotel/office/vehicles to serve the purpose to the satisfaction of Engineer.
(d) The Concessionaire shall be responsible for and take all necessary measures to ensure the security of the Engineer's Office, Laboratory and their contents at all times and shall employ watchmen for this purpose.

(e) Laboratory and Survey Equipment shall be provided by the Concessionaire for entire concession period. After expiry of the contract period, the equipment shall become the property of the Concessionaire.

6.2 SITE LAYOUT

(a) The layouts of the sites for the Engineer's Office (to accommodate 15 persons) and Laboratory are to be agreed by the Engineer and should take into account the following general requirements:

(b) Safe access from the public road.

(c) Paved areas for vehicle movement.

(d) Covered areas for vehicle parking.

(e) Dust suppression in unpaved areas.

(f) Grading of the site to provide drainage.

(g) Separate foul and surface water drainage system, with outfall and treatment as appropriate. Septic tanks being suitably distanced from and down-wind of occupied buildings.

(h) Standby electrical generating capacity located and protected to avoid noise nuisance.

(i) Suitable and convenient covered areas for storage of materials samples.

(j) Ducts, cables, pipes and sewers for services and drainage.

Security measures comprising perimeter fencing or walls, gates and guardhouses.

6.3 UTILITIES

(a) Back-up electrical power supply by diesel generator shall be provided. The generator shall have an automatic cut-in in case of failure of the main supply. The power circuit shall be equipped with voltage regulation to protect electrical equipment from overload and to ensure proper operation of computers and the like.

(b) A continuous water supply shall be available for normal use. All kitchens shall be provided with potable water and the source shall be tested and certified by the Concessionaire at least monthly or at shorter intervals as directed by the Engineer.

(c) Continuous supplies of water, electricity and fuel for the stand-by generator shall be provided by the Concessionaire who shall be responsible for and pay all costs of installation, connection, maintenance and use.

(d) Concessionaire shall be responsible to do all the formalities in acquiring and installing the Internet, Water and Electricity connection for the respective building required under this SP.

6.4 COMMUNICATIONS

(a) The Concessionaire shall arrange for, provide and install in the Engineer's Office and Laboratory, communication facilities including Fifteen (15) mobile (cellular) telephone sets with all appurtenances.
(b) The Concessionaire will be required to pay for the cost of telephone calls including calls from mobile phones made by the Engineer, his staff up to a total cost of Rs. 50,000/= (Fifty Thousand Rupees) per calendar month.

(c) Intercom facilities shall be provided between the rooms of the Engineer's Office and the Engineer's Laboratory and Concessionaire's Project Manager if in the same compound.

7. ESTABLISHMENT

(a) Within 7 (Seven) days of the Commencement Date the Concessionaire shall submit to the Engineer the details of furniture and equipment for the Engineer's Office and Laboratory. The rental housing/office/laboratory shall also be arranged within this period.

(b) Within 7 (Seven) days of receiving the Concessionaire's proposals the Engineer will approve them with any necessary modifications and will instruct the Concessionaire to proceed with the procurement of the furnishings and equipment.

(c) The Engineer's Facilities shall be available and ready for use within 30 (Thirty) days of the Commencement Date.

(d) Till such time that the Engineer's facilities are provided, the Concessionaire shall make interim arrangement and shall bear all expenses, such as rent, transport, communications, utilities etc. required to be provided under the provision of this schedule.

7.1 SCOPE

The Concessionaire shall provide the Engineer's office building on rental basis.

a) The office shall comprise Eight offices rooms, a conference room, four lavatories, a kitchen with washing facility and tea room.

b) The Concessionaire's Office will be situated adjacent to but at a reasonable distance from the Engineer's Office.

c) The Concessionaire shall maintain the Engineer's Office in good condition to the satisfaction of the Engineer for as long as required for the purposes of the Contract.

d) The Concessionaire shall provide the Engineer with at-least three office messengers, three helpers/labor for laboratory and four helpers/labor for survey staff and pay for the same.

e) The office building shall be provided with water reservoirs of adequate capacity.

f) The Engineer's office will be handed over to the Concessionaire six (6) months after the date of issue of the Completion Certificate.

8. FURNITURE AND EQUIPMENT

In addition to normal stationery requirements, the Concessionaire shall provide for the Engineer’s Office, furnishings and equipment complying at least to the following list, all to the approval of the Engineer and all for the exclusive use of the Engineer.
9. OFFICE FURNITURE

<table>
<thead>
<tr>
<th>No.</th>
<th>Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Standard office desks with lockable drawers and glass top</td>
</tr>
<tr>
<td>9</td>
<td>Small tables</td>
</tr>
<tr>
<td>4</td>
<td>Swivel type padded desk chairs with arms and castors</td>
</tr>
<tr>
<td>1</td>
<td>Executive desk with lockable drawers and glass top with computer table</td>
</tr>
<tr>
<td>1</td>
<td>Executive type upholstered desk chair</td>
</tr>
<tr>
<td>1</td>
<td>Secretary’s desk with chair and matching computer table</td>
</tr>
<tr>
<td>1</td>
<td>Conference table for eighteen persons with padded swivel chairs</td>
</tr>
<tr>
<td>25</td>
<td>Standard office chairs</td>
</tr>
<tr>
<td>1</td>
<td>Lockable metal filing cabinets for drawings (1.0 x 0.80 x 0.75) m with 4 No. Drawers</td>
</tr>
<tr>
<td>8</td>
<td>Metal cabinets with two lockable doors and five shelves 0.95m x 0.50m x 1.85m high</td>
</tr>
<tr>
<td>2</td>
<td>Metal filing cabinets with four lockable drawers</td>
</tr>
<tr>
<td>4</td>
<td>Metal filing cabinets with two lockable drawers</td>
</tr>
<tr>
<td>5</td>
<td>Book cases with two shelves</td>
</tr>
<tr>
<td>1</td>
<td>Executive sofa set comprising one sofa, two armchairs and coffee table with glass top</td>
</tr>
<tr>
<td>6</td>
<td>Display boards</td>
</tr>
<tr>
<td>12</td>
<td>Metal waste baskets</td>
</tr>
<tr>
<td>7</td>
<td>Office clock, battery powered</td>
</tr>
<tr>
<td>6</td>
<td>Plastic trash containers, 500 mm diameter minimum by 750 mm high.</td>
</tr>
<tr>
<td>1</td>
<td>Electric water coolers</td>
</tr>
<tr>
<td>6</td>
<td>Desk lamps, fluorescent, 20 watts</td>
</tr>
<tr>
<td>1</td>
<td>Desk lamp, executive type</td>
</tr>
<tr>
<td>1</td>
<td>Photocopier with enlarging and reduction capability with 55-65 copies/minute speed</td>
</tr>
<tr>
<td>1</td>
<td>Automatic voltage stabilizer for Xerox photocopier</td>
</tr>
<tr>
<td>10</td>
<td>Air conditioners (cooling and heating) 18,000 BTU or as required</td>
</tr>
<tr>
<td>1</td>
<td>Facsimile machine, Panasonic VF-270 or equivalent</td>
</tr>
<tr>
<td>Quantity</td>
<td>Item Description</td>
</tr>
<tr>
<td>----------</td>
<td>------------------</td>
</tr>
<tr>
<td>1</td>
<td>Automatic voltage stabilizer for facsimile machine</td>
</tr>
<tr>
<td>15</td>
<td>Standard size staplers</td>
</tr>
<tr>
<td>2</td>
<td>Heavy duty staplers</td>
</tr>
<tr>
<td>15</td>
<td>Paper cutters</td>
</tr>
<tr>
<td>2</td>
<td>Paper hole punches, heavy duty</td>
</tr>
<tr>
<td>15</td>
<td>Paper hole punches, light duty</td>
</tr>
<tr>
<td>2</td>
<td>Pairs of scissors, heavy duty</td>
</tr>
<tr>
<td>15</td>
<td>Pencil sharpeners</td>
</tr>
<tr>
<td>4</td>
<td>Pencil sharpeners, desk mounted</td>
</tr>
<tr>
<td>15</td>
<td>Calculators Scientific</td>
</tr>
<tr>
<td>1</td>
<td>Binding machine, Model No. 212 PB by General Binding Corp or similar</td>
</tr>
<tr>
<td>2</td>
<td>Digital Cameras, 35 mm single lens reflex Canon/Nikkon or equivalent, 35-150 mm zoom lens, electronic flash gun, carrying case, filters</td>
</tr>
<tr>
<td>2</td>
<td>Movie Cameras</td>
</tr>
<tr>
<td>8</td>
<td>Fire extinguishers (carbon dioxide), wall-hung</td>
</tr>
</tbody>
</table>

10. | Desktop PCs i-7 with latest version of Licensed Window Operating system, 8 GB RAM, 1 TB hard disk, DVD/RW, LED/LCD 20" PCI Express Graphic Card 1GB, LAN 10/100, Sound Card. |
| 4 | Lap-top computers with all accessories |
| 2 | Laser Printer (A3 + A4 paper size), |
| 6 | Uninterruptible Power supplies, 1 KVA. |
| 1 | Copies of the latest versions of the following PC software |
| | MS Office Latest Version |
| | - AutoCad (latest Licensed Version) |
| | Internet facility |
| | Photocopier Machine (Latest Model), |
| | Scanners. |
11. MISCELLANEOUS

<table>
<thead>
<tr>
<th>Qty</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Oxford Shorter English Dictionary (Soft/Hard copy)</td>
</tr>
<tr>
<td>2</td>
<td>English – Urdu and Urdu – English dictionaries</td>
</tr>
<tr>
<td>20</td>
<td>Construction hard hats</td>
</tr>
<tr>
<td>1</td>
<td>Set of relevant AASHTO specifications</td>
</tr>
<tr>
<td>1</td>
<td>Set of relevant Asphalt Institute manuals</td>
</tr>
<tr>
<td>1</td>
<td>Set of relevant British Standard specifications</td>
</tr>
<tr>
<td>1</td>
<td>Set of relevant ASTM standards</td>
</tr>
<tr>
<td></td>
<td>Consumables including camera film, batteries for clocks and calculators, paper, cartages and all other office supplies as required.</td>
</tr>
<tr>
<td></td>
<td>Venetian blinds and cotton curtains on all windows</td>
</tr>
</tbody>
</table>

12.

<table>
<thead>
<tr>
<th>Qty</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Stainless steel sink with drain board</td>
</tr>
<tr>
<td>1</td>
<td>Electric refrigerator, 0.50 cu.m. capacity with separate freezer compartment, self-defrost type</td>
</tr>
<tr>
<td>1</td>
<td>Set of kitchen cabinets, lockable, with Formica top</td>
</tr>
<tr>
<td>1</td>
<td>Electric kettle</td>
</tr>
<tr>
<td>1</td>
<td>Electric coffee maker</td>
</tr>
<tr>
<td>1</td>
<td>Water heater, 60 liters per minutes</td>
</tr>
<tr>
<td>6</td>
<td>Tea towels</td>
</tr>
<tr>
<td>2</td>
<td>Towel racks</td>
</tr>
<tr>
<td>1</td>
<td>Exhaust fan</td>
</tr>
<tr>
<td></td>
<td>Tea pot, coffee pot, cups, saucers, glasses, spoons and serving trays for 24 persons</td>
</tr>
</tbody>
</table>
13. LAVATORIES

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Hot water heaters, 6 liters per minute</td>
</tr>
<tr>
<td>4</td>
<td>Water closets, pedestal style</td>
</tr>
<tr>
<td>4</td>
<td>Wash basins with hot and cold water</td>
</tr>
<tr>
<td>4</td>
<td>Stainless steel lavatory paper holders</td>
</tr>
<tr>
<td>4</td>
<td>Paper towel dispensers</td>
</tr>
<tr>
<td>4</td>
<td>Mirrors, 400 mm x 500 mm</td>
</tr>
<tr>
<td>4</td>
<td>Ceramic urinals</td>
</tr>
<tr>
<td>4</td>
<td>Exhaust fan, ½ HP, 220 Volt</td>
</tr>
</tbody>
</table>

14. ENGINEER’S LABORATORY

14.1. SCOPE

1. The Concessionaire for the duration of the Contract shall provide Engineer’s Laboratory on rental basis. The laboratory shall be for the exclusive use of the Engineer for testing soils, aggregate, concrete and bituminous materials. The laboratory shall be fully equipped with all utilities, furniture, apparatus and fittings appropriate to such use.

2. The Engineer’s Laboratory shall be located adjacent to the Engineer’s Office. It shall consist of a hall and two offices with storage, lavatory and washing facilities. The hall shall be divided into bitumen section, a soil and aggregates section, and a concrete section.

3. Outside the laboratory water tanks shall be constructed for curing concrete samples, of a size and location approved by the Engineer.

4. The laboratory shall be provided with electricity and telephone and shall be fully air-conditioned. It shall have a regular and dependable supply of water, electricity available throughout 24 hours of each day.

5. All rooms shall be provided with exhaust fans, located particularly over fume cupboards and the like.

6. To maintain the water, supply the building shall be provided with underground and overhead water reservoirs of adequate capacity.

7. The lavatory shall be connected to a septic tank of adequate capacity with a 200 mm sanitary pipe and ventilation pipe stack.

8. The Concessionaire shall provide qualified materials technicians and qualified laboratory helpers as deemed necessary by the Engineer to assist in operating the laboratory. All costs necessary for the provision and upkeep of these personnel shall be the responsibility of the Concessionaire and shall be considered included in the payment herein specified for providing and maintaining the Engineer’s Laboratory.

9. The building for laboratory shall be provided with all the facilities in accordance with Schedule-D.

10. The Engineer’s Laboratory will be handed over to the Concessionaire six months after
the date of issue of the Taking Over Certificate.

11. The Engineer’s Laboratory fittings, furnishings and equipment shall become the property of the Concessionaire six months after the date of issue of the Completion Certificate.

15 SAMPLING

It shall be the responsibility of the Concessionaire to take samples as required by the Engineer and to provide all necessary transport, labor, tools, containers, wrappings and so forth for uplifting and dispatching samples to the Engineer’s Laboratory.

16 TESTS

1. The Engineer’s Laboratory shall be equipped to perform the following in-house tests:

<table>
<thead>
<tr>
<th>TEST</th>
<th>AASHTO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moisture content test by oven drying</td>
<td></td>
</tr>
<tr>
<td>Atterberg limits</td>
<td>T-89 &amp; T-90</td>
</tr>
<tr>
<td>Moisture density relationship of soils (standard method)</td>
<td>T-99</td>
</tr>
<tr>
<td>Moisture density relationship of soils (modified method)</td>
<td>T-180, Method B and D</td>
</tr>
<tr>
<td>Specific gravity of soils</td>
<td>T-100</td>
</tr>
<tr>
<td>CBR test</td>
<td>T-193</td>
</tr>
<tr>
<td>Sieve analysis of soils and aggregate and mineral filler</td>
<td>T-88, T-27 and T-37</td>
</tr>
<tr>
<td>Specific gravity and water absorption of the fine aggregates</td>
<td>T-84</td>
</tr>
<tr>
<td>Specific gravity and water absorption of coarse aggregates</td>
<td>T-85</td>
</tr>
<tr>
<td>Unit weight of aggregates</td>
<td>T-19</td>
</tr>
<tr>
<td>Los/Angeles abrasion test for aggregates</td>
<td>T-96</td>
</tr>
<tr>
<td>Chemical tests:</td>
<td></td>
</tr>
<tr>
<td>- Organic impurities for sand in concrete</td>
<td>T-21</td>
</tr>
<tr>
<td>- Chlorides and Sulphates in fine aggregates</td>
<td>ASTM-1411</td>
</tr>
<tr>
<td>- Potential alkali reactivity test</td>
<td>ASTM-C 289</td>
</tr>
<tr>
<td>Amount of material passing No. 200 sieve</td>
<td>T-11</td>
</tr>
<tr>
<td>Soundness of aggregates</td>
<td>T-104</td>
</tr>
<tr>
<td>Test Description</td>
<td>Code</td>
</tr>
<tr>
<td>---------------------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>Clay lumps and friable particles in aggregates</td>
<td>T-112</td>
</tr>
<tr>
<td>Curing concrete compressive test specimens</td>
<td>T-23</td>
</tr>
<tr>
<td>Compressive strength of concrete cylinder specimens</td>
<td>T-22</td>
</tr>
<tr>
<td>Quality of water to be used in concrete</td>
<td>T-26</td>
</tr>
<tr>
<td>Making and curing concrete test specimens in the laboratory</td>
<td>T-126</td>
</tr>
<tr>
<td>Plastic fines in graded aggregates and soils by use of sand equivalent test</td>
<td>T-176</td>
</tr>
<tr>
<td>Sampling bituminous materials</td>
<td>T-40</td>
</tr>
<tr>
<td>Marshall test and loss in stability</td>
<td>T-245</td>
</tr>
<tr>
<td>Specific gravity of compacted bituminous mixtures</td>
<td>T-166</td>
</tr>
<tr>
<td>Quantitative extraction of bitumen from bituminous paving mixtures</td>
<td>T-164</td>
</tr>
<tr>
<td>Viscosity of bitumen</td>
<td>T-20, T-202</td>
</tr>
<tr>
<td>Penetration of bitumen</td>
<td>T-49</td>
</tr>
<tr>
<td>Flash and fire points</td>
<td>T-48</td>
</tr>
<tr>
<td>Solubility of bituminous materials in organic solvents</td>
<td>T-44</td>
</tr>
<tr>
<td>Coating and stripping of bitumen-aggregate mixture</td>
<td>T-182</td>
</tr>
<tr>
<td>In-place density by sand cone method (with 15.25 cm. and 30.5 cm. cone)</td>
<td>T-191</td>
</tr>
<tr>
<td>In-place density of compacted base course containing large sizes of coarse</td>
<td>T-181</td>
</tr>
<tr>
<td>aggregates</td>
<td></td>
</tr>
<tr>
<td>Sampling fresh concrete</td>
<td>T-141</td>
</tr>
<tr>
<td>Concrete slump</td>
<td>T-119</td>
</tr>
<tr>
<td>Sampling bituminous materials</td>
<td>T-40</td>
</tr>
<tr>
<td>Determining the temperature of bituminous paving mixtures</td>
<td>-</td>
</tr>
<tr>
<td>Coring and determination of bulk specific gravity of compacted bituminous</td>
<td>T-230, T-166</td>
</tr>
<tr>
<td>Mixtures</td>
<td></td>
</tr>
</tbody>
</table>
17. **FURNISHING**

The Concessionaire shall provide for the Engineer’s Laboratory furnishings described in the following list to a quality approved by the Engineer. Substitution of type may be made only upon approval of the Engineer.

<table>
<thead>
<tr>
<th>NO.</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Standard office desks</td>
</tr>
<tr>
<td>1</td>
<td>Swivel type padded desk chairs</td>
</tr>
<tr>
<td>7</td>
<td>Work tables</td>
</tr>
<tr>
<td>15</td>
<td>Standard office chairs</td>
</tr>
<tr>
<td>6</td>
<td>Small tables</td>
</tr>
<tr>
<td>3</td>
<td>Side racks</td>
</tr>
<tr>
<td>2</td>
<td>Metal filing cabinets, 4-drawer</td>
</tr>
<tr>
<td>6</td>
<td>Electronic calculators</td>
</tr>
<tr>
<td>4</td>
<td>Air conditioners (cooling and heating)</td>
</tr>
<tr>
<td>3</td>
<td>Electric water coolers</td>
</tr>
<tr>
<td>1</td>
<td>Display board</td>
</tr>
<tr>
<td>3</td>
<td>Desk lamps, fluorescent, 20 watts</td>
</tr>
<tr>
<td>3</td>
<td>Standard size staplers</td>
</tr>
<tr>
<td>1</td>
<td>Heavy duty stapler</td>
</tr>
<tr>
<td>2</td>
<td>Paper cutters</td>
</tr>
<tr>
<td>2</td>
<td>Paper hole punches</td>
</tr>
<tr>
<td>2</td>
<td>Pencil sharpeners</td>
</tr>
<tr>
<td>4</td>
<td>Fire extinguishers</td>
</tr>
</tbody>
</table>
18. **EQUIPMENT**

(a) The Concessionaire shall provide new laboratory equipment as noted in the list *Equipment for the Engineer’s Laboratory* included herein. The equipment shall be purchased from international suppliers, all to the approval of the Engineer.

(b) The Concessionaire shall submit to the Engineer within 7 (seven) days of the Commencement Date a complete list of the equipment, apparatus and supplies he proposes to furnish for the Engineer’s Laboratory. The list shall include the manufacturer’s name and descriptive literature.

(c) Additional equipment and materials shall be supplied by the Concessionaire at no additional cost as and when required by the Engineer to perform any test relevant to the Works.

(d) Any damaged equipment received in the laboratory shall not be accepted by the Engineer and shall have to be replaced with new one of matching quality and other specifications of the equipment. Any equipment got damaged due to the negligence of Concessionaire’s staff during the working shall be repaired or replaced as would be convenient to the Concessionaire such that the testing schedule in any way should not be effected. The repaired equipment shall be examined by the Engineer or his representative and approved for the use in the material testing. If repaired equipment does not come up to the satisfaction of the Engineer, the same shall have to be replaced with new one.
# EQUIPMENT FOR SITE LABORATORY

<table>
<thead>
<tr>
<th>SR. NO.</th>
<th>EQUIPMENT DESCRIPTION</th>
<th>MODEL No./ NAME</th>
<th>UNIT</th>
<th>QTY.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>GENERAL EQUIPMENT</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Laboratory oven, capacity 256 litre</td>
<td>LIM-600 (NEUMAR, GER)</td>
<td>Each</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Laboratory oven, capacity 53 litre</td>
<td>LIM-400 (NEUMAR, GER)</td>
<td>Each</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Hot plate, maximum temperature 350°C</td>
<td>L-236</td>
<td>Each</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Gas burner, two flames</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Bunsen burner with tripod</td>
<td>China</td>
<td>Each</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>Heavy duty straight spring scale</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Heavy duty balance, 20 kg.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Triple beam balance, 2,610 grams</td>
<td>OHAUS, USA</td>
<td>Each</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>Precision mechanical balance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Wall clock</td>
<td>OHAUS, USA</td>
<td>Each</td>
<td>1</td>
</tr>
<tr>
<td>11</td>
<td>Stop watch</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Vernier caliper</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Thermometer, general, 0°C - 200°C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Maximum - minimum thermometer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Tongs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Desiccator</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Beaker, pyrex, 250 ml</td>
<td>CASI</td>
<td>Each</td>
<td>1</td>
</tr>
<tr>
<td>18</td>
<td>Beaker, pyrex, 500 ml</td>
<td>O</td>
<td>Each</td>
<td>1</td>
</tr>
<tr>
<td>19</td>
<td>Beaker, pyrex, 1,000 ml</td>
<td>China</td>
<td>Each</td>
<td>2</td>
</tr>
<tr>
<td>20</td>
<td>Funnel, 250 ml</td>
<td>ZEAL, UK</td>
<td>Each</td>
<td>2</td>
</tr>
<tr>
<td>21</td>
<td>Funnel, 500 ml</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Volumetric flask, 100 ml</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>Volumetric flask with stopper, 250 ml</td>
<td>Local</td>
<td>Each</td>
<td>2</td>
</tr>
<tr>
<td>24</td>
<td>Volumetric flask with stopper, 500 ml</td>
<td>China</td>
<td>Each</td>
<td>2</td>
</tr>
<tr>
<td>25</td>
<td>Volumetric bottle flask, 250 ml</td>
<td>PYRE</td>
<td>Each</td>
<td>2</td>
</tr>
<tr>
<td>26</td>
<td>Volumetric bottle flask, 500 ml</td>
<td>X</td>
<td>Each</td>
<td>2</td>
</tr>
<tr>
<td>27</td>
<td>Wash bottle, 100 ml</td>
<td>PYRE</td>
<td>Each</td>
<td>2</td>
</tr>
<tr>
<td>28</td>
<td>Wash bottle, 250 ml</td>
<td>X</td>
<td>Each</td>
<td>2</td>
</tr>
<tr>
<td>29</td>
<td>Wash bottle, 500 ml</td>
<td>PYRE</td>
<td>Each</td>
<td>2</td>
</tr>
<tr>
<td>30</td>
<td>Specific gravity bottles (100 ml)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>Graduated cylinder, 100 ml</td>
<td>X</td>
<td>Each</td>
<td>2</td>
</tr>
<tr>
<td>32</td>
<td>Graduated cylinder, 250 ml</td>
<td>PYRE</td>
<td>Each</td>
<td>2</td>
</tr>
<tr>
<td>33</td>
<td>Graduated cylinder, 1,000 ml</td>
<td>X</td>
<td>Each</td>
<td>1</td>
</tr>
<tr>
<td>34</td>
<td>Reagent bottle stoppered, 2 litre</td>
<td>Chin</td>
<td>Each</td>
<td>2</td>
</tr>
<tr>
<td>35</td>
<td>Aluminium cans with cover, 2” diameter</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>Aluminium cans with cover, 3” diameter</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>37</td>
<td>Scoop</td>
<td>Chin</td>
<td>Each</td>
<td>2</td>
</tr>
<tr>
<td>38</td>
<td>Brush, fine</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>39</td>
<td>Wire brush, coarse</td>
<td>Chin</td>
<td>Each</td>
<td>2</td>
</tr>
<tr>
<td>40</td>
<td>Wire brush, fine</td>
<td>a</td>
<td>L.S.</td>
<td></td>
</tr>
<tr>
<td>41</td>
<td>Bucket, 12 litre</td>
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<tr>
<td>SR. NO.</td>
<td>EQUIPMENT DESCRIPTION</td>
<td>MODEL No./NAME</td>
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<td>QTY.</td>
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<tr>
<td>42</td>
<td>Trolly</td>
<td>Loca</td>
<td>Each</td>
<td>1</td>
</tr>
<tr>
<td>43</td>
<td>Shovel,</td>
<td>I</td>
<td>Each</td>
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</tr>
<tr>
<td>44</td>
<td>Large</td>
<td>Loca</td>
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<td>1</td>
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<td>45</td>
<td>Pickaxe</td>
<td>I</td>
<td>Each</td>
<td>1</td>
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<td>46</td>
<td>Sample splitter,</td>
<td>Loca</td>
<td>Each</td>
<td>1</td>
</tr>
<tr>
<td>47</td>
<td>coarse Sample</td>
<td>I</td>
<td>Each</td>
<td>1</td>
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<tr>
<td>48</td>
<td>splitter, fine</td>
<td>Loca</td>
<td>Each</td>
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<td>49</td>
<td>Sieve shaker for 8&quot; diameter sieve,</td>
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<td>Each</td>
<td>4</td>
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<tr>
<td>50</td>
<td>motorised Tin pan/tray, 12&quot; x 12&quot; x 2&quot;</td>
<td>Loca</td>
<td>Each</td>
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<tr>
<td>51</td>
<td>Tin pan/tray, 18&quot; x 18&quot; x 3&quot;</td>
<td>I</td>
<td>Each</td>
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<tr>
<td>52</td>
<td>Tin pan/tray, 24&quot; x 18&quot; x 3&quot;</td>
<td>I</td>
<td>Each</td>
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**COARSE AND FINE AGGREGATES SIEVE**

<table>
<thead>
<tr>
<th></th>
<th>Sieve set 8&quot; diameter:</th>
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<tbody>
<tr>
<td>53</td>
<td>3/4 inch</td>
<td>CBC-</td>
<td>Each</td>
<td>3</td>
</tr>
<tr>
<td>54</td>
<td>1/2 inch</td>
<td>8075</td>
<td>Each</td>
<td>2</td>
</tr>
<tr>
<td>55</td>
<td>3/8 inch</td>
<td>CBC-</td>
<td>Each</td>
<td>2</td>
</tr>
<tr>
<td>56</td>
<td>No. 4 (4.74 mm)</td>
<td>8050</td>
<td>Each</td>
<td>2</td>
</tr>
<tr>
<td>57</td>
<td>No. 8 (2.36 mm)</td>
<td>CBC-</td>
<td>Each</td>
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</tr>
<tr>
<td>58</td>
<td>No. 10 (2.00 mm)</td>
<td>CB-84</td>
<td>Each</td>
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</tr>
<tr>
<td>59</td>
<td>No. 16 (1.18 mm)</td>
<td>CB-88</td>
<td>Each</td>
<td>2</td>
</tr>
<tr>
<td>60</td>
<td>No. 30 (0.60 mm)</td>
<td>CB-810</td>
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<td>61</td>
<td>No. 40 (0.425 mm)</td>
<td>CB-816</td>
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<tr>
<td>62</td>
<td>No. 50 (0.300 mm)</td>
<td>CB-830</td>
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<tr>
<td>63</td>
<td>No. 80 (0.180 mm)</td>
<td>CB-840</td>
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<tr>
<td>64</td>
<td>No. 100 (0.150 mm)</td>
<td>CB-850</td>
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<td>65</td>
<td>No. 200 (0.075 mm)</td>
<td>CB-880</td>
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<td>66</td>
<td>Wet washing No. 200</td>
<td>CB-</td>
<td>Each</td>
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<tr>
<td>67</td>
<td>Sieve set 12&quot; diameter:</td>
<td>CB-</td>
<td>Each</td>
<td>3</td>
</tr>
<tr>
<td>68</td>
<td>3 inch (75 mm)</td>
<td>CB-</td>
<td>Each</td>
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</tr>
<tr>
<td>69</td>
<td>2 1/2 inch (63 mm)</td>
<td>CB-</td>
<td>Each</td>
<td>2</td>
</tr>
<tr>
<td>70</td>
<td>2 inch (50 mm)</td>
<td>8100</td>
<td>Each</td>
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</tr>
<tr>
<td>71</td>
<td>1 1/2 inch (38 mm)</td>
<td>CB-</td>
<td>Each</td>
<td>2</td>
</tr>
<tr>
<td>72</td>
<td>1 inch (25 mm)</td>
<td>8200</td>
<td>Each</td>
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<tr>
<td>73</td>
<td>3/4 inch (19 mm)</td>
<td>CL-385</td>
<td>Each</td>
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<tr>
<td>74</td>
<td>1/2 inch (12.5 mm)</td>
<td>CW-</td>
<td>Each</td>
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<tr>
<td>75</td>
<td>3/8 inch (9.5 mm)</td>
<td>CW-</td>
<td>Each</td>
<td>2</td>
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<tr>
<td>76</td>
<td>No. 4 (4.74 mm)</td>
<td>18300</td>
<td>Each</td>
<td>2</td>
</tr>
<tr>
<td>77</td>
<td>Sieve set 18&quot; diameter:</td>
<td>CW-</td>
<td>Each</td>
<td>2</td>
</tr>
<tr>
<td>78</td>
<td>3 inch (75 mm)</td>
<td>18250</td>
<td>Each</td>
<td>2</td>
</tr>
<tr>
<td>79</td>
<td>2 inch (50 mm)</td>
<td></td>
<td>Each</td>
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</tr>
<tr>
<td>SR. No.</td>
<td>Equipment Description</td>
<td>Model No./Name</td>
<td>Unit</td>
<td>Qty.</td>
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<tr>
<td>---------</td>
<td>-------------------------------------</td>
<td>----------------</td>
<td>--------</td>
<td>------</td>
</tr>
<tr>
<td>80</td>
<td>1 1/2 inch (38 mm)</td>
<td>CW-18150</td>
<td>Each</td>
<td>2</td>
</tr>
<tr>
<td>81</td>
<td>1 inch (25 mm)</td>
<td>CW-18100</td>
<td>Each</td>
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</tr>
<tr>
<td>82</td>
<td>3/4 inch (19 mm)</td>
<td>CW-18075</td>
<td>Each</td>
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<tr>
<td>83</td>
<td>1/2 inch (12.5 mm)</td>
<td>CW-18050</td>
<td>Each</td>
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</tr>
<tr>
<td>84</td>
<td>3/8 inch (9.5 mm)</td>
<td>CW-18037</td>
<td>Each</td>
<td>2</td>
</tr>
<tr>
<td>85</td>
<td>No. 4 (4.75 mm)</td>
<td>CW-184</td>
<td>Each</td>
<td>2</td>
</tr>
<tr>
<td>86</td>
<td>Pan</td>
<td>CB-8500</td>
<td>Each</td>
<td>2</td>
</tr>
<tr>
<td>87</td>
<td>Cover</td>
<td>CB-8506</td>
<td>Each</td>
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**Atterberg Limits**

<table>
<thead>
<tr>
<th>No.</th>
<th>Equipment Description</th>
<th>Model</th>
<th>Unit</th>
<th>Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>88</td>
<td>Liquid limit test set with all accessories</td>
<td>CL-209</td>
<td>Each</td>
<td>1</td>
</tr>
<tr>
<td>89</td>
<td>Plastic limit test set with all accessories</td>
<td>CL-251</td>
<td>Each</td>
<td>1</td>
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**Sand Equivalent**

<table>
<thead>
<tr>
<th>No.</th>
<th>Equipment Description</th>
<th>Model</th>
<th>Unit</th>
<th>Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>90</td>
<td>Apparatus complete</td>
<td>CL-230</td>
<td>Set</td>
<td>1</td>
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</table>

**Coarse and Fine Aggregate Unit**

<table>
<thead>
<tr>
<th>No.</th>
<th>Equipment Description</th>
<th>Model</th>
<th>Unit</th>
<th>Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>91</td>
<td>Density basket, brass</td>
<td>G-340</td>
<td>Each</td>
<td>1</td>
</tr>
<tr>
<td>92</td>
<td>Sand absorption cone and tamper</td>
<td>Local</td>
<td>Each</td>
<td>1</td>
</tr>
<tr>
<td>93</td>
<td>Pycnometers</td>
<td>Local</td>
<td>Each</td>
<td>2</td>
</tr>
<tr>
<td>94</td>
<td>Specific gravity bottle</td>
<td>China</td>
<td>Each</td>
<td>1</td>
</tr>
<tr>
<td>95</td>
<td>Specific gravity bottle</td>
<td>China</td>
<td>Each</td>
<td>1</td>
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</tbody>
</table>

**Abrasion**

<table>
<thead>
<tr>
<th>No.</th>
<th>Equipment Description</th>
<th>Model</th>
<th>Unit</th>
<th>Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>97</td>
<td>Los Angeles abrasion machine with</td>
<td>M-600</td>
<td>Each</td>
<td>1</td>
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</table>

**Coarse and Fine Aggregate Soundness**

<table>
<thead>
<tr>
<th>No.</th>
<th>Equipment Description</th>
<th>Model</th>
<th>Unit</th>
<th>Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>98</td>
<td>Distilled water</td>
<td></td>
<td>L.S.</td>
<td>*</td>
</tr>
<tr>
<td>99</td>
<td>Sodium sulphate solution</td>
<td></td>
<td>L.S.</td>
<td>*</td>
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**Modified Compaction**

<table>
<thead>
<tr>
<th>No.</th>
<th>Equipment Description</th>
<th>Model</th>
<th>Unit</th>
<th>Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>Straight edge</td>
<td>Local</td>
<td>Each</td>
<td>1</td>
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<tr>
<td>101</td>
<td>Scoop</td>
<td>Local</td>
<td>Each</td>
<td>1</td>
</tr>
<tr>
<td>102</td>
<td>Scoop</td>
<td>Local</td>
<td>Each</td>
<td>1</td>
</tr>
<tr>
<td>103</td>
<td>Mixing spoons</td>
<td>Local</td>
<td>Each</td>
<td>1</td>
</tr>
<tr>
<td>104</td>
<td>Modified compaction hammer, 10 lbs</td>
<td>Local</td>
<td>Each</td>
<td>2</td>
</tr>
<tr>
<td>105</td>
<td>Modified compaction mould, 6&quot; diameter</td>
<td>Local</td>
<td>Each</td>
<td>2</td>
</tr>
<tr>
<td>106</td>
<td>Modified compaction mould, 4&quot; diameter</td>
<td>Local</td>
<td>Each</td>
<td>2</td>
</tr>
<tr>
<td>107</td>
<td>Preparation knife</td>
<td>Local</td>
<td>Each</td>
<td>1</td>
</tr>
<tr>
<td>108</td>
<td>Wooden hammer</td>
<td>Local</td>
<td>Each</td>
<td>1</td>
</tr>
<tr>
<td>109</td>
<td>Spatula</td>
<td>Local</td>
<td>Each</td>
<td>1</td>
</tr>
<tr>
<td>110</td>
<td>Mixing tray, 24&quot; x 24&quot; x 3&quot;</td>
<td>Local</td>
<td>Each</td>
<td>*</td>
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**Laboratory CBR**

<table>
<thead>
<tr>
<th>No.</th>
<th>Equipment Description</th>
<th>Model</th>
<th>Unit</th>
<th>Qty.</th>
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</thead>
<tbody>
<tr>
<td>111</td>
<td>Soaking, tank 60&quot; x 120&quot; x 24&quot;</td>
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<td>Each</td>
<td>1</td>
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<tr>
<td>112</td>
<td>CBR mould, 6&quot; diameter with collars, plate,</td>
<td>Local</td>
<td>Each</td>
<td>9</td>
</tr>
<tr>
<td>113</td>
<td>Filter Paper</td>
<td>Local</td>
<td>L.S.</td>
<td>*</td>
</tr>
<tr>
<td>114</td>
<td>Swell Plates</td>
<td>Local</td>
<td>Each</td>
<td>9</td>
</tr>
<tr>
<td>115</td>
<td>Surcharge weights</td>
<td>Local</td>
<td>Each</td>
<td>18</td>
</tr>
<tr>
<td>116</td>
<td>Surcharge weights, slotted</td>
<td>Local</td>
<td>Each</td>
<td>2</td>
</tr>
<tr>
<td>117</td>
<td>Tripod attachment</td>
<td>Local</td>
<td>Each</td>
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</tr>
<tr>
<td>SR. NO.</td>
<td>EQUIPMENT DESCRIPTION</td>
<td>MODEL No./NAME</td>
<td>UNIT</td>
<td>QTY.</td>
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<td>Cement</td>
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<td></td>
<td>Asphalt</td>
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<td>Bitumen</td>
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<td>Concrete</td>
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<tr>
<td>118</td>
<td>Dial indicator</td>
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<td>Each</td>
<td>9</td>
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<tr>
<td>119</td>
<td>Spacer, disc</td>
<td>Local</td>
<td>Each</td>
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<td>120</td>
<td>CBR testing machine automatic</td>
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<tr>
<td>121</td>
<td>Proving ring, 10 KN</td>
<td>PR-60</td>
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<tr>
<td>122</td>
<td>Providing ring, 50 KN</td>
<td>PR-100</td>
<td>Each</td>
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<tr>
<td>123</td>
<td>Sand cone bottle</td>
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<td>Each</td>
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<td>124</td>
<td>Density plate</td>
<td>Local</td>
<td>Each</td>
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<tr>
<td>125</td>
<td>Plastic jug for sand</td>
<td>Local</td>
<td>Each</td>
<td>2</td>
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<tr>
<td>126</td>
<td>Replacement jug</td>
<td>Local</td>
<td>Each</td>
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<td>127</td>
<td>Spoon</td>
<td>Local</td>
<td>Each</td>
<td>2</td>
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<tr>
<td>128</td>
<td>Plastic bags</td>
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<td>Each</td>
<td>2</td>
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<tr>
<td>129</td>
<td>Chisel, 12&quot;</td>
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<td>Each</td>
<td>2</td>
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<tr>
<td>130</td>
<td>Hammer, 2.5 lbs</td>
<td>OHAUS (USA)</td>
<td>Each</td>
<td>2</td>
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<tr>
<td>131</td>
<td>Field balance</td>
<td>Local</td>
<td>Each</td>
<td>2</td>
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<td></td>
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<td>132</td>
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<tr>
<td>133</td>
<td>Bitumen penetration test, penetrometer</td>
<td>AP-140</td>
<td>Set</td>
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<td>134</td>
<td>Marshall stability compressive machine</td>
<td>AP-170 &amp; PR 60</td>
<td>Each</td>
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<td>135</td>
<td>Marshall specimen mould assembly</td>
<td>Local</td>
<td>Each</td>
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<tr>
<td>136</td>
<td>Base plate for compressive mould</td>
<td>AP-166</td>
<td>Each</td>
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<td>137</td>
<td>Marshall compaction hammer</td>
<td>AP-165</td>
<td>Each</td>
<td>1</td>
</tr>
<tr>
<td>138</td>
<td>Marshall specimen mould holder</td>
<td>AP-167</td>
<td>Each</td>
<td>1</td>
</tr>
<tr>
<td>139</td>
<td>Marshall breaking head</td>
<td>AP-169</td>
<td>Each</td>
<td>1</td>
</tr>
<tr>
<td>140</td>
<td>Marshall flow meter</td>
<td>AP-171</td>
<td>Each</td>
<td>1</td>
</tr>
<tr>
<td>141</td>
<td>Marshall mixing apparatus</td>
<td>C-110</td>
<td>Each</td>
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<tr>
<td>142</td>
<td>Water bath (thermostatic) controlled to</td>
<td>AP-160</td>
<td>Each</td>
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<tr>
<td>143</td>
<td>Bituminous extractor apparatus complete</td>
<td>AP-174</td>
<td>Each</td>
<td>1</td>
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<tr>
<td>144</td>
<td>Filter disc</td>
<td>AP-177</td>
<td>L.S.</td>
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<tr>
<td>145</td>
<td>Mixing bowl (steel)</td>
<td>AP-190</td>
<td>Each</td>
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<td>146</td>
<td>Vacuum pycnometer</td>
<td>AP-132</td>
<td>Each</td>
<td>1</td>
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<tr>
<td>147</td>
<td>Extractor for stability mould</td>
<td>AP-168</td>
<td>Each</td>
<td>1</td>
</tr>
<tr>
<td>148</td>
<td>Stability mould with collar</td>
<td>AP-166</td>
<td>Each</td>
<td>6</td>
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<td>149</td>
<td>Compaction pedestal</td>
<td>AP-172</td>
<td>Each</td>
<td>1</td>
</tr>
<tr>
<td>150</td>
<td>Pavement core drill with 4&quot; diameter core</td>
<td>DR-1304</td>
<td>Each</td>
<td>1</td>
</tr>
<tr>
<td>151</td>
<td>Core bit, 4&quot; diameter</td>
<td>DR-1440</td>
<td>Each</td>
<td>4</td>
</tr>
<tr>
<td>152</td>
<td>Carbon tetrachloride</td>
<td>AP-178</td>
<td>Drum</td>
<td></td>
</tr>
<tr>
<td>153</td>
<td>Thermometer, metallic 350°C</td>
<td>-</td>
<td>Each</td>
<td>4</td>
</tr>
<tr>
<td>154</td>
<td>Hubbard-carmick specific gravity bottle</td>
<td>AP-185</td>
<td>Each</td>
<td>1</td>
</tr>
<tr>
<td>155</td>
<td>Stop watch for marshall test</td>
<td>-</td>
<td>Each</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>156</td>
<td>Compressive strength machine, heavy duty,</td>
<td>CT-755</td>
<td>Each</td>
<td>1</td>
</tr>
<tr>
<td>157</td>
<td>Steel scale</td>
<td>-</td>
<td>Each</td>
<td>2</td>
</tr>
<tr>
<td>158</td>
<td>Curing tank with temperature control</td>
<td>-</td>
<td>Each</td>
<td>1</td>
</tr>
<tr>
<td>SR. NO.</td>
<td>EQUIPMENT DESCRIPTION</td>
<td>MODEL No./ NAME</td>
<td>UNIT</td>
<td>QTY.</td>
</tr>
<tr>
<td>--------</td>
<td>---------------------------------------------------</td>
<td>-----------------</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td>159</td>
<td>Cement mould brush</td>
<td>CT-68B</td>
<td>Each</td>
<td>2</td>
</tr>
<tr>
<td>160</td>
<td>Flexure attachment</td>
<td>CT-84</td>
<td>Each</td>
<td>1</td>
</tr>
<tr>
<td>161</td>
<td>Concrete tray</td>
<td>CT-58</td>
<td>Each</td>
<td>*</td>
</tr>
<tr>
<td>162</td>
<td>Air meter complete</td>
<td>-</td>
<td>Set</td>
<td>1</td>
</tr>
<tr>
<td>163</td>
<td>Cylinder mould, heavy duty, 6” diameter</td>
<td>CT-35</td>
<td>Each</td>
<td>9</td>
</tr>
<tr>
<td>164</td>
<td>Cylinder capping apparatus</td>
<td>CT-53</td>
<td>Each</td>
<td>1</td>
</tr>
<tr>
<td>165</td>
<td>Concrete capping compound</td>
<td>-</td>
<td>Kg</td>
<td>*</td>
</tr>
<tr>
<td>166</td>
<td>Laboratory warming pot</td>
<td>L-114</td>
<td>Each</td>
<td>1</td>
</tr>
<tr>
<td>167</td>
<td>Slump test cone</td>
<td>CT-69</td>
<td>Set</td>
<td>2</td>
</tr>
<tr>
<td>168</td>
<td>Tamper</td>
<td>CT-22</td>
<td>Each</td>
<td>1</td>
</tr>
<tr>
<td>169</td>
<td>Vibrating table</td>
<td>CT-164</td>
<td>Each</td>
<td>1</td>
</tr>
<tr>
<td>170</td>
<td>Concrete micrometer</td>
<td>CT-29</td>
<td>Each</td>
<td>1</td>
</tr>
<tr>
<td>171</td>
<td>Vicat apparatus set</td>
<td>CT-1</td>
<td>Set</td>
<td>1</td>
</tr>
<tr>
<td>172</td>
<td>Steel straight edge</td>
<td>-</td>
<td>Each</td>
<td>2</td>
</tr>
<tr>
<td>173</td>
<td>Hand gloves, rubber</td>
<td>-</td>
<td>Pair</td>
<td>*</td>
</tr>
<tr>
<td>174</td>
<td>Trowel triangular blade</td>
<td>CT-67</td>
<td>Each</td>
<td>2</td>
</tr>
<tr>
<td>175</td>
<td>Cement cube mould</td>
<td>CT-60</td>
<td>Each</td>
<td>2</td>
</tr>
</tbody>
</table>
19. MAINTENANCE OF ENGINEER’S OFFICE AND LABORATORY

19.1 SCOPE

1. The Concessionaire shall maintain the Engineer’s Office and Laboratory in all respects, including all repairs and replacements of any item and the supply of all consumables.

2. The Concessionaire shall provide all necessary janitorial services and supplies for the Engineer’s Office & Laboratory. The services shall include normal domestic servicing and cleaning, including lavatories and bathrooms, washing windows and so forth. Janitorial services shall be performed on a daily basis with personnel and to a program of work approved by the Engineer.

3. The Concessionaire shall maintain the Engineer’s Office & Laboratory in a neat, hygienic and attractive manner and provide daily garbage collection and disposal services.

4. The Concessionaire shall maintain fire extinguishers and air-conditioners as recommended by their manufacturers and shall clean and replace air-conditioner air filters at regular intervals of one month, or more frequently if required by service conditions or as otherwise directed by the Engineer.

5. The Concessionaire shall provide guard services for the Engineer’s Office & Laboratory on a twenty-four-hour basis. The suitability, number and work schedule of all guard personnel shall be approved by the Engineer.

6. The maintenance of Engineer’s office housing and laboratory shall also include payment all utilities bills such as Telephone (includes Mobile Telephone and internet service also) Electricity and water etc. by the Concessionaire.

20. ENGINEER’S SURVEY EQUIPMENT

20.1 SCOPE

1. The Concessionaire shall provide and maintain survey equipment for the use of the Engineer. All the survey equipment shall be new and shall be maintained throughout the Contract and replaced by the Concessionaire free of charge in case of damage or loss due to any caused. The Concessionaire shall also arrange calibration of all surveying equipment after every three months.

2. The Concessionaire shall provide and pay for experienced survey helpers for the Engineer as required by the Engineer.

3. The survey equipment after the completion of the project shall become the property of the Concessionaire.

21. EQUIPMENT

The Concessionaire shall provide and maintain the following survey equipment:
<table>
<thead>
<tr>
<th>NO.</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total Station survey units complete</td>
</tr>
<tr>
<td></td>
<td>Total Station accessories complete as under:</td>
</tr>
<tr>
<td></td>
<td>- Interface Cable</td>
</tr>
<tr>
<td></td>
<td>- Comms Plus Unit</td>
</tr>
<tr>
<td></td>
<td>- Precision Wooden Tripod</td>
</tr>
<tr>
<td>1</td>
<td>Single Tilting Range Pole Prism complete as under:</td>
</tr>
<tr>
<td></td>
<td>- Prism</td>
</tr>
<tr>
<td></td>
<td>- Single Tilting Mount with Coaxial Target</td>
</tr>
<tr>
<td></td>
<td>- Range Pole Telescopic Tripod with Soft Case</td>
</tr>
<tr>
<td></td>
<td>- 2 m Telescopic Range Pole</td>
</tr>
<tr>
<td></td>
<td>- Range Pole Level</td>
</tr>
<tr>
<td></td>
<td>- Soft Case</td>
</tr>
<tr>
<td></td>
<td>1 complete Single Tilting Prism with Coaxial Target as under:</td>
</tr>
<tr>
<td></td>
<td>- Prism</td>
</tr>
<tr>
<td></td>
<td>- Single Tilting Mount with Coaxial Target</td>
</tr>
<tr>
<td></td>
<td>- Simple Carrier</td>
</tr>
<tr>
<td></td>
<td>- Tribrach with Optical Plummet</td>
</tr>
<tr>
<td></td>
<td>- Soft</td>
</tr>
<tr>
<td></td>
<td>1 complete Triple Tilting Prism with Coaxial Target as under:</td>
</tr>
<tr>
<td></td>
<td>- Prism</td>
</tr>
<tr>
<td></td>
<td>- Triple Tilting Mount with Coaxial Target</td>
</tr>
<tr>
<td></td>
<td>- Simple Carrier</td>
</tr>
<tr>
<td></td>
<td>- Tribrach with optical plummet</td>
</tr>
<tr>
<td>Item</td>
<td>Description</td>
</tr>
<tr>
<td>---------------------------</td>
<td>------------------------------------</td>
</tr>
<tr>
<td>Soft case</td>
<td></td>
</tr>
<tr>
<td>Aluminum Telescopic Tripod</td>
<td></td>
</tr>
<tr>
<td>1 m Range Pole for Extension</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Automatic Level complete</td>
</tr>
<tr>
<td>2</td>
<td>Aluminum Telescopic Tripod</td>
</tr>
</tbody>
</table>
22. CONSUMABLES

The Concessionaire shall provide adequate supplies of expendable materials, such as pencils, rubbers, steel nails, inks, notebooks, drawing paper, survey pegs, brushes, paints etc. as required by the Engineer.

23. ENGINEER’S VEHICLES

23.1 SCOPE

1. The Concessionaire shall provide, maintain and make available at all times for the exclusive use of the Independent Engineer the following new vehicles, the number and type of each being as specified below:

   a. Double Cabin (4WD – 3000cc) ------------------------ 1 no

   b. Jeep (4WD – 1500cc) ------------------------------- 2 nos

   c. Car (1000cc) --------------------------------------- 2 nos

   All vehicles shall be air-conditioned.

2. All vehicles shall be fitted with 3-point inertia-reel seat belts for all occupants.

3. All the vehicles shall be provided for the Engineer’s use within 28 (twenty-eight) days from the Start Date.

4. If the Concessionaire fails to provide the vehicles within the time specified, the cost incurred by the Engineer in renting similar replacement vehicles plus a 20% (twenty percent) overhead charge shall be payable by the Concessionaire.

5. The vehicles shall be registered, taxed, comprehensively insured, fueled, repaired, serviced, cleaned and maintained by the Concessionaire for the duration of the Contract plus six months and temporarily replaced if, in the Engineer’s opinion, any vehicle is not in a roadworthy condition.

6. The Concessionaire shall provide safe, experienced and competent drivers for all the vehicles, to the approval of the Engineer. Each driver shall be responsible for the
vehicle allocated to him for the duration of the Contract. The Concessionaire shall promptly replace any driver who, in the Independent Engineer’s opinion, is not satisfactory.

7. All vehicles shall become property of the Concessionaire six months after the issuance of Completion Certificate

15. **PROJECT DIRECTOR’S VEHICLE:**

The required numbers of vehicles for the Project Director are listed below:

<table>
<thead>
<tr>
<th>Type</th>
<th>Model</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a)</td>
<td>SUV (4WD – 2800cc)</td>
<td>1 No</td>
</tr>
<tr>
<td>(b)</td>
<td>Car (1800 cc)</td>
<td>1 No</td>
</tr>
<tr>
<td>(c)</td>
<td>Car (1000 cc)</td>
<td>2 No</td>
</tr>
<tr>
<td><strong>Anticipated start of design</strong></td>
<td>Within ten (10) days of Effective Date</td>
<td></td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-------------------------------------</td>
<td></td>
</tr>
<tr>
<td><strong>Anticipated end of design</strong></td>
<td>means the date falling the later of:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(c) one hundred and eighty (180) days after the Effective Date; or</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(d) ninety days (90) days from the approval of physical Hydraulic Model Study from the Irrigation Department of Government of Sindh</td>
<td></td>
</tr>
<tr>
<td><strong>Scheduled Commencement Date</strong></td>
<td>means the date falling the later of:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(a) one hundred and eighty (180) days after the Effective Date; or</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(b) ninety days (90) days from the approval of physical Hydraulic Model Study from the Irrigation Department of Government of Sindh</td>
<td></td>
</tr>
<tr>
<td><strong>Anticipated start of construction</strong></td>
<td>Commencement Date</td>
<td></td>
</tr>
<tr>
<td><strong>Substantial Completion</strong></td>
<td>Twenty-four (24) months from Commencement Date</td>
<td></td>
</tr>
<tr>
<td><strong>Anticipated expiry of Concession Agreement &amp; handover of facilities</strong></td>
<td>10 years following Substantial Completion Date</td>
<td></td>
</tr>
<tr>
<td><strong>Scheduled Construction Completion Date</strong></td>
<td>As determined by Independent Auditor on Substantial Completion but in any event not exceeding ninety (90) days following Substantial Completion Date</td>
<td></td>
</tr>
</tbody>
</table>
SCHEDULE G – LIST OF TESTS & COMPLETION TESTS

The Concessionaire shall furnish the laboratory testing facility with testing equipment, services, supplies, attendants/helper, furniture and its running and maintenance cost for the tests to be conducted. The Concessionaire shall also provide for the laboratory a vehicle with driver to be approved by the Independent Engineer for the sole use of the laboratory to transport testing equipment, testing samples and laboratory technicians, for carrying out inspection and testing on site throughout the same period.

All tests shall be executed as per the designated standard and all required equipment for facilitation of the tests should be furnished in the lab with two sets of latest edition of prescribed standards (one to be placed in the laboratory and other in the Independent Engineer office).

The Concessionaire should submit the list of tests to be carried out and their sample forms in the proposed methodology.

THE TESTS

A) LABORATORY TESTS

The Laboratory shall be equipped to perform the following tests:

<table>
<thead>
<tr>
<th>SR. NO.</th>
<th>TESTS</th>
<th>AASHTO DESIGNATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dry preparation of soil samples</td>
<td>T-87</td>
</tr>
<tr>
<td>2</td>
<td>Soil Classification</td>
<td>M-145</td>
</tr>
<tr>
<td>3</td>
<td>Determination of Moisture Content</td>
<td>T-265</td>
</tr>
<tr>
<td>4</td>
<td>Atterberg Limits</td>
<td>T-89 &amp; 90</td>
</tr>
<tr>
<td>5</td>
<td>Moisture density relationship (Modified Method)</td>
<td>T-180</td>
</tr>
<tr>
<td>6</td>
<td>C.B.R Test and swelling test</td>
<td>T-193</td>
</tr>
<tr>
<td>7</td>
<td>Relative Density Test</td>
<td>ASTM D4253</td>
</tr>
<tr>
<td>8</td>
<td>Sieve Analysis of Soils, aggregate and Mineral Filler</td>
<td>T-88, T-27 &amp; T-37</td>
</tr>
<tr>
<td>9</td>
<td>Los Angeles Abrasion test of aggregates</td>
<td>T-96</td>
</tr>
<tr>
<td>10</td>
<td>Sand Equivalent</td>
<td>T-176</td>
</tr>
<tr>
<td>11</td>
<td>Soundness of aggregates</td>
<td>T-104</td>
</tr>
<tr>
<td>12</td>
<td>Asphalt Coating</td>
<td>T-195</td>
</tr>
<tr>
<td>13</td>
<td>Coating and stripping of Bitumen Aggregate</td>
<td>T-182</td>
</tr>
<tr>
<td>14</td>
<td>Specific Gravity &amp; Absorption of Coarse Aggregate</td>
<td>T-85</td>
</tr>
<tr>
<td>15</td>
<td>Specific Gravity and Absorption of Fine Aggregate</td>
<td>T-84</td>
</tr>
<tr>
<td>16</td>
<td>Penetration of bitumen material</td>
<td>T-49</td>
</tr>
<tr>
<td>17</td>
<td>Amount of Passing No. 200 sieve</td>
<td>T-11</td>
</tr>
<tr>
<td>18</td>
<td>Quantitative Extraction of Bitumen from Mixtures</td>
<td>T-164</td>
</tr>
<tr>
<td>19</td>
<td>Gradation analysis of bitumen extracted aggregates</td>
<td>T-30</td>
</tr>
<tr>
<td>SR. NO.</td>
<td>TEST</td>
<td>AASHTO DESIGNATION</td>
</tr>
<tr>
<td>--------</td>
<td>----------------------------------------------------------------------</td>
<td>--------------------</td>
</tr>
<tr>
<td>20</td>
<td>Specific gravity of compacted bitumen mixture</td>
<td>T-166</td>
</tr>
<tr>
<td></td>
<td><strong>SR. NO.</strong> TESTS <strong>AASHTO DESIGNATION</strong></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Marshall test and loss in stability</td>
<td>T-245</td>
</tr>
<tr>
<td>22</td>
<td>Maximum specific gravity of bitumen paving mixture</td>
<td>T-209</td>
</tr>
<tr>
<td>23</td>
<td>Air voids in compacted paving bitumen mix</td>
<td>T-269</td>
</tr>
<tr>
<td>24</td>
<td>Specific gravity of bitumen material</td>
<td>T-228</td>
</tr>
<tr>
<td>25</td>
<td>Softening point of bitumen (Ring and Ball method)</td>
<td>T-53</td>
</tr>
<tr>
<td>26</td>
<td>Sampling aggregates</td>
<td>T-2</td>
</tr>
<tr>
<td>27</td>
<td>Fineness Modulus</td>
<td>T-27</td>
</tr>
<tr>
<td>28</td>
<td>Organic impurities</td>
<td>T-21</td>
</tr>
<tr>
<td>29</td>
<td>Mortar Strength</td>
<td>T-71</td>
</tr>
<tr>
<td>30</td>
<td>Friable particles</td>
<td>T-112</td>
</tr>
<tr>
<td>31</td>
<td>Potential reactivity of carbonate rocks for concrete aggregates (Rock-Cylinder method)</td>
<td>ASTM C-586</td>
</tr>
<tr>
<td>32</td>
<td>Unit weight of aggregates</td>
<td>T-19</td>
</tr>
<tr>
<td>33</td>
<td>Air content of freshly mixed concrete by volumetric method</td>
<td>T-196</td>
</tr>
<tr>
<td>34</td>
<td>Making and curing of concrete test specimens</td>
<td>T-126</td>
</tr>
<tr>
<td>35</td>
<td>Curing concrete compressive test specimens</td>
<td>T-23</td>
</tr>
<tr>
<td>36</td>
<td>Compressive strength of cylinder concrete specimens</td>
<td>T-22</td>
</tr>
<tr>
<td>37</td>
<td>Setting time and consistency of cement</td>
<td>T-131</td>
</tr>
<tr>
<td>38</td>
<td>Normal consistency of hydraulic cement</td>
<td>T-129</td>
</tr>
</tbody>
</table>

B) **FIELD TESTS:**

The following tests will be carried out for field control/spot checking purposes as the Works proceeds:

<table>
<thead>
<tr>
<th>SR. NO.</th>
<th>TEST</th>
<th>AASHTO DESIGNATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>In-place density by Sand Cone Method</td>
<td>T-191</td>
</tr>
<tr>
<td>2</td>
<td>Sampling fresh concrete</td>
<td>T-141</td>
</tr>
<tr>
<td>3</td>
<td>Slump of Portland cement concrete</td>
<td>T-119</td>
</tr>
<tr>
<td>4</td>
<td>Sampling bituminous materials</td>
<td>T-40</td>
</tr>
<tr>
<td>5</td>
<td>Determining the temp. of bituminous paving mixtures</td>
<td>-</td>
</tr>
<tr>
<td>6</td>
<td>Determining Degree of Pavement Compaction by coring</td>
<td>T-230</td>
</tr>
<tr>
<td>7</td>
<td>Bulk specific gravity</td>
<td>T-166</td>
</tr>
<tr>
<td>8</td>
<td>Density of soil and soil aggregate by Nuclear methods</td>
<td>T-238</td>
</tr>
<tr>
<td>9</td>
<td>Moisture content of soil and soil aggregate by Nuclear method</td>
<td>T-239</td>
</tr>
</tbody>
</table>
THE COMPLETION TESTS

Completion Tests shall mean the final inspection and tests of the Concession Assets by the Independent Engineer to ensure that the same conforms to the Project Requirements.

The roughness of the pavement, over any one kilometer length, shall not exceed a value of 5,000 millimeters per kilometer, as measured using 'Bump Integrator' technique, or an equivalent alternative standard established through alternative testing methods. Roughness criteria as per Highway Design and Maintenance Standards Model (HDM 1995) are as follows:

<table>
<thead>
<tr>
<th>Road Type</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smooth Paved Road</td>
<td>2,000 mm/km</td>
</tr>
<tr>
<td>Reasonably Smooth Paved Road</td>
<td>4,000 mm/km</td>
</tr>
<tr>
<td>Medium Rough Paved Road</td>
<td>6,000 mm/km</td>
</tr>
<tr>
<td>Rough Paved Road</td>
<td>8,000 mm/km</td>
</tr>
<tr>
<td>Very Rough Paved Road</td>
<td>10,000 mm/km</td>
</tr>
</tbody>
</table>
1. OPERATION AND MAINTENANCE

- The Concessionaire is required to carry out Operations & Maintenance – O&M in respect of the Project in conformity with AASHTO standards and in accordance with the Concession Agreement. The O&M Requirements are set out, inter alia, in Article 19 (Operations and Maintenance).
- The general scope of Operations & Maintenance includes all services associated with the planning, management and delivery of the operations, maintenance and asset preservation activities to ensure compliance with AASHTO standards and with all performance measures set out in the Concession Agreement.
- The Project should be constructed and operated in a manner that it does not require Maintenance during the Defects Liability Period.
- The Project should not require a Major Maintenance before ten years of Substantial Completion Date and afterwards, should not require another major maintenance before ten years of first Major Maintenance. The cost for the Major Maintenance shall be borne by the Concessionaire.

2. OPERATIONS ROLE

- The Concessionaire will ensure the smooth flow of vehicles and minimization of traffic delays and closures
- The Concessionaire will ensure the safety of commuters and will provide emergency support to commuters
- Safety vehicle, two trucks, ambulances, patrolling vehicles will be used by Concessionaire to ensure smooth operations of works
- The Concessionaire will ensure the administration, monitoring of conditions, traffic control, assessment of the need for load restriction, posting of warnings to vehicles, and signage
- The Concessionaire will ensure the Quality Management on a self-auditing basis, in conformity with AASHTO testing procedures
- Following Operation methodology should be followed by the Concessionaire:
  - Patrolling on three-hour intervals, on 24/7/365 basis
  - Emergency & Rescue response system
  - Provision of emergency medical services/ambulance/clinic
  - Maintaining traffic sign maintenance data, cat eyes, road markings, culverts, bridges
  - Maintaining the trees (Palm/date family) and/or low height planters planted by the Concessionaire at the Project Site
  - Maintaining weight violations data, death/injuries data.
  - Preparing periodic report with peak hour flows and peak day flows and other statistics
  - Maintaining operational crew & equipment for emergency maintenance
  - Preparing and implementing education programs and campaigns on:
    - Road safety and customer safety
    - Customer response & comments
    - Customer awareness
3. MAINTENANCE ROLE

Concessionaire is responsible for maintaining the Concession Assets, including the Project Facilities, road pavement, structures, pavement markings, drainage infrastructure, electrical systems, mechanical installations, closed landfill sites, landscaping, inspections, periodic repairs, traffic maintenance and emergency maintenance mentioned as under.

a) Annual/Routine Maintenance (From year 3 of Operations phase)

- Isolated holes, Pot holes, fold pavements, skin patch, widening roads in asphaltic layer should immediately be repaired
- Any damages to side barrier due to any accident or other causes should immediately be reported periodically
- Road Marking Maintenance
- Cat's Eyes Maintenance
- Traffic Sign Maintenance
- Minor maintenance due to damage caused by Road accidents
- Revetment/Stone Pitching

b) Periodic/Major Maintenance

- Over-lays (two overlays, first after 10 years of Substantial Completion and second on 10th year of first overlay)
- Potholes Maintenance
- Guard Rail Maintenance
- Shoulder Maintenance
- Revetment/Stone Pitching
- New Road Markings, where required.
- International Road Roughness Test at selected sections identified by the Independent Engineer should be carried out at every five years of operation and any portion of pavement found failed should be maintained as per AASHTO standards with approval from Independent Engineer. All the formalities will be checked for their stability and smooth operation.

4. OPERATION AND MAINTENANCE CRITERIA

4.1 Operation Requirements - General Criteria

During the Operations Phase of the Concession, the Concessionaire shall be responsible for the efficient operation of all sub Projects, the recovery and removal of broken-down vehicles, the removal of debris and spillage from the concession area and the provision of other basic services to users of the facility. In this regards the Concessionaire shall formulate detailed SOPs.
The Concessionaire will be required to liaise closely with the police and the emergencies services to ensure that performance and safety standards are met at all times.

In this section, a series of minimum performance standards are set out that must be met at all times by the Concessionaire. The Concessionaire will be required to operate an Operations Manual, to be approved by the Agency, setting out procedures whereby these standards – or higher performance standards as may be agreed upon – are to be met.

4.2 Restriction on Vehicular Access

Use of Project area will not be limited to any particular types of vehicles. Limitation on permissible gross vehicle weight, maximum axle load, and vehicle width, height and length will be governed as per the NHA Standards (the Permissible Load).

The Concessionaire shall have the option to allow the vehicles exceeding the Permissible Load by up to fifteen (15%) percent subject to charging fines. In such case, the Concessionaire shall send a request to allow such vehicles exceeding the Permissible Load to the Agency via the Independent Engineer for approval.

The Agency shall, at its sole discretion, decide whether or not such vehicles exceeding the Permissible Load are allowed to use the Proposed flyover/expressway/bridge. Provided however, it is clarified that the Concessionaire shall not be allowed to permit vehicles weighing more than fifteen (15) percent of the Permissible Load.

The rate of any fines to be imposed on such vehicles exceeding the Permissible Load shall be proposed by the Independent Engineer in accordance with the NHA Standards and the same shall be notified by the Agency. Such notification shall be displayed publicly by the Concessionaire at appropriate locations.

The fines collected by the Concessionaire shall be used for any additional Operation & Maintenance expenditure incurred due to allowing vehicles exceeding Permissible Load. It is hereby agreed that any notification to allow vehicles exceeding Permissible Load shall be made on the request of the Concessionaire and that the Agency shall not provide any funding for the increased Operation & Maintenance expenditures as a result of allowing vehicles exceeding the Permissible Load. The increased Operation & Maintenance expenditures, if any, will be borne by the Concessionaire.

Vehicles exceeding the Permissible Load shall not be allowed to use the Project facilities. The Concessionaire shall ensure that adequate facilities are built to allow
such vehicles which exceed the Permissible Load to take a U-turn without hindering normal traffic flow.

The Concessionaire shall be responsible to provide the necessary width and length of road and safety features, as approved by the Independent Engineer, when constructing such facilities to regulate the flow of vehicles exceeding the Permissible Load.

4.3 IDENTIFICATION OF INCIDENTS AND INITIATION OF ACTION

In normal circumstances, any emergency telephones if provided shall be in working order at all times.

The Project Control Centre shall be staffed by at least two personnel at all times. The principal function of these personnel shall be to receive information and to initiate appropriate actions to overcome reported incidents. Such actions shall include mobilization of vehicle recovery and emergency services.

The response time between receipt of information and initiation of appropriate action shall normally be no longer than fifteen (15) minutes.

4.4 RECOVERY OF STANDARD VEHICLES

Throughout the duration of the Operations Phase of the Concession the CONCESSIONAIRE shall provide, at cost a vehicle recovery services to remove stranded vehicle from the Concession Area.

This recovery service shall operate in such a manner as to provide, as a minimum, that all stranded vehicles shall, within one hour of being reported, be located and removed from the project road to the local repair facility.

The vehicles deployed and the methods used for removal of stranded vehicles shall conform to internationally recognized standards. In addition, all staff employed in such activities shall be fully trained in all aspects of vehicle removal and road safety, and shall wear appropriate reflective clothing.

4.5 REMOVAL OF DEBRIS AND SPILLAGE

At all times throughout the duration of Operation Phase of the Concession, the Concessionaire shall provide and maintain a mobile rapid response maintenance team to attend at the scene of any reported incident.

The primary function of this rapid response team will include, but not be limited to:
• The removal of debris and spillage from the carriageway;
• The rendering safe of any identified safety hazards; and
• The introduction and monitoring of any emergency traffic management system that is required in connection with emergency situations with necessary coordination with traffic police.

The vehicle deployed and the methods and equipment used for carrying out these emergency activities shall conform to internationally recognized standards. In addition, all staff employed in such activities shall be fully trained in all aspects of traffic safety, emergency procedures and remedial maintenance and shall wear appropriate reflective clothing.

**PROVISION OF BASIC LEVELS OF SERVICES**

In addition to the above specific operational requirements, the following basic levels of services shall be maintained at all times throughout the Operations Phase if the Concession:

- All parts of the project shall remain open for use by traffic at all time, except as may be agreed from time to time by the Agency;
- All road lighting, intersection, shall be illuminated throughout the hours of darkness, except as provided for under the maintenance regime in Section 5.
- All toilet facilities shall be continually staffed and the toilets shall be maintained in a clean condition throughout the operational hours of the Service (and Rest) Areas (if such areas are provided).
- All parts of the Concession Areas shall be kept clean, tidy and free from litter.

**4.6 TRAFFIC MANAGEMENT AND ROAD SAFETY**

When undertaking any maintenance or other activity, on or adjacent to the project facilities, adequate precautions shall be taken to protect the safety of both the general public and Concessionaire’s employee and representative. These precautions shall include, but not be limited to, the provision of adequate advance signing, the provision of appropriate traffic management system on the approaches to and adjacent to the works area, and when appropriate the provision of adequate illumination of all signing and traffic management system.

The layout of all such signing and of the traffic management systems themselves shall be in accordance with the requirement of international standards.

**5. MAINTENANCE WORKS AND REQUIREMENTS**

**5.1 GENERAL**

It is an implicit requirement of the Concession that the Concessionaire shall maintain the facility in good order throughout the Concession Period. It is also a requirement that Concessionaire shall transfer the facility to the Agency, at the end of the Concession Period in an acceptable and well-maintained condition.
The Concessionaire will be required to prepare SOPs and undertake a maintenance program with the objective of ensuring that the all sub projects can be operated efficiently throughout the Concession Period and satisfies the condition Criteria at transfer.

Maintenance of the facility can be broadly divided into two specific areas day-to-day corrective action to remedy faults due to vehicle damage, vandalism and reported malfunctions; and planned maintenance based on regular inspection, assessment of condition against specified performance thresholds.

For both of these types of maintenance activity, a comprehensive database shall be established by the Concessionaire, detailing in date order, all reported faults (whether through planned maintenance inspections or reports from members of the public, police or other government bodies) and the corrective action taken. All such records shall remain available for inspection by the Agency for period of the Concession Period.

The road will be re-evaluated every 7 - 10 years and a structural overlay will be provided to enhance the life of pavement for next ten years. The same procedure will be repeated for the overlays to enhance the design life of carriageway to next 20 years.

5.2 Road Pavement

The need for periodic maintenance of the road pavement will be determined by the use of annual condition and usage surveys. The function of these surveys will be to record, in both absolute and relative terms, the road pavement’s performance, ride ability and structural integrity. Bump Integrator or latest technology available shall be used for the purpose of condition survey.

On an annual basis, condition surveys shall be undertaken of the whole road pavement within the Concession Area. These surveys shall be divided into one kilometer sections and shall record:

- the location, type and magnitude of all cracking in the road pavement (block cracking, alligator cracking, longitudinal and transverse cracking, and edge cracking)
- the location condition and magnitude of all existing sealing compound in the road pavement;
- the extent of all potholes and patching, both within the pavement and at the pavement edge;
- the structural strength of the road pavement and its sub layers. as indicated by the extent of any depressions, or rutting in the inner and outer wheel tracks of the nearside lane;
- the extent of any bleeding, stripping or spreading of the road surface;
- the riding quality (roughness) of the pavement.

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Based on the findings of these surveys, a planned maintenance program shall be developed for the following year, the objective of such a program being to take remedial action at the earliest possible time to both reduce the overall need for maintenance and the consequent disruption to traffic.

In determining this maintenance program, it will be a mandatory requirement that the condition of the road pavement conforms to the following minimum performance standards throughout the period of the Concession:

**EXTENT OF CRACKING AND JOINT SEALING**

5.1.1 Within any kilometer section of road, the extent of pavement cracking shall not exceed the limit set out in table 2.1 in all cases cracking should be non-spalling.

<table>
<thead>
<tr>
<th>Table 2.1: Road Pavement, Maximum Acceptable Extent of Cracking</th>
</tr>
</thead>
</table>
**Type of Cracking** | **Maximum Acceptable levels**
---|---
Centre Line Cracking | 0.1 meters per sq. meter for less than 25 percent of the section length
Wheel Track Cracking | 0.1 meters per sq. meter for less than 25 percent of the section length
Block Cracking | 0.1 meters per sq. meter for less than 25 percent of the section length

**EXTENT OF POTHOLES**

5.1.2 Within any one (1) kilometer length of road there shall be no more than five existing or patched potholes with a size greater than 500mm x 500mm x 25mm

**EXTENT OF RUTTING**

5.1.3 The depth of rutting at any particular location shall not exceed 13 (Thirteen) millimeters and, additionally, over a one kilometer length of carriageway no more than 250 meters shall be rutted up to depth of 13 (Thirteen) millimeters as per AASHTO Guide for Design of Pavement Structures, Appendix-K. These criteria shall apply to the mean depth of rutting computed from measurements taken every 20 feet (6 meters) along the length of the road.

**RIDING QUALITY**

5.1.4 The roughness or the pavement, over anyone kilometer length, shall not exceed a value of 5,000 millimeters per kilometer, as measured using the 'Bump Integrator' technique, or an equivalent alternative standard established through use of alternative testing methods. Roughness criteria as per Highway Design and Maintenance Standard Model (HOM 1995) is as following:

- Smooth Paved Road 2,000 mm/Km
- Reasonably Smooth Paved Road 4,000 mm/Km
- Medium Rough Paved Road 6,000 mm/Km
- Rough Paved Road 8,000 mm/Km
- Very Rough Paved Road 10,000 mm/Km

5.1.5 In addition to ensuring that the road pavement meets the above stated minimum performance criteria, the RBOe will also be required to conduct a 'rolling routine maintenance program to ensure that the
road pavement and shoulders are adequately protected from rapid deterioration through the day-to-day actions of raffle and water penetration. This program shall include, but not be limited to:

- making good all potholes and edge failures within seven days of their being identified or reported;
- sealing all pavement cracks at the earliest possible opportunity following the annual inspection; and
- repairing any existing joint or crack-filling sealant that has ceased to be effective.

2. **Structure**

5.1.6 All structures shall be fully inspected at two yearly intervals as part of a planned monitoring procedure, and any identified defects shall be remedied within a period of six months from the date of inspection.

5.1.7 In addition, any structure that has been the subject of collision or other damage shall be inspected as soon as is practical, and in any event within a period of 24 hours of the incident taking place.

5.1.8 If such an inspection shows that the structure's structural integrity has been compromised, appropriate action shall be taken immediately to ensure the safety of road users. Remedial repairs should then be undertaken, as soon as is practical, to restore the structure to a safe operational condition.

5.1.9 Minor damage that does not in any way compromise the structural integrity of the structure shall be carried out within six months as part of a rolling maintenance program.

3. **Earthworks**

5.1.10 All earthworks shall be inspected for signs of deterioration, at three-monthly intervals, and more frequently during the monsoon season, as part of a 'rolling planned maintenance program' and appropriate remedial action shall be taken to make good any identified defects.

5.1.11 In addition, daily inspections of any susceptible areas of earthworks (including rip-rap embankment linings) shall be made during periods when unusually high water levels are identified adjacent to the Concession Area, and appropriate action shall be taken to both safeguard the structural integrity of the facility and to remedy any defects that occur.
4. DRAINAGE

5.1.12 The drainage system shall be inspected and routinely maintained at six-monthly intervals. The timing of these inspections shall be such as to ensure that the system is fully functional at times of heaviest rainfall and there is no water ponding which may cause damage to the road pavement.

5.1.13 The six-monthly inspection and routine maintenance shall be designed to ensure that the system is free of silt and other debris, all covers and manholes are in place and secured, and are fully functional. Catch basins and culvert inlets and outlets should also be cleaned regularly to remove accumulated debris.

5.1.14 In addition, at two-yearly intervals the drainage system shall be fully inspected to ascertain its structural integrity, and appropriate remedial action shall be taken as necessary.

5. ROAD LIGHTING

5.1.15 Routine maintenance activities shall be undertaken at the intervals specified in Table 2.3

**Table 2.3: Road Lighting, Maintenance Schedule**

<table>
<thead>
<tr>
<th>Interval</th>
<th>Maintenance Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Every 14 days</td>
<td>Remedy any defect leading to non-illumination of the lamp fitting</td>
</tr>
<tr>
<td>Every 12 months</td>
<td>Clean all lanterns and examine the water tightness, mechanical, structural and electrical integrity of the necessary remedial repair</td>
</tr>
<tr>
<td>Every 36 months</td>
<td>Bulk change all High Pressure Sodium lamps (SON and SON-T)</td>
</tr>
<tr>
<td>Every 5 years or earlier if necessary</td>
<td>Repaint all lamp column in accordance with United Kingdom Department of Transport Standard BD 1/83 or similar.</td>
</tr>
</tbody>
</table>

2.6.2 All faults that are not rectified at the time of inspection shall be rectified as follows:
• Where the identified fault represents a structural or electrical safety hazard, steps shall be taken to effect a permanent or temporary repair within 24 hours and all temporary repairs shall be permanently rectified with in period of 14 days.
• Where lighting failures constitute a road safety hazard the failure shall be rectified as soon as possible and at least within 14 days of the inspection; and
• Isolate lamp failures that do not constitute a road safety hazard, and any other defects that do not compromise safety, shall be rectified within six months as part of rolling 6-monthly maintenance program.

5.7 **ROAD SIGNS**

5.7.1 Routine maintenance of road signs shall be of two types. The first relates to the visibility and safety of the sign installation and the second relates to the overall condition of the sign.

5.7.2 Routine maintenance activities shall be undertaken at the intervals specified in Table 2.4.

5.7.3 The maintenance activities set out in Table 2.4 shall include the inspection of all signs at the intervals specified, for the purpose of identifying and rectifying the particular category of fault. All faults that are not rectified at the time of inspection shall be rectified as follows:

• Where the identified fault represents a safety hazard, steps shall be taken to effect a permanent or temporary repair within 24 hours and all temporary repairs shall be permanently rectified with in period of 28 days.
• Where the identified fault does not represent a safety hazard, remedial action shall be undertaken as soon as is practical.
• Any road sign that is damaged beyond repair shall be replaced at the earliest opportunity and in any events within 7 days of the damage occurring.

5.7.4 In addition to the routine maintenance regime set out in Table 2.4 bulk changes of all lamps shall be carried at intervals appropriate to the type of lamp used.
### TABLE 2.4: ROAD SIGN, MAINTENANCE SCHEDULE

<table>
<thead>
<tr>
<th>Interval</th>
<th>Maintenance Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily</td>
<td>Visual Inspection for damage or vandalism and the effecting of all emergency repair work identified through inspection or reported by the public, police or other body.</td>
</tr>
<tr>
<td>Every 28 days</td>
<td>Remedy any defect resulting in non-illumination of lamps.</td>
</tr>
<tr>
<td>At least every 6 months but more regularly if needed</td>
<td>Clean the surface material of all signs and luminaries and take appropriate action to ensure that unobstructed visibility is maintained in accordance with the design criteria.</td>
</tr>
<tr>
<td>Every 2 years</td>
<td>Maintain all electrical installation and remedy any identified faults in accordance with United Kingdom IEE Wiring Regulation (15th Edition) or similarly approved standard.</td>
</tr>
<tr>
<td>Every 2 years</td>
<td>Check the structural integrity of all signs including the security of all brackets, bolts and other fittings the condition of all rivets welded joints frames posts and gantries</td>
</tr>
<tr>
<td></td>
<td>Check the appearance and condition of the sign in terms of legibility luminance color and retro-reflective properties and carry out all necessary remedial works.</td>
</tr>
</tbody>
</table>

### 5.8 Road Markings

5.8.1 All road markings shall be subjected to routine inspection at least once every year. These inspections shall be aimed at determining the extent of degradation of the markings due to:
a. Normal wear and tear or damage
b. Spread due to movement of the road surface or plasticity of the material
c. Loss of color
d. Reduction in retro-reflective properties.

5.8.2 Apart from subjective inspections of retro-reflective properties, all inspections shall be carried out in daylight conditions:

5.8.3 In all cases where the level of degradation exceeds the limits set out in Table 2.5 corrective maintenance shall be undertaken within a period of six months.

5.9 VEHICULAR SAFETY BARRIERS

5.9.1 Maintenance of safety barriers shall be of two types. The first relates to identifying and rectifying collision damage, and the second relates to maintaining the overall condition of the safety barrier.

8.16 TABLE 2.5: ROAD MARKINGS, MAINTENANCE PERFORMANCE THRESHOLDS

<table>
<thead>
<tr>
<th>Type of Degradation</th>
<th>Threshold for Corrective Maintenance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wear (erosion)</td>
<td>70% or less of the Thermoplastic material remaining on the road surface</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Spread</th>
<th>10% or greater increase in the dimension of the markings, when compared with specified dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color (luminance factor)</td>
<td>Luminance factor 45% or less</td>
</tr>
<tr>
<td>Retro-reflectivity</td>
<td>Nominal 100mcd/m2/1ux</td>
</tr>
</tbody>
</table>

5.9.2 All vehicular safety barriers shall be visually examined on a daily basis to identify damage. All such damage that is identified shall be made safe at the earliest opportunity, and in any event within a period of 24 hours. In addition, permanent repairs to all damaged sections of safety barrier shall be affected within a period of seven days.

5.9.3 All safety barriers shall be inspected at six-monthly intervals to determine
their condition in terms of structural integrity and horizontal and vertical alignment. Any identified defects that relate directly to user safety shall be rectified as soon as is practical, and in any event made temporarily safe within a period of 24 hours and fully rectified within the following seven days.

5.9.4 Other identified defects that do not affect user safety shall be rectified as part of a 'rolling' six-monthly maintenance program,
SCHEDULE I – INSURANCES

PART I – CONSTRUCTION PERIOD INSURANCES

As mutually agreed between the Parties prior to the Commencement Date.

PART II – OPERATIONS PERIOD INSURANCES

As mutually agreed between the Parties prior to the Commencement Date.
## SCHEDULE J – SPECIFIED CONCESSIONAIRE PERMITS

### LIST OF CONSENTS

<table>
<thead>
<tr>
<th>S.No</th>
<th>PERMITS</th>
<th>TO BE PROCURED BY CONCESSIONAIRE</th>
<th>TO BE PROCURED BY AGENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Pakistan Engineering Council</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Sindh Environmental Protection Agency, Government of Sindh (EIA)</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Sindh Building Control Authority</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Karachi Development Authority/KDA/CDGK</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Forest Department, Government of Sindh</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Provincial Highway Department, Government of Sindh</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>7.</td>
<td>National Highway Authority, Ministry of Communication, Government of Pakistan</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>8.</td>
<td>Pakistan Petroleum Limited, if required</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>Sui Southern Gas Company – SSGC, if required</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Pakistan Telecommunication Authority, if required</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>National Transmission &amp; Despatch Company Limited, if required</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>Mosques, Imam Barghas, Places of Religious Affairs, Government of</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Sindh.</td>
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<td>---</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>14.</td>
<td>WAPDA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15.</td>
<td>Culture, Tourism &amp; Antiquities Department, Government of Sindh</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
1. The certified copies of the memorandum and articles of association of the Concessionaire;

2. Board Resolution duly passed by the board of directors of the Concessionaire resolving that the Concessionaire may undertake the Project and stating the name of the authorized signatory of the Concessionaire who shall sign this Agreement, the Agency Agreements, the Financing Documents, and the Project Agreements (to which the Concessionaire is a party) and all other necessary documents in favor of the Agency for and on behalf of the Concessionaire;

3. Certificate of incorporation; and

To:  
**PROJECT MANAGER,**  
**URBAN ROAD INITIATIVES IN KARACHI – KORANGI LINK ROAD PROJECT**  
**GOVERNMENT OF SINDH**

GUARANTEE NO. ...................................... (hereinafter referred to as the “Guarantee”)  
Dated: ........................................

We, [INSERT NAME OF BANK], being the Guarantee issuing bank (hereinafter referred to as the “Guarantor Bank”) understands that the following parties have entered into an agreement entitled the “CONCESSION AGREEMENT” dated [●], 20__(hereinafter referred to as the “Agreement”) for the design, engineering, construction, financing, commissioning, operations and maintenance of the Urban Road Initiatives In Karachi – Korangi Link Road Project under the public private partnership mode:

(a) **THE GOVERNOR OF SINDH** (THROUGH LOCAL GOVERNMENT & HTP DEPARTMENT), having its offices at 3rd Floor, Sindh Secretariat, Karachi, Pakistan (hereinafter referred to as the “Agency”); and

(b) [●], a company incorporated under the laws of Pakistan, having its registered office located at [●] (hereinafter referred to as the “Concessionaire”, which expression shall, where the context so permits, be deemed to mean and include its legal heirs, successors in interest, administrators, executors, and permitted assigns).

Further, the Guarantor Bank understands that pursuant to the terms of the Agreement, the Concessionaire is required to provide the Agency with a bank guarantee in an amount equal to PKR [INSERT AMOUNT IN NUMBERS]/- (Pakistani Rupees [INSERT AMOUNT IN WORDS]).

The above premised, the Guarantor Bank hereby undertakes irrevocably and unconditionally to pay to the Agency, without any notice, reference or recourse to the Concessionaire or to any other entity or without any recourse or reference to the Agreement, any other document, agreement, instruments or deeds, any sum or sums (or any part thereof) equivalent in aggregate up to but not exceeding a maximum amount of:

PKR [●]/- (Pakistani Rupees [●])  
(hereinafter referred to as the “Guaranteed Amount”)
at sight & immediately, however not later than within [●] ([●]) business days from the date of the Guarantor Bank's receipt of the Agency's first written demand (hereinafter referred to as the "Demand") at the Guarantor Bank's offices located at [INSERT ADDRESS OF THE GUARANTOR BANK AT WHICH DEMAND WILL BE MADE], such Demand stating:

(a) the total amounts demanded; and

(b) the bank account to which the amounts demanded pursuant to the demand are to be credited/transfered (hereinafter referred to as the "Bank Account").

A Demand shall only be honoured by the Guarantor Bank if it is made by and bears the signature of an authorised officer or representative of the Agency.

The Guarantor Bank shall unconditionally honour a Demand hereunder made in compliance with this Guarantee immediately (however not later than [●] ([●]) business days) of its receipt of the Agency's Demand, as stated earlier, and shall transfer the amount specified in the Demand to the Bank Account.

This Guarantee shall come into force and shall become automatically effective upon its issuance.

After having come into force, this Guarantee and the Guarantor Bank's obligations hereunder shall expire on [INSERT DATE AND TIME] (the Guarantee Expiry Hard Date) irrespective of whether this Guarantee has been returned to the Guarantor Bank provided that, in the event that the Agency issues a Demand to the Guarantor Bank on or immediately prior to the Guarantee Expiry Hard Date and the same is received by the Guarantor Bank on or prior to the Guarantee Expiry Hard Date, the Guarantor Bank shall honour such Demand.

Upon expiry, this Guarantee shall be returned to the Concessionaire without undue delay. Multiple Demands may be made by the Agency under this Guarantee, but the Guarantor Bank's aggregate liability shall be restricted up to the Guaranteed Amount.

The Guarantor Bank hereby agrees that any part of the Agreement may be amended, renewed, extended, modified, compromised, released or discharged by mutual agreement between the Agency and the Concessionaire without:

(a) in any way impairing or affecting the Guarantor Bank's liabilities hereunder;

(b) notice to the Guarantor Bank; and
(c) the necessity for any additional endorsement, consent or guarantee by the Guarantor Bank.

This Guarantee for its validity period shall not be affected in any manner by any change in the Guarantor Bank’s constitution or of the Concessionaire’s constitution or of their successors and assignees and this Guarantee shall be legally valid, enforceable and binding on each of their successors and permitted assignees.

All references to any contract or other instruments are by way of reference only and shall not affect the Guarantor Bank’s obligations to make payment under the terms of this Guarantee.

The Agency shall not assign / transfer or cause or permit to be assigned or transferred any of its rights, title, interests and benefits of this Guarantee without the prior written consent of the Guarantor Bank and the Concessionaire.

If one or more of the provisions of this Guarantee are held or found to be invalid, illegal, or unenforceable for any reason whatsoever, in any respect, any such invalidity, illegality, or unenforceability of any provision shall not affect the validity of the remaining provisions of this Guarantee.

The Guarantor Bank hereby declares and confirms that under its constitution and applicable laws, it has the necessary power and authority to:

(a) enter into, execute and deliver this Guarantee; and

(b) perform the obligations it has undertaken under this Guarantee, which obligations are valid and legally binding on and enforceable against the Guarantor Bank under the laws of Pakistan.

Further, the Guarantor Bank hereby declares and confirms that the signatory(ies) to this Guarantee is/are its duly authorized officer(s) to execute this Guarantee.

This Guarantee and all rights and obligations arising from this Guarantee shall be governed and construed in all respects in accordance with the laws of Pakistan. The courts in Karachi, Pakistan shall have exclusive jurisdiction in respect of any dispute relating to any matter contained herein.

**EXECUTED & ISSUED**

**FOR & ON BEHALF OF THE GUARANTOR BANK**
<table>
<thead>
<tr>
<th><strong>WITNESSES</strong></th>
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SCHEDULE M – FORM OF O&M PERFORMANCE SECURITY

To:
PROJECT MANAGER,
URBAN ROAD INITIATIVES IN KARACHI – KORANGI LINK ROAD PROJECT,
GOVERNMENT OF SINDH

GUARANTEE NO. ……………………. (hereinafter referred to as the “Guarantee”)
Dated: …………………………….

We, [INSERT NAME OF BANK], being the Guarantee issuing bank (hereinafter referred to as the “Guarantor Bank”) understands that the following parties have entered into an agreement entitled the “CONCESSION AGREEMENT” dated [●], 20__ (hereinafter referred to as the “Agreement”) for the design, engineering, construction, financing, commissioning, operations and maintenance of the Urban Road Initiatives In Karachi – Korangi Link Road Project under the public private partnership mode:

(a) THE GOVERNOR OF SINDH (THROUGH LOCAL GOVERNMENT & HTP DEPARTMENT), having its offices at 3rd Floor, Sindh Secretariat, Karachi, Pakistan (hereinafter referred to as the “Agency”); and

(b) [●], a company incorporated under the laws of Pakistan, having its registered office located at [●], Pakistan (hereinafter referred to as the “Concessionaire”, which expression shall, where the context so permits, be deemed to mean and include its legal heirs, successors in interest, administrators, executors, and permitted assigns).

Further, the Guarantor Bank understands that pursuant to the terms of the Agreement, the Concessionaire is required to provide the Agency with a bank guarantee in an amount equal to PKR [INSERT AMOUNT IN NUMBERS]/- (Pakistani Rupees [INSERT AMOUNT IN WORDS]).

The above premised, the Guarantor Bank hereby undertakes irrevocably and unconditionally to pay to the Agency, without any notice, reference or recourse to the Concessionaire or to any other entity or without any recourse or reference to the Agreement or any other document, agreement, instruments or deeds, any sum or sums (or any part thereof) equivalent in aggregate up to but not exceeding a maximum amount of:

PKR [●]/- (Pakistani Rupees [●])

(hereinafter referred to as the “Guaranteed Amount”)
at sight, immediately, however not later than within [●] ([●]) business days from the date of the Guarantor Bank's receipt of the Agency's first written demand (hereinafter referred to as the "Demand") at the Guarantor Bank's offices located at [INSERT ADDRESS OF THE GUARANTOR BANK AT WHICH DEMAND WILL BE MADE], such Demand stating:

(a) the total amounts demanded; and

(b) the bank account to which the amounts demanded pursuant to the demand are to be credited/transfered (hereinafter referred to as the "Bank Account").

A Demand shall only be honoured by the Guarantor Bank if it is made by and bears the signature of an authorised officer or representative of the Agency.

The Guarantor Bank shall unconditionally honour a Demand hereunder made in compliance with this Guarantee immediately (however not later than [●] ([●]) business days) of its receipt of the Agency's Demand, as stated earlier, and shall transfer the amount specified in the Demand to the Bank Account.

This Guarantee shall come into force and shall become automatically effective upon its issuance.

After having come into force, this Guarantee and the Guarantor Bank's obligations hereunder shall expire on [INSERT DATE AND TIME] (the Guarantee Expiry Hard Date) irrespective of whether this Guarantee has been returned to the Guarantor Bank provided that, in the event that the Agency issues a Demand to the Guarantor Bank on or immediately prior to the Guarantee Expiry Hard Date and the same is received by the Guarantor Bank on or prior to the Guarantee Expiry Hard Date, the Guarantor Bank shall honour such Demand.

Upon expiry, this Guarantee shall be returned to the Concessionaire without undue delay. Multiple Demands may be made by the Agency under this Guarantee, but the Guarantor Bank's aggregate liability shall be restricted up to the Guaranteed Amount.

The Guarantor Bank hereby agrees that any part of the Agreement may be amended, renewed, extended, modified, compromised, released or discharged by mutual agreement between the Agency and the Concessionaire without:

(a) in any way impairing or affecting the Guarantor Bank's liabilities hereunder; and

(b) notice to the Guarantor Bank; and
(c) the necessity for any additional endorsement, consent or guarantee by the Guarantor Bank.

This Guarantee for its validity period shall not be affected in any manner by any change in the Guarantor Bank’s constitution or of the Concessionaire’s constitution or of their successors and assignees and this Guarantee shall be legally valid, enforceable and binding on each of their successors and permitted assignees.

All references to any contract or other instruments are by way of reference only and shall not affect the Guarantor Bank’s obligations to make payment under the terms of this Guarantee.

The Agency shall not assign / transfer or cause or permit to be assigned or transferred any of its rights, title, interests and benefits of this Guarantee without the prior written consent of the Guarantor Bank and the Concessionaire.

If one or more of the provisions of this Guarantee are held or found to be invalid, illegal, or unenforceable for any reason whatsoever, in any respect, any such invalidity, illegality, or unenforceability of any provision shall not affect the validity of the remaining provisions of this Guarantee.

The Guarantor Bank hereby declares and confirms that under its constitution and applicable laws, it has the necessary power and authority to:

(a) enter into, execute and deliver this Guarantee; and

(b) perform the obligations it has undertaken under this Guarantee, which obligations are valid and legally binding on and enforceable against the Guarantor Bank under the laws of Pakistan.

Further, the Guarantor Bank hereby declares and confirms that the signatory(ies) to this Guarantee is/are its duly authorized officer(s) to execute this Guarantee.

This Guarantee and all rights and obligations arising from this Guarantee shall be governed and construed in all respects in accordance with the laws of Pakistan. The courts in Karachi, Pakistan shall have exclusive jurisdiction in respect of any dispute relating to any matter contained herein.

**EXECUTED & ISSUED**
**FOR & ON BEHALF OF THE GUARANTOR BANK**
<table>
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<th>NAME</th>
<th>DESIGNATION</th>
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**Witnesses**

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<th>Witness I</th>
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Scope of services for the role of the Independent Auditor for the Project as per the terms and conditions under the Concession Agreement shall include the following:

1. To work in close coordination with the Independent Engineer and exchange information as required for the performance of their respective tasks.

2. To review the Financial Model of the Project with a view to understand the dynamics and structure of the project from a financial perspective.

3. To give presentations to various Government tiers on the Financial Model when required. Also, be present in all meetings of the Agency at almost all levels during various approvals, needs and issues etc. related to the Project Link Road to Korangi.

4. Monitor, the estimation of all costs incurred on the Project and compliance of financial provisions by the Concessionaire under the Concession Agreement.

5. In consultation with the Independent Engineer, establish the need for increase in costs and the reasons therefore, as provided for in the Concession Agreement, with respect to the design, construction, testing and commissioning of the Concession Assets.

6. Establish the Total Project Cost of the Project based on the mechanism outlined in the terms of the Concession Agreement.

7. On intimation from the Concessionaire, Financiers or the Agency establish the occurrence of a Material Adverse Effect on the Project and recommend, based on the terms of the Concession Agreement, a mechanism to overcome the same.

8. Upon the issuance of the Final Project Construction Completion Certificate, the Independent Auditor along with the Independent Engineer shall undertake to verify the Total Project Cost as determined by the Concessionaire and submitted by the Concessionaire, based on the calculations and the measurements, work done, costs incurred, invoices and amounts paid by the Concessionaire. The Total Project Cost consisting of the actual capital cost of the Project upon its completion and all authorized variations thereto, so determined and certified shall be presented to the Agency, the Concessionaire and the Financiers.

9. The Independent Auditor shall not be involved in day-to-day supervision. The work of the Independent Auditor is therefore:
   - monitoring
   - certification
   - issuing monthly progress reports
cost certification
► expert adjudicator on financial matters relating to force majeure, terminations, project delays or other project issues as and when they arise of the Project’s issues, funding mechanisms, project risks and intimate the party concerned of their responsibility as laid down in the Concession Agreement and Financing Documents.

10. The Independent Auditor shall be required to follow a system of periodic reports in such frequency and formats as determined by the Concessionaire and the Agency.

Scope of Work of the Independent Auditor in Different Phases of the Project:

1 Phase I: Pre-Construction Activities of Independent Auditor

The Independent Auditor will review all relevant aspects of the Project and will, in particular, address the following issues:

1.1 Assist the Agency in reviewing the Financial Model and give recommendations on the Financial Model along with running sensitivities on it.

1.2 The Independent Auditor shall also give presentations to Agency on the Financial Model and other financial matters related to the Project as and when required.

1.3 Issue certificates as per the requirements of the Project Agreements.

1.4 Monitor and assist in the Financial Closure of the Project.

1.5 Assisting the project stakeholders throughout the CP completion process.

1.6 The Independent Auditor shall perform all such other obligations as set out in the Concession Documents.

2 Phase II: Role of Independent Auditor During Construction Stage

During construction, the Independent Auditor will carry out the following tasks:

2.1 Monitor financial progress against anticipated program included in the Financial Model.

2.2 Review proposed changes in the Financial Model / budget and their consequences on the Pre-Estimated Project Cost and Total Project Cost.
2.3 Monitor the overall cost of the project as construction proceeds and identify cost change implications.

2.4 Endorsement of Total Project Cost in accordance with the Concession Agreement.

2.5 In collaboration with the Independent Engineer, issue certificates related to Construction Performance Security as and when required as per the Concession Agreement.

2.6 Provide periodically, in collaboration with the Independent Engineer, Construction Monthly Progress Report.

2.7 Evaluate and endorse calculations prepared by the Concessionaire in relation to amounts to be paid to the Concessionaire upon occurrence of certain events (including Change of Scope, Relief Events, Force Majeure Events, Agency Events of Default and Concessionaire Events of Default and other events set out in the Concession Documents).

2.8 Issue certifications to facilitate disbursement of funding from stakeholders with respect to construction and other expenditures in accordance with the Financial Model.

2.9 In respect of the occurrence of a Force Majeure event in accordance with the provisions of the Project Agreements, the Independent Auditor shall consult with the Concessionaire, Agency and Financiers in order to determine the amount of resultant compensations, if any, in accordance with the provisions of the Project Agreements and issue necessary certifications in this respect.

2.10 In respect of the occurrence of a termination event in accordance with the provisions of the Project Agreements, the Independent Auditor shall consult with the Concessionaire, Agency and Financiers in order to determine the amount of resultant compensations, if any, in accordance with the provisions of the Project Agreements and issue necessary certifications in this respect.

2.11 The Independent Auditor shall perform all such other obligations as set out in the Concession Documents.

3 PHASE III: ROLE OF INDEPENDENT AUDITOR DURING POST CONSTRUCTION STAGE

The Independent Auditor shall also be responsible to perform the following obligations and duties:
3.1 In collaboration with the Independent Engineer, issue certificates related to O&M Performance Security as and when required as per the Concession Agreement.

3.2 Actualize the Financial Model on periodic basis, as per the Project Agreements, based on the prevailing KIBOR, CPI, WPI or any other index as stated in the Project Agreements.

3.3 Compute Annuity Amount Payments and Annuity Amount Payment Adjustment on periodic basis and issue certificates in accordance with the Project Agreements.

3.4 Determine and certify advertising proceeds payable to the Agency (as Class B Dividend or otherwise) and the management fee payable to the Concessionaire, if any

3.5 In case of Force Majeure event, Relief Event or Termination Event or any other event (including Change of Scope) whereby the project stakeholders require input from the Independent Auditor in accordance with the Project Agreements, assist the stakeholders in issuing relevant certificates as and when required.

3.6 Assist the Agency, the Concessionaire and Financiers on financial matters that arise from time to time.

3.7 At each year end, the Independent Auditor will quantify and inform the impact of the Taxes Component on the Agency, on account of Change in Law in the relevant year, in its report through a separate letter to the Agency and the Finance Department of the Government of Sindh.

3.8 The Independent Auditor shall perform all such other obligations as set out in the Concession Documents.
1. **GENERAL**

The Independent Engineer of the Project shall, in principle be responsible for review / approving / certifying of designs, drawings, all the activities associated with the construction works to ensure compliance with the technical requirements, progress monitoring, and affirmation of all certification done by the Concessionaire.

The Independent Engineer shall supervise that the requirement of the Concession Agreement and its various appendices, other than mentioned for Independent Auditor-IA of the Project, are met by the Concessionaire and in case of any discrepancy / deviations, and shall inform Agency and the Concessionaire. The responsibility of the Independent Engineer during various phases of design review, construction and Operation and Maintenance shall be but not limited to the following.

2. **DESIGN REVIEW PHASE**

   (a) Review and approve the adequacy of topographical surveys, geo-technical and sub-soil investigations, hydrological investigation for the Project, project buildings and other structures.

   (b) Review and approve the condition survey of existing utilities & their relocation design and Construction drawings prepared and submitted by the Concessionaire to the Independent Engineer for the construction of various components of the road, bridges / structures, river training works, erosion protection works, guide banks, spars, estimates, reports and other deliverables with regard to:

   (i) Adequacy, completeness, optimality and capability of design to perform as required in anticipated operating conditions and to meet the technical requirements specified in this Agreement.

   (ii) Identification of project design features or any major equipment component that does not appear to meet design, performance requirements or fails to adhere to good engineer practice.

   (iii) Provide an opinion on the quality of the design with respect to their effect on the anticipated service life of the facility, the degree of maintenance needed to meet performance requirements and long term availability over the term of the Concession.
(c) Review and approve reports prepared and submitted by the Concessionaire, with respect to the traffic, traffic management etc.

(d) Review and approve the implementation schedule of engineering, design, procurement and construction of the Project submitted by the Concessionaire and determine that adequate provisions have been made for the following:

   (i) Design
   (ii) Raw material sourcing
   (iii) Raw material processing equipment
   (iv) Utilities
   (v) Other Equipment procurement
   (vi) Construction
   (vii) Testing

(e) Review and approve the Operation and Maintenance during the Operations Period

(f) Review and comment on the consistency of all project documents

(g) Review the available permits or permit applications

(h) Review the environmental management plan for the Project during the Construction Period (and the Operations Period, if required)

(i) Review and comment on the utilities arrangement for the Project, including, but not limited to the water supply and electricity supply

(j) Review and approve the adequacy and reasonableness of the Project co-ordination and monitoring systems

(k) Review quality assurance and quality control provisions during the design, and construction and O&M phase

   (i) Independent Engineer is required to prove due diligence and utmost expertise in ensuring that quality control provisions are maintained at all times during the Construction Period and the Operations Period

   (ii) Independent Engineer will be responsible to report to the Agency/Lenders in case the quality standards and quality control provisions are not maintained on the Project Site

(l) Audit the safety of the Project during Construction Period and the Operations Period.
(m) Reviewing the safety measures proposed for the construction of the facilities and their compliance with the safety regulations.

(n) Review, Audit, Comment and approve the working methodology submitted by the Concessionaire regarding the construction of project infrastructure in densely populated areas to avoid disturbance to traffic and public.

3. **Role of Independent Engineer during Construction Phase**

(a) The duties of the Independent Engineer are to supervise the works in detail and to approve the materials, formworks, and workmanship of the works on a fulltime basis. As stated in the Concession Agreement, the Independent Engineer shall have no authority to relieve the Concessionaire of any of its duties or to impose additional obligations.

(b) The Independent Engineer shall review and approve works program prepared and submitted by the Concessionaire. Payments will be made upon Independent Engineer’s certification, with final approval of Independent Auditor.

(c) The Independent Engineer shall supervise/approve each and every activity including material testing, mix designs, JMFs, day to day testing such as FDT etc. and review the material testing results and mix designs and to order special tests of materials and / or completed works, and / or order removal and substitution of substandard material and / or work as required.

(d) The Independent Engineer shall review and approve work methodology of each item of work.

(e) The Independent Engineer shall review quality assurance and quality control during construction period.

(f) The Independent Engineer shall ensure that the Construction Works is accomplished in accordance with the Applicable Standards and best engineering practice.

(g) The Independent Engineer shall identify construction delays, if any and recommend to the Agency/Lenders the remedial measures to expedite the progress.

(h) Review and approve shop drawings for each component of the Project Works prepared and submitted to Independent Engineer by the Concessionaire.
(i) Review the “Construction Drawings” and “As Built” drawings for each component of the Project Works prepared and submitted to Independent Engineer by the Concessionaire.

(j) Review the safety measures provided for the traffic and Project workers.

(k) Determine any extension of the Project Completion Schedule, to which the Concessionaire is entitled and shall notify Agency/Lenders, accordingly.

(l) Review compliance by the Concessionaire of its obligations under the Concession Agreement.

(m) Issue Substantial Completion Certificate after checking the results and workability of the Project assets after the prescribed tests.

(n) Issue Substantial Completion Certificate duly appended with a list of outstanding items (Project Completion Check List).

(o) For performance testing, the Independent Engineer will

   (i) Review test procedures developed by the Concessionaire appointed O&M Contractor and confirm compliance with applicable test codes and standards and with testing criteria specified in Concession Agreement and its Schedules.

   (ii) Review the quality control reports, material testing results and mix design and to order special tests of materials and/or completed works, and/or order removal and substitution of substandard materials and/or works as required.

   (iii) Review test reports prepared by Concessionaire or Concessionaire’s testing consultant.

   (iv) Monitor successful completion of each Project Completion Check List Items. Make one final visit to Project Site to verify that Project Completion Check List Items have been completed and thereafter sign and submit the Final Project Construction Completion Certificate.

(p) Review & approve the Land and Utility folder (i/c. its relocation criterias, typical X-Sections.

4. **Role of Independent Engineer during Operations Period**
(a) Review and approve work plan and schedules of various operation and maintenance activities

(b) Review and approve the O&M Manual(s) prepared by the Concessionaire for their completeness and compatibility with those of similar facilities

(c) Review and approved the performance of Operation and Maintenance activities including equipment, service, traffic, operation and safety

(d) Recommend necessary actions to the Agency/Lenders to undertake maintenance obligations of the Concessionaire at risk and cost of the Concessionaire in the event of his failure to carry out the Operations and Maintenance

(e) Undertake audit of the traffic using the Project at reasonable times

(f) Review and inspect the Project and its assets at all reasonable times and upon reasonable notice to the Concessionaire during the Operations and Maintenance Period and issue a Construction Inspection Report and O&M Inspection Report of such inspections to the Lenders

(g) Review the accident record, prepared and submitted by Concessionaire, on the Project and suggest remedial measures at reasonable intervals

5. **The Other Functions of the Independent Engineer Shall be the Following:**

(a) Perform functions, including issue of directions to the Concessionaire, in respect of the Emergency De-commissioning of the Concession Assets as provided in this Agreement.

(b) Verify and ascertain evidence of insurance cover as provide in this Agreement

(c) Perform functions in respect of Change of Scope as provided in this Agreement

(d) Inspect the Concession Assets including the Project at the time of handing over thereof by the Concessionaire to the Lenders/Agency and perform functions in respect to such handing over as provided in this Agreement
SCHEDULE O – FORM OF VESTING CERTIFICATE

a. [insert details] being the Independent Engineer, and [insert details] being the Independent Auditor, refer to the agreement entitled “Concession Agreement” dated [●], 20…. (as amended from time to time) (the “Concession Agreement”) relating to, inter alia, the designing, construction, development, operation and maintenance (through Public Private Partnership on a design, build, finance, operate and transfer basis) the Urban Road Initiatives In Karachi – Korangi Link Road Project (the “Project”);

b. The Independent Engineer and the Independent Auditor hereby acknowledge the compliance the fulfillment by the Concessionaire of the Divestment Requirements set forth in Article 24 of the Concession Agreement and, on such basis, hereby issue this Vesting Certificate (the “Certificate”). Upon issuance of this Certificate, the Agency shall be deemed to have acquired, and all title and interest of the Concessionaire in or about the Concession Assets (as defined in the Concession Agreement) and the same shall be deemed to have vested unto the Agency, free from any encumbrances, charges and liens whatsoever, other than such encumbrances which the Agency was responsible to prevent under the terms of this Agreement.

Signed this …………….. day of …………., at Karachi.

FOR AND ON BEHALF OF
[INSERT DETAILS]

________________________________________
Signature

________________________________________
Name

________________________________________
Designation

Signed in the presence of the following witnesses:
FOR AND ON BEHALF OF
[●]

Signature

Name

NIC No.

Signature

Name

Designation

Signed in the presence of the following witnesses:
“Assured Availability” means the availability of the Project assured by the Concessionaire for each Annuity Amount Payment Period, computed as under:

**For Korangi Bridge**

\[
AA = 6 \times LA
\]

**For Complete Project (Except Korangi Bridge)**

\[
AA = 4 \times LA
\]

**WHERE:**

\[
AA = \text{Assured Availability}
\]

\[
LA = \text{Lane Availability}
\]

Further, for the purposes of this definition, “Lane Availability” means, in respect of each Annuity Amount Payment Period, the availability of any lane comprising the Project, measured in terms of lane kilometer hours as under:

\[
LA = L \times h \times D
\]

**WHERE:**

\[
L = \text{Length of the Project Roads / Bridge (where applicable)}
\]

\[
h = \text{Total hours in a day, i.e. 24}
\]

\[
D = \text{Actual number of days in the relevant Annuity Amount Payment Period}
\]
Urban Road Projects in Karachi
Shifting of Existing Bund Along Left Bank of
Malir River at Korangi Causeway
(KPT Interchange to PAF Airmen Academy)

1. General and Background

Jam Sadiq Bridge (JS Bridge) is the only bridge, connecting both banks of the Malir River in the vicinity of Korangi Industrial Area. The bridge observes heavy traffic jams during flood season as both causeways (English Biscuit Manufacturers (EMB) & Korangi) upstream and downstream of Jam Sadiq Bridge submerge due to high flood depths in Malir river. Local Government Department, Government of Sindh intends to reduce traffic load on the existing JS Bridge by constructing a new bridge on Malir River, approximately 600 m downstream of the existing bridge. For the newly proposed bridge, reduced waterway / length of bridge, almost similar to JS Bridge, has been adopted.

The proposed bridge will run parallel to the existing JS Bridge as it traverse the shortest route to connect both banks of the river. Existing left bund downstream of JS Bridge will be extended up to the newly proposed bridge. Thereafter, the left bund will be re-aligned through the flood plain area up to the existing PARCO Elevated Oil Pipeline.

2. Proposed Project Works

Given below the proposed works and brief description of the proposed project components and are shown in Figure 1 below.

i. Proposed Korangi Bridge, about 600 m downstream of JS Bridge, just upstream of Existing Korangi Road Causeway.

ii. The upstream Right Guide Bank (RGB) and upstream Left Guide Bank (LGB) for the proposed Korangi Bridge have been proposed as the straight continuation of the d/s LGB and d/s RGB for JS Bridge.

iii. The downstream LGB for the proposed Korangi Bridge has been assumed as the straight continuation of the d/s LGB for JS bridge upto the Parco Oil Pipeline. Due to this layout, the existing left flood bund on the d/s of proposed Korangi Bridge comes under the shadow of d/s LGB; and the land
between the existing left flood bund and the newly proposed LGB may be used for the development purposes (about 84 ha).

iv. The d/s RGB is proposed as a small straight portion initially, which then curves rightward to meet the existing right flood bank.

3. Proposed Korangi Road Bridge

Jam Sadiq Bridge (JS Bridge) is the only bridge, connecting both banks of the Malir River in the vicinity of Korangi Industrial Area. The bridge observes heavy traffic jams during flood season as both causeways (English Biscuit Manufacturers (EMB) & Korangi) upstream and downstream of Jam Sadiq Bridge submerge due to high flood depths in Malir River. Local Government Department, Government of Sindh intends to reduce traffic load on the existing JS Bridge by constructing a new bridge on Malir River, approximately 600 m downstream of the existing bridge and just upstream of existing Korangi Road Causeway. For the newly proposed bridge, reduced waterway / length of bridge, almost similar to JS Bridge, has been adopted. The proposed bridge will run parallel to the existing JS Bridge as it traverse the shortest route to connect both banks of the river. Existing left bund downstream of JS Bridge will be extended up to the newly proposed bridge. Thereafter, the left bund will be re-aligned through the flood plain area up to the existing PARCO Elevated Oil Pipeline.

4. Design of Flood Protection Embankments / Bunds / Guide Banks

Flood protection embankments/ bunds are man-made structures. These are constructed in the flood plains of a river and run parallel to the river bank along its length. The aim of providing these embankments is to confine the river flood water within the cross section available between the embankments. The designed to contain the flood waters, so as to provide protection against inundation or thus not allowed to spill over to the flood plains. Flood bunds provide a considerable reduction in the risk of flooding, but cannot be expected to provide a total protection with zero flood risk. Therefore, flood bunds provide protection with some risk due to many factors; including deferred maintenance, rodents, parallel flow erosion, growth of herbaceous plants, poor quality of compaction & soil type, etc. The extent of risk varies with the prevailing site conditions.

a. Design Flood

While analysis and selection of design discharge for a new structure along a stream, it is considered necessary to get maximum discharge carrying capacity
of existing structures located upstream/downstream of newly proposed location. This information is required to avoid bottle necks corresponding to design flood magnitude in the stream. The design capacity of existing Jam Sadiq Bridge is 409,000 ft\(^3\)/s (11,580 m\(^3\)/s).

Climate change projections of the area indicate higher frequencies as well as higher magnitude of extreme events (rainfall, floods, etc.). Recent flood events of August 2020 may be considered as the impact of climate change. In view of the uncertainties associated with the rainfall data and likelihood of higher rainfall intensities and magnitude under future climate change scenarios, it is highly recommended that 100-year flood estimate by HEPO-1990 (table below), as more conservative estimate, may be adopted as design flood for providing flood protection structures in the study reach. The recommended flood magnitude has already been adopted at existing bridge and flood embankments.

### Peak Discharges of Malir River

<table>
<thead>
<tr>
<th>Return Period</th>
<th>Discharge (ft(^3)/s)</th>
<th>Discharge (m(^3)/s)</th>
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<tr>
<td>100-Year</td>
<td>409,000</td>
<td>11,580</td>
</tr>
<tr>
<td>75-Year</td>
<td>372,000</td>
<td>10,500</td>
</tr>
<tr>
<td>50-Year</td>
<td>240,000</td>
<td>7,000</td>
</tr>
<tr>
<td>20-Year</td>
<td>193,000</td>
<td>5,460</td>
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</table>

b. **Water Surface Profiles With Proposed Works**

Water surface profiles have been simulated by incorporating all existing and proposed interventions/features into HEC-RAS Model (Discharge of 409,000 cusecs). Following structures (Existing/Proposed) have been incorporated in model, which is shown in **Figure 2 and Figure 3:**

- **Jam Sadiq Bridge (Existing)**
- **Korangi Road (KR) Bridge (Proposed)**
  - Detailed already given above and also consult the Nespak Karachi Office.
- **Relocated Left Bund/Embarkment (Proposed)**
  - The downstream Relocated Left Bund about 3 km long from the proposed KR Bridge has been assumed as the straight continuation up to the Parco Oil Pipeline. Due to this layout, the existing left flood bund on the d/s of proposed Korangi Bridge comes under the shadow of d/s LGB; and the land between the existing left flood bund and the
newly proposed LGB may be used for the development purposes (about 105 ha).

iv. **Upstream and Downstream of Right Guide Bank (Proposed)**
About 810 m long RGB has been proposed as the straight continuation from JS Bridge to proposed KR Bridge d/s, which then curves rightward to meet the existing right flood bank.

v. **Upstream Left Guide Bank (Proposed)**
About 400 m long LGB has been proposed as the straight continuation from JS Bridge to proposed KR Bridge.

c. **Design Parameters**

1.1.2 **Top Width and Side Slope of Bunds**
The geometry of the section i.e., the river side and country side slopes, top width etc. are fixed to ensure a stability of section under all flow conditions. Top width of the proposed bund varies from 25 m to 35 m mentioned in the Drawing (Annexure C). Slope of inner side (facing water) is fixed as 3H:1V and for outer side, it is 2H:1V. The proposed typical cross section of the embankment is shown in **Figure 4**.

![Figure 4: Proposed Typical Cross Section of Embankment](image)

**Design of Stone Protection Works**
Stone protection works of the proposed embankment comprise of the following two components:
- Stone Pitching along slope of embankments / bunds.
- Horizontal Launching Apron at the toe of embankments / bunds.

In order to design protection works, it is necessary to calculate the scour depth long proposed guide bund.
(a) Determination of Scour Depth

If the provided water way is less than the Lacey’s regime width, the potential scour depth depends on the discharge intensity “q” (discharge per unit width), silt factor “f” (function of \(d_{50}\)), and scour factor “X” (as per the vulnerability of location).

\[
XR = 1.34 \times \left[ \frac{q^2}{f} \right]^{1/3} \text{ (in metric units)}
\]

where:
- \(q\) = Design discharge per unit width in \(\text{m}^3/\text{sec}\).
- \(f\) = Lacey’s silt factor depending upon bed material.
- \(R\) = Scour depth below FSL or HFL in meter.
- \(X\) = Scour Factor.

General values of X are as follows:
- In a straight reach \(1.5R\)
- At right angle bend \(2.0R\)
- At nose of Pier \(2.0R\)

When the provided water way is greater than the Lacey’s regime width (present case), the potential scour depends on the total discharge, silt factor, and the scour factor.

\[
XR = 0.475 \times \left[ \frac{Q}{f} \right]^{1/3} \text{ (in metric units)}
\]

The value of silt factor “f” has been adopted as 1, which has been taken from the report “Feasibility Study and Design for Realignment of Bund from Northern Side of Malir River, NESPAK, June 2013. If the geotechnical report updates the value of \(d_{50}\), the design may be modified accordingly.

The scour level for piers and guide banks has been worked out to 15.0 m and 6.8 m, respectively. The actual scour depth depends on the bed level at the point of interest.

(b) Stone Pitching

Side slopes of protection bund have been proposed to be protected against river water action by providing stone pitching. Thickness of pitching is provided against the predominant flow characteristics (i.e., discharge intensity and velocity), which affect the stability of pitching.

The thickness of stone pitching is proposed as 0.8 times the thickness of horizontal apron in launched position; which works out to be 1.0 m (3.3 ft).

(c) Size of Stone
Size of the stone depends on the flow velocity, specific gravity, and the type of turbulence. ISBASH curve or its equation is usually adopted for recommending the stone size. The size (dia) of stone size has been worked out as 0.64 m (approx. 2ft) using ISBASH curve and base filter layer under stone pitching on the level and on slope shall comprise of graded spall/ bajri of size 1/8 inch to 2 inches.

(d) Launching Apron

Launching apron is the horizontal extension of slope pitching on the river bed to guard against undermining and collapse of stone pitching and progressive slipping of the protection bund material into the scour hole, caused at the toe during floods. The launching apron is usually laid in a width of 1.5 times the scour depth below bed.

The scour depth below bed (D) is computed as the difference of potential/factored scour depth and flow depth computed by HEC-RAS (XR-Y). The launching angle is taken as the saturated angle of repose (θ), and the length of finally launched apron (along hypotenuse) is computed as D/Sin θ. The volume of stone per foot run is computed as the product of hypotenuse length and the desired thickness “t” (1.2 m = 4 ft). This volume of stone (t* D/Sin θ) has been distributed on a length of 1.5 D (15 m) along guide banks, and the thickness of apron in horizontal position “t” is worked out to be t / 1.5 Sin θ (1.6 m = 5.25 ft).

5. ESTIMATE OF QUANTITIES

Proposed Works

Design of proposed flood embankments to confine the river by shifting the southern left protection bund into the flood plain from downstream of Jam Sadiq Bridge till drain/ PARCO Oil Pipeline, include the following:

a) Design of relocated left flood protection embankment
b) Design of proposed guide banks of Korangi Bridge

Unit Rates

The cost estimate has been based on Composite Schedule of Rates (CSR) of NHA. However the rates for non-schedule items are based on prevailing market rates.
BOQ of Civil Works

The estimated quantity cost of the proposed project works has been summarized in Table 1 and Table 2.

### Table 1: Relocated About 3-Km Long Left Embankment

**Abstract of Cost**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>CodeN</th>
<th>Description of Items</th>
<th>Quantity</th>
<th>Unit</th>
<th>Rate(Rs)</th>
<th>Amount(Rs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>101</td>
<td>Clearing and Grubbing</td>
<td></td>
<td>-</td>
<td>L.S.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>108c</td>
<td>Formation of embankment from borrow excavation in common material</td>
<td>848100</td>
<td>CM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>509e</td>
<td>Grouted Riprap, Class B, 1.0m Thick Stone</td>
<td>99180</td>
<td>CM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>509h</td>
<td>Filter layer of granular material, 0.3 Thick FILT</td>
<td>24845</td>
<td>CM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>509c</td>
<td>Riprap, Class C, 1.6 m Thick Stone Apron</td>
<td>86415</td>
<td>CM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>107b</td>
<td>Structural excavation in common material</td>
<td>86415</td>
<td>CM</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 2: Right Guide Bank U/S and D/S of the Proposed Korangi Road Bridge Abstract of Cost

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Code No.</th>
<th>Description of Items</th>
<th>Quantity</th>
<th>Unit</th>
<th>Rate (Rs.)</th>
<th>Amount (Rs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>101</td>
<td>Clearing and Grubbing</td>
<td>-</td>
<td>L.S.</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>108c</td>
<td>Formation of embankment from borrow excavation in common material</td>
<td>268939</td>
<td>CM</td>
<td>31434</td>
<td>8328253</td>
</tr>
<tr>
<td>3</td>
<td>509e</td>
<td>Grouted Riprap, Class B, 1.0m Thick Stone Pitching</td>
<td>31434</td>
<td>CM</td>
<td>31434</td>
<td>972126</td>
</tr>
<tr>
<td>4</td>
<td>509h</td>
<td>Filterlayer of granular material, 0.3 Thick Filter</td>
<td>7868</td>
<td>CM</td>
<td>7868</td>
<td>305353</td>
</tr>
<tr>
<td>5</td>
<td>509c</td>
<td>Riprap, Class C, 1.6 m Thick Stone Apron</td>
<td>21348</td>
<td>CM</td>
<td>21348</td>
<td>452252</td>
</tr>
<tr>
<td>6</td>
<td>107b</td>
<td>Structural excavation in common material</td>
<td>21348</td>
<td>CM</td>
<td>21348</td>
<td>452252</td>
</tr>
<tr>
<td>7</td>
<td>201</td>
<td>Granular Sub-Base Material 0.5m Thick Preparation Under the Embankment</td>
<td>31630</td>
<td>CM</td>
<td>31630</td>
<td>948900</td>
</tr>
</tbody>
</table>

Total Cost

**Total Cost**
Figure 1: Layout of Existing and Proposed Bunds
Figure 2: Water Level Profile for Discharge of 409,000 Cusecs with Proposed Works
Figure 3: Layout Plan Showing Proposed Arrangements
SCHEDULE R – ANNUITY AMOUNT PAYMENT SCHEDULE

[Based on the Bid submitted. It is understood that the Annuity Amount Payment Schedule to be attached herewith shall only be indicative and shall be finalized in the Annuity Amount Payment Agreement]
SCHEDULE S – NOTICES

[To be finalized prior to execution]
### Schedule T – Termination Payment

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Termination Payment Amount</th>
<th>Compensation Payable by Agency</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Non-Political Event Termination Amount</td>
<td>(a) Termination Equity; and&lt;br&gt;(a) Ninety five percent (95%) of Financing Due.</td>
</tr>
<tr>
<td>2.</td>
<td>Political Event Termination Amount</td>
<td>(a) Termination Equity;&lt;br&gt;(b) Termination Dividend Amount; and&lt;br&gt;(c) Financing Due.</td>
</tr>
<tr>
<td>3.</td>
<td>Concessionaire Default Termination Amount</td>
<td>(b) Ninety five percent (95%) of Financing Due.</td>
</tr>
<tr>
<td>4.</td>
<td>Agency Default Termination Amount</td>
<td>(a) Termination Equity;&lt;br&gt;(b) Termination Dividend Amount; and&lt;br&gt;(c) Financing Due.</td>
</tr>
<tr>
<td>5.</td>
<td>Corrupt Act Termination Amount</td>
<td>(a) Ninety five percent (95%) of Financing Due.</td>
</tr>
<tr>
<td>6.</td>
<td>Change in Law Termination Amount</td>
<td>(a) Termination Equity;&lt;br&gt;(b) Termination Dividend Amount; and&lt;br&gt;(c) Financing Due.</td>
</tr>
</tbody>
</table>
The Following Base Case Financial Model, along with the Bid, will be submitted by the Bidder.
Illustration for the case where the Concession Period of three (3) years or more is still remaining at Termination Date:

TERMINATION EQUITY

(1) Assuming that the Termination Date falls on the fifth anniversary of the Substantial Completion Date;

⇒ Class A share Equity Invested of PKR 5 billion will reduce by 5 equal installments using straight line basis;

⇒ Termination Equity = PKR 5 billion ($A$) – (PKR 500 million ($B$) x 5 ($C$))

= PKR 2.5 billion

Where $A$ is the Class A Shares Invested Equity;
Where $B$ is the amount of installment of each year; and
Where $C$ is the year of termination from the Substantial Completion Date.

TERMINATION DIVIDEND AMOUNT

Assuming that the Termination Date falls on the fifth anniversary of the Substantial Completion Date;

⇒ Termination Dividend Amount = PKR 2.5 billion ($D$) x 17% ($E$) x 3 ($F$)

= PKR 1,275,000,000/-

Where $D$ is the Termination Equity;
Where $E$ is the Termination Equity IRR; and
Where $F$ is the number of years aggregate return for the equity on Class A Shares.

Illustration for the case where the Concession Period of less than three (3) years is still remaining at Termination Date:

TERMINATION EQUITY
(2) Assuming that the Termination Date falls on the eight anniversary of the Substantial Completion Date;

Class A share Equity Invested of PKR 5 billion will reduce by 8 equal installments using straight line basis;

Termination Equity = PKR 5 billion (A) – (PKR 500 million (B) x 8 (C))

= PKR 1.0 billion

Where A is the Class A Shares Invested Equity;

Where B is the amount of installment of each year; and

Where C is the year of termination from the Substantial Completion Date.

**TERMINATION DIVIDEND AMOUNT**

Assuming that the Termination Date falls on the fifth anniversary of the Substantial Completion Date;

Termination Dividend Amount = PKR 1.0 billion (D) x 17% (E) x 2 (F)

= PKR 340,000,000/-

Where D is the Termination Equity;

Where E is the Termination Equity IRR; and

Where F is the number of years aggregate return for the equity on Class A Shares.
Vehicles will meet the following minimum specifications:

- One (1) Four Wheel Jeep – double cabin (4WD – 3000 cc)
- Two (2) Jeeps (4WD – 1300 cc)
- Two (2) Car (1000 cc)
**Schedule X - Proposed Detail Design Approval Process**

1. **Preparation of Detail Engineering**
   - Design based on design requirements & criteria

2. **Data Collection**
   - Topographic Survey (If required)
   - Geotechnical Investigations
   - Traffic Survey

3. **Incorporation of comments**

4. **Submission to GoS/Independent Engineer for Approval**

5. **Preparation of Detail Design after incorporation of comments**

6. **Submission for Final Approval**

7. **Preparation of Construction Drawings**

8. **Execution of Project**
1. **CONCESSIONAIRE CONDITIONS PRECEDENT**

(a) the Concessionaire has provided the Construction Performance Security to the Agency that remains effective and valid till the Construction Performance Security Expiry Date;

(b) the Corporate Documents of the Concessionaire reflect, to the satisfaction of the Agency, the different classes of shares (i.e. Class A Shares and Class B Shares);

(c) the Concessionaire has provided to the Agency, the Independent Auditor and the Independent Engineer certified true copies of the executed EPC Contract;

(d) the Concessionaire has provided copies of its Corporate Documents to the Agency (with copies delivered to the Independent Engineer and the Independent Auditor), duly certified as true copies by the company secretary or director of the Concessionaire;

(e) the Concessionaire has provided to the Agency copies (with copies delivered to the Independent Engineer and Independent Auditor) of its Board Resolution that duly authorizes:

(f) each of the Specified Concessionaire Permits have been procured by the Concessionaire and the same are effective and valid and have not been cancelled and/or rescinded and the Concessionaire has provided copies of the same to the Agency (with copies delivered to the Independent Engineer and the Independent Auditor);

(g) the Concessionaire has entered into the Project Site Licence Agreement with the Agency for the Licence of the Project Site to the Concessionaire in accordance with Article 4 (Project Site);

(h) the Concessionaire has provided to the Agency documents evidencing that:

(i) the Concessionaire and the Sponsor have entered into the Equity Funding & Utilization Agreement with the Agency;
(ii) the Concessionaire has entered into the Escrow Agreement with the other counterparties to such agreement, established the Escrow Account and issued the standing instructions in relation to the Escrow Account in terms of this Agreement and the Escrow Agreement; and

(iii) the Concessionaire and the Sponsor have entered into the Price Escalation Agreement with the Agency;

(i) the Concessionaire’s Approved Detailed Engineering Design of the Project stands approved by the Independent Engineer and the Agency in accordance with Section 12.5 (Approval of the Detailed Engineering Design);

(j) the Concessionaire has established the Independent Engineer Payment Account and issued the Independent Engineer Payment Account Standing Instructions in accordance with the terms of the Independent Engineer Contract;

(k) the Concessionaire has established the Independent Auditor Payment Account and issued the Independent Auditor Payment Account Standing Instructions in accordance with the terms of the Independent Auditor Contract;

(l) the Concessionaire has satisfied such other Conditions Precedent as specified in the Agency Agreements;

(m) the Concessionaire has submitted copies of documents evidencing satisfaction of each of the Conditions Precedent to the Independent Engineer and the Independent Auditor;

(n) The Concessionaire has received the EIA Approval, in relation to the Project, in accordance with (without limitation) the Environmental Standards;

(o) The Concessionaire shall provide the Sponsor Equity SBLC to the Agency, at least thirty (30) days prior to the Scheduled Commencement Date;

(p) The Concessionaire has obtained a no objection certificate from the Irrigation Department, Government of Sindh prior to commencement of bridge/river training works;

(q) The Concessionaire has carried out the physical Hydraulic Model Study in order to establish the most appropriate location, length, skew angle of bridge, type and sizes and geometry of river training works such as guide banks, ghunda bund, cunette, spurs and the same has been approved by the Independent Engineer in accordance with the Applicable Standards.
2. **AGENCY CONDITIONS PRECEDENT**

(a) the Agency has licenced the Project Site to the Concessionaire in accordance with Article 4 *(Project Site)* and the Project Site Licence Agreement;

(b) subject to Section 12.5 *(Approval of the Preliminary Engineering Design and the Detailed Engineering Design)*, the Agency has handed over Vacant Possession of the Project Site to the Concessionaire in accordance with Article 4 *(Project Site)* and the Project Site Licence Agreement;

(c) the Agency has entered into the Independent Engineer Contract for the appointment of the Independent Engineer with the other counterparties to such contract, within one (1) month of the Effective Date;

(d) the Agency has entered into the Independent Auditor Contract for the appointment of the Independent Auditor with the other counterparties to such contract, within one (1) month of the Effective Date;

(e) the Agency has entered into the Equity Funding & Utilization Agreement with the Concessionaire and the Sponsor;

(f) the Agency has entered into the Escrow Agreement;

(g) the Agency has provided the First Agency Financial Instrument in accordance with Section 17.4;

(h) the Agency has entered into the Price Escalation Agreement with the Concessionaire and the Sponsor;

(i) the Agency has satisfied such other Conditions Precedent as specified in the Agency Agreements; and see if addition can be made;

(j) the Agency has submitted copies of documents evidencing satisfaction of each of the Agency Conditions Precedent to the Independent Engineer and the Independent Auditor; and

(k) the Agency has duly issued the Agency Annuity Amount Payment Account Standing Instructions to the Agency Annuity Amount Payment Account Bank.

3. **CONCESSIONAIRE CONDITIONS SUBSEQUENT**

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The Concessionaire undertakes to fulfill the following Project Segment Conditions Subsequent to the entire satisfaction of the Agency:

(i) ninety (90) days prior to the Scheduled Substantial Completion Date, the Concessionaire shall provide the Agency (with copies to the Independent Engineer and the Independent Auditor) with evidence of appointment of the O&M Contractor.

4. **AGENCY CONDITIONS SUBSEQUENT**

The Agency undertakes to fulfill the following Project Segment Conditions Subsequent to the satisfaction of the Concessionaire:

(i) The Agency shall nominate two (2) board observers on the board of directors of the Concessionaire.
**Annuity Amount Payment Damages Events** means the following events (as certified in writing by the Independent Engineer); provided, that the same shall not constitute an Annuity Amount Payment Damages Event in case the same results from the Permitted Events (excluding the Non Political Events):

(a) non compliance of any one or more of the key performance indicators as mentioned in the table above; and/or

(b) the Project (or any part thereof) is closed to traffic; or

(c) the Independent Engineer determines that:

(i) the riding quality of the Project (or any part thereof) has deteriorated to a level which is below the acceptable levels prescribed by the Applicable Standards; and

(ii) the Project (or any part thereof) is not safe for operation, irrespective of whether the Project (or any part thereof) has been closed to traffic or not.

provided, that in order to constitute as the Annuity Amount Payment Damages Event, the aforesaid events must occur in relation to a stretch of a lane of the Project of at least five (5) meters.

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Key Performance Indicators</th>
<th>SLAB A</th>
<th>SLAB B</th>
<th>SLAB C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Damages in Pak. Rupees</td>
<td>Response Time (days)</td>
<td>Damages in Pak. Rupees</td>
<td>Response Time (days)</td>
</tr>
<tr>
<td>1</td>
<td>Pothole on paved roads</td>
<td>25,000/day/ pothole</td>
<td>1&lt;=t&lt;4</td>
<td>50,000/day/ pothole</td>
</tr>
<tr>
<td>2</td>
<td>Edge failure on paved roads</td>
<td>18,000/day/ failure</td>
<td>1&lt;=t&lt;4</td>
<td>36,000/day/ failure</td>
</tr>
<tr>
<td>3</td>
<td>Rutting more than 20m long and 10mm deep on paved road</td>
<td>9,000/day/rut</td>
<td>1&lt;=t&lt;7</td>
<td>18,000/day/ rut</td>
</tr>
<tr>
<td></td>
<td>Description</td>
<td>1≤t&lt; =12</td>
<td>12≤t&lt; =24</td>
<td>t&gt;24</td>
</tr>
<tr>
<td>---</td>
<td>-----------------------------------------------------------------------------</td>
<td>----------</td>
<td>-----------</td>
<td>------</td>
</tr>
<tr>
<td>4</td>
<td>Drains, ditches, and other drainage structures to be cleaned</td>
<td>3,000/day/culvert or drain</td>
<td>6,000/day/culvert or drain</td>
<td>12,000/day/culvert or drain</td>
</tr>
<tr>
<td>5</td>
<td>Bridge parapets, barriers, expansion joints to be maintained</td>
<td>18,000/day/joint</td>
<td>36,000/day/joint</td>
<td>72,000/day/joint</td>
</tr>
<tr>
<td>6</td>
<td>Vertical signs to be well-placed, cleaned and visible day and night</td>
<td>6,000/day/Sign</td>
<td>12,000/day/Sign</td>
<td>24,000/day/Sign</td>
</tr>
<tr>
<td>7</td>
<td>Horizontal lane markings to be well maintained</td>
<td>3,000/m/day</td>
<td>6,000/m/day</td>
<td>12,000/m/day</td>
</tr>
<tr>
<td>8</td>
<td>Safety Barrier/Project Corridor to be cleaned, well maintained and visible during day and night</td>
<td>1,500/day/km or part</td>
<td>3,000/day/km or part</td>
<td>6,000/day/km or part</td>
</tr>
<tr>
<td>9</td>
<td>Litter or residues on or around pavement</td>
<td>1,500/day of delay</td>
<td>3,000/day of delay</td>
<td>6,000/day of delay</td>
</tr>
<tr>
<td>10</td>
<td>Failure to maintain trees/plants</td>
<td>1,000/month/tree or plant</td>
<td>2,000/month/tree or plant</td>
<td>3,000/month/tree or plant</td>
</tr>
<tr>
<td>11</td>
<td>Failure to achieve the Project Construct Completion by the Scheduled Project Constructo</td>
<td>1,000,000/day/delay</td>
<td>1,500,000/day/delay</td>
<td>2,000,000/day/delay</td>
</tr>
</tbody>
</table>
Where \( t \) denotes the non-rectification period in days.

**Illustration of Annuity Amount Payment Damages**

If the Annuity Amount Payment Damages Event occurs on a single day in relation to a stretch of a lane of the Project of fifty (50) meters, the damages shall be calculated as follows:

**Damages: A \times B**

WHERE:

A: the length of the stretch of a lane of the Project;

B: per lane meter rate of damages

**Damages: 50 \times 5,000: PKR 250,000/-**

Note:

The aforesaid damages shall become payable after expiry of the relevant cure period set out in the Concession Agreement and/or the O&M Manual in respect of the underlying performance failure set out in the table above, the Concessionaire having failed to cure the same during the said cure period.
The aforementioned rate of damages (other than rates applicable in relation to Annuity Amount Payment Damages Event) would be applicable on slab basis and on the entirety of the non-rectification period, based on each performance indicator. Furthermore, these rates are applicable for:

(a) the first (1st) Operational Year and will be indexed each subsequent Operational Year; and

Provided that (a) above shall be based on the prevailing Wholesale Price Index (WPI) rate.

The KPIs stated above are non-exhaustive. Additional KPIs may be added in the O&M Manual.
For and on behalf of

GOVERNOR OF SINDH
(Through SECRETARY, LOCAL GOVERNMENT & HTP DEPARTMENT)
through its authorised signatory

Name: ...........................................
Designation: ................................

Name: ...........................................
Designation: ................................

in the presence of: ..........................

signature of WITNESSES

1- Name: ...........................................
   Address: ...........................................
   NIC No: ............................................

2- Name: ...........................................
   Address: ...........................................
   NIC No: ............................................
For and on behalf of CONCESSIONAIRE through its authorised signatory

Name:
Designation: ..................................................

in the presence of:
signature of WITNESSES

1-
Name: ..................................................
Address: ..................................................
NIC No: ..................................................

2-
Name: ..................................................
Address: ..................................................
NIC No: ..................................................

..................................................
..................................................
..................................................

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THE INDEPENDENT AUDITOR AGREEMENT

BY & BETWEEN

GOVERNOR OF SINDH
(THROUGH THE SECRETARY, LOCAL GOVERNMENT & HOUSING TOWN PLANNING DEPARTMENT)
(AS THE AGENCY)

AND

[•]
(AS THE CONCESSIONAIRE)

AND

[•]
(AS THE INDEPENDENT AUDITOR)

DATED: AS OF ..................................

AT: KARACHI, PAKISTAN

.............................................  .............................................  .............................................
AGENCY INITIALS               CONCESSIONAIRE INITIALS               INDEPENDENT AUDITOR’S INITIALS
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INDEPENDENT AUDITOR AGREEMENT

This INDEPENDENT AUDITOR AGREEMENT (this Agreement) is made at Karachi, Pakistan, on this __________ day of __________ (the Signing Date) by and between:

THE GOVERNOR OF SINDH (THROUGH SECRETARY, LOCAL GOVERNMENT & HOUSING TOWN PLANNING DEPARTMENT) having his offices at Local Government Department, Ground Floor, Tughlaq House, Sindh Secretariat, Karachi, Pakistan for and on behalf of the Government of Sindh (the Agency);

AND

[●], a company incorporated under the Applicable Laws of Pakistan, having its registered office located at [●] (the Concessionaire, which expression shall, where the context so permits, be deemed to mean and include its successors-in-interest and permitted assigns);

AND

[●•], a Chartered Accountant firm validly existing under the laws of Pakistan having its place of business located at [●] (the Independent Auditor which expression shall, where the context so permits, be deemed to mean and include, its successors in interest, administrators and permitted assigns);

(the Agency and the Concessionaire are hereinafter collectively referred to as the Concession Agreement Parties and each individually as a Concession Agreement Party, as the context may require);

3

(AGENCY INITIALS) (CONCESSIONAIRE INITIALS) (INDEPENDENT AUDITOR’S INITIALS)
RECITALS

(a) WHEREAS, the Agency is desirous to implement the Project on a PPP basis;

(b) WHEREAS, the Agency and the Concessionaire have entered into the Concession Agreement for the purposes of implementation of the Project;

(c) WHEREAS, Concession Agreement requires appointment of the Independent Auditor by the Concession Agreement Parties that shall perform various duties and obligations as contemplated under the Concession Documents;

(d) WHEREAS, subject to the terms of this Agreement, the Concession Agreement Parties are desirous of appointing [•] as the Independent Auditor for the Project; and

(e) AND WHEREAS, the Parties desire to set forth the terms and conditions under which the Independent Auditor shall perform the Services and shall act as the Independent Auditor for the purposes set out in the Concession Documents and the Concessionaire shall pay for the same.

NOW, THEREFORE, in view of the foregoing and in consideration of the mutual benefits to be derived and the representations and warranties, covenants and agreement contained herein and other good and valuable consideration, the sufficiency of which is hereby acknowledged, intending to be legally bound, the Parties hereby agree as follows:
1. DEFINITIONS & INTERPRETATION

1.1 DEFINITIONS

Unless specified otherwise herein, in this Agreement (including the Recitals), all capitalized terms shall have the meanings assigned to them under the Concession Agreement (as defined below).

In addition, the following terms shall have the following meanings, unless the context otherwise requires:

Affiliate means, in respect of a person, a person that controls, is controlled by, or is under common control with such person, and “control” means the ability to direct the policies or operations of a person, whether by contract, ownership of equity interests, or otherwise;

Agency shall bear the meaning ascribed thereto in the Preamble;

Agreed Form means any instrument which is in the form and substance agreed to by the Concession Agreement Parties;

Agreement means this “Independent Auditor Agreement” including the main body of this Agreement and the Schedules attached hereto;

Agreement Period means the period commencing on the Signing Date and (unless extended in accordance with Section 2.2.2) ending on the earlier of:

(i) the Termination Date; or

(ii) the date occurring after the lapse of twenty-four (24) months from the Signing Date;

Appointment shall bear the meaning ascribed thereto in Section 2.1.1;

Applicable Laws shall bear the meaning ascribed thereto in the Concession Agreement;

Authorized Representative shall bear the meaning ascribed thereto in Section 5.2.1;

Authorized Signatories shall bear the meaning ascribed thereto in Section 5.1.1;

Base Case Financial Model shall bear the meaning ascribed thereto in the Concession Agreement;

Business Days means a day (other than Saturday, Sunday or a gazetted holiday) on which banks in Pakistan are generally open for business;

Change in Law shall bear the meaning ascribed thereto in the Concession Agreement;

Commencement Certificate shall bear the meaning ascribed thereto in the Concession Agreement;

Commencement Date shall bear the meaning ascribed thereto in the Concession Agreement;
**Concession Agreement** means the agreement entitled the "Concession Agreement" dated [•] and entered into between the Agency and the Concessionaire for the purposes of the Project;

**Concession Agreement Parties, Concession Agreement Party** shall bear the meaning ascribed thereto in the Preamble;

**Concession Documents** means:

(i) the Agency Agreements (including the Concession Agreement and the Equity Funding and Utilization Agreement);

(ii) the Project Agreements;

(iii) the Financing Documents; and

(iv) any other agreements that are entered into and/or are to be entered into for the purposes of the Project and designated as "Concession Documents" with the mutual consent of the Parties;

**Concessionaire** shall bear the meaning ascribed thereto in the Preamble;

**Concessionaire Independent Auditor Payment Account** means the account opened and maintained by the Concessionaire with the Concessionaire Independent Auditor Payment Account Bank for the purposes set out in this Agreement;

**Concessionaire Independent Auditor Payment Account Bank** means the financial institution/banking company mutually agreed between the Concession Agreement Parties for the purposes of establishing and maintaining the Concessionaire Independent Auditor Payment Account in accordance with the terms of this Agreement;

**Concessionaire Independent Auditor Payment Account Standing Instructions** means the irrevocable (subject to Section 4.7.5 and Section 4.7.6) standing instructions issued by the Concessionaire to the Concessionaire Independent Auditor Payment Account Bank in respect of the Concessionaire Independent Auditor Payment Account in accordance with this Agreement and substantially in the form and content attached hereto at **SCHEDULE D (Form of Concessionaire Independent Auditor Payment Account Standing Instructions)**;

**Contractor(s)** shall bear the meaning ascribed thereto in the Concession Agreement;

**Encumbrance** shall bear the meaning ascribed thereto in the Concession Agreement;

**Financial Close** shall bear the meaning as ascribed thereto in the Concession Agreement;

**Financial Model** shall bear the meaning as ascribed thereto in the Concession Agreement;

**Financiers** shall bear the meaning as ascribed thereto in the Concession Agreement;

**Financier Relevant Period** means the period commencing on Financial Close and expiring on the date that is the earlier of:

(a) the date of termination or expiry of this Agreement, whichever is earlier; and

(b) the Financing Termination Date;
Financing Documents shall bear the meaning as ascribed thereto in the Concession Agreement;

Financing Termination Date shall bear the meaning as ascribed thereto in the Concession Agreement;

Firm shall bear the meaning ascribed thereto in Section 3.5.12;

Firm Persons shall bear the meaning ascribed thereto in Section 11.1.2;

Force Majeure Event shall bear the meaning ascribed thereto in the Concession Agreement;

IA Certifications and Reports means any consents, approvals, reports, certifications, letters, determinations or other communications (duly signed by the authorised representative of the Independent Auditor) issued by the Independent Auditor, as and when required, pursuant to the Concession Documents;

Independent Auditor shall bear the meaning ascribed thereto in the Preamble;

Independent Auditor Payment Account means the bank account of the Independent Auditor that is established and maintained with a financial institution/banking company operating in Pakistan and which is notified by the Independent Auditor to the Concessionaire in writing (with a copy to the Agency) within five (5) days of the Signing Date;

Independent Auditor Payment Amount shall bear the meaning ascribed thereto in Section 4.6.2;

Independent Auditor Payment Amount Certificate means the certificate to be jointly issued by the Independent Engineer and the Independent Auditor in the Agreed Form to the Concessionaire (with a copy to the Agency) and submitted by the Concessionaire to the Concessionaire Independent Auditor Payment Account Bank setting out the Independent Auditor Payment Amount along with the Independent Auditor’s invoice (or revised invoice, if applicable in terms of Section 4.6.5) annexed thereto for such Independent Auditor Payment Amount;

Independent Auditor Payment Date shall bear the meaning ascribed thereto in Section 4.6.2;

Independent Engineer shall bear the meaning ascribed thereto in the Concession Agreement;

Interim Period shall bear the meaning ascribed thereto in Section 8.1.3;

Materials shall bear the meaning ascribed thereto in Section 12.3A.1;

Methodologies & Parameters means the various methodologies and parameters applicable to the performance of the Services by the Independent Auditor:

(a) as set out in SCHEDULE B (Clarifications to the Terms of Reference - Methodologies & Parameters); and

(b) if required, as to be mutually agreed between the Parties from time to time in respect of obligations, duties and roles relating to the Independent Auditor set out in the Concession Documents not executed to date;

Monthly Fee shall bear the meaning ascribed thereto in Section 4.1.1 (b);
Non Default Suspension shall bear the meaning ascribed thereto in Section 12.5.1;

Notified, Notice, Notify and its grammatical variations means as notified in writing;

Parties, Party shall bear the meaning ascribed thereto in the Preamble;

Phase I shall bear the meaning ascribed thereto in Section 3.4.1(a);

Phase II shall bear the meaning ascribed thereto in Section 3.4.1(b);

Phase III shall bear the meaning ascribed thereto in Section 3.4.1(c);

Phases means collectively Phase I, Phase II and Phase III and Phase means any of them individually;

Preamble means the preamble to this Agreement;

Project shall bear the meaning as ascribed thereto in the Concession Agreement;

Project Agreements shall bear the meaning as ascribed thereto in the Concession Agreement;

Construction Completion Date shall bear the meaning as ascribed thereto in the Concession Agreement;

Process shall bear the meaning ascribed thereto in Section 11.1.2;

Processing Purposes shall bear the meaning ascribed thereto in Section 11.1.2(e);

Recipient shall bear the meaning ascribed thereto in Section 12.1.2;

Revised Suspension Monthly Price shall bear the meaning ascribed thereto in Section 12.3A.1;

Sample Access Letter shall bear the meaning ascribed thereto in Section 3.5.9(d)

Scope of Work shall bear the meaning ascribed thereto in Section 3.4.1;

Sender shall bear the meaning ascribed thereto in Section 12.1.2;

Service Providers shall bear the meaning ascribed thereto in Section 11.1.2;

Services means all works and services to be performed and the deliverables to be delivered as part of its Scope of Work, in each case, by the Independent Auditor:

(a) in accordance with and pursuant to this Agreement, including as set out in Article 3 (Services and Related Matters) and SCHEDULE A (Terms of Reference) and SCHEDULE B (Clarification to the Terms of Reference – Methodologies & Parameters); and

(b) in performance of its role as the Independent Auditor as contemplated by the Concession Documents;

Services Personnel shall bear the meaning ascribed thereto in Section 5.3.1;

Signing Date shall bear the meaning ascribed thereto in the Preamble;

Tax Advice shall bear the meaning ascribed thereto in Section 3.5.11;
Termination Date shall bear the meaning ascribed thereto in Section 8.1.4;

Termination Notice Period shall bear the meaning ascribed thereto in Section 8.1.1;

Trigger Date shall bear the meaning as ascribed thereto in the Concession Agreement; and

Works Documents means any communication, data, information, report, document, notice, certificate, analysis, calculation, agreement, note, budget, approval, consent, correspondence, opinion or any other document or instrument of any nature whatsoever relating to the Project.

1.2 INTERPRETATION

1.2.1 Words used in this Agreement importing the singular shall include the plural or vice versa.

1.2.2 Save where the contrary is indicated, any reference in this Agreement to:

(a) an Article, Section, Clause or Schedule shall be construed as a reference to an article, section, clause or schedule of this Agreement;

(b) any instrument, memorandum, agreement, contract or document shall be construed as a reference to that instrument, memorandum, agreement, contract or document (together with any recitals, schedules or sections thereto) all as amended, varied, restated, novated or supplemented from time to time;

(c) any person shall be construed so as to include their respective administrators, successors in interest and permitted assigns from time to time;

(d) a statute, enactment or order shall be construed as a reference to such statute, enactment or order as the same may have been, or may from time to time be, amended or re-enacted and all subsidiary legislation and other instrument made under or deriving validity therefrom;

(e) the singular shall include the plural and vice versa, where appropriate;

(f) the words including and includes, and any grammatical variants of those words, will be read as if followed by the words ‘without limitation’;

(g) a reference to a person shall be construed to include a juridical person;

(h) a time of day shall be construed as a reference to Pakistan Standard Time; and

(i) headings in this Agreement are for ease of reference only and shall be ignored in construing this Agreement.

1.2.3 The Recitals, Preamble, introduction and Schedules to this Agreement shall form an integral part of this Agreement.
2. **Term**

2.1 **The Appointment**

2.1.1 Subject to the terms of this Agreement, the Concession Agreement Parties hereby:

(a) appoint [•] to act as the Independent Auditor for the Project; and

(b) authorize the Independent Auditor to perform the Services in respect of the Project,

in each case above, during the Agreement Period (the Appointment), and the Independent Auditor hereby accepts such Appointment and undertakes to perform the Services in accordance with the requirements of this Agreement and the Concession Documents.

2.2 **Term and Extension**

2.2.1 Subject to Section 2.2.2 below, the Appointment of the Independent Auditor, in terms of this Agreement, shall be for the Agreement Period and shall come into effect on the Signing Date.

2.2.2 The Concessionaire, acting with the prior written consent of the Agency, shall have the right to extend the Agreement Period on the same terms and conditions as stated hereto for such further period(s) as necessary to ensure that the Independent Auditor is appointed up to the Construction Completion Date. Any extension of the Agreement Period following the Construction Completion Date shall be subject to mutual written agreement between the Parties. In the event the Parties mutually agree to extend the Agreement Period for the continued provision of Services in Phase III, the scope of work and a separate fee shall be renegotiated in accordance with Section 4.2 (Phase III Fee).

2.3 **Reliance**

2.3.1 The Concession Agreement Parties are, and the Financiers (in respect of the Financier Relevant Period and to the extent agreed with the same) shall, rely upon the Independent Auditor’s expertise to perform the Services in such a manner so as to undertake and perform the role of the Independent Auditor contemplated under this Agreement and other Concession Documents using the Methodologies & Parameters and the Independent Auditor hereby acknowledges such reliance of the Concession Agreement Parties and the Financiers (in respect of the Financier Relevant Period).

2.3.2 The Independent Auditor hereby represents that it has the required ability, skills, technical support, personnel and capacity to perform the Services.
3. **SERVICES & RELATED MATTERS**

3.1 **GENERAL**

3.1.1 The Independent Auditor hereby undertakes that it shall:

(a) perform the Services diligently and within the timelines set out in and the Concession Documents;

(b) exercise, in the performance of the Services, all skill, care and diligence to be expected of a qualified and competent professional experienced in each of the disciplines to which the Services relate;

(c) cooperate with the parties to the Concession Documents in respect of matters relating to the Independent Auditor for the purposes of, *inter alia*, facilitating implementation of the Project;

(d) review the Concession Documents delivered by the Concessionaire and all Works Documents that are provided to it pursuant to the Concession Documents in its capacity as the Independent Auditor;

(e) coordinate and liaise with the Independent Engineer in respect of matters that require the Independent Engineer’s input in term of the Concession Documents;

(f) prepare, review and issue (in accordance with this Agreement and/or the Concession Documents) all Works Documents contemplated to be issued by the Independent Auditor under the Concession Documents;

(g) as and when requested or required, consult with the parties to the Concession Documents and/or any other relevant stakeholders of the Project for the performance of Services and request (where available and applicable) any Works Document that is of a financial nature and is required by the Independent Auditor to perform the Services;

(h) as and when requested or required, pursuant to this Agreement and the Concession Documents, review and comment on any Works Documents provided to it pursuant to the Concession Documents and request further Works Documents as may be required;

(i) prepare, issue, deliver, review, certify, determine and/or approve (by whatsoever nomenclature referred to in the Concession Documents) (as applicable) all Works Documents contemplated to be prepared, issued, delivered, reviewed, certified, determined and/or approved (as applicable) by the Independent Auditor under the Concession Documents;

(j) visit, if considered relevant by it, any of the offices of the Concessionaire or any other location where relevant personnel or records of the Concessionaire are located;

(k) comply with the Applicable Laws in its performance of Services; and

(l) perform, provide inputs, and/or advise on matters (as applicable) relating to the Financing Documents including (without limitation), preparation and delivery of various IA Certifications and Reports, matters relating to disbursements/contributions, cost overruns, base equity requirements and perform other roles and functions contemplated to be performed by the
Independent Auditor (by whatsoever name/nomenclature referred to) under the Financing Documents.
3.2 PERFORMANCE OF OBLIGATIONS OF INDEPENDENT AUDITOR UNDER THE CONCESSION DOCUMENTS

3.2.1 The Services shall include all such duties and obligations as are to be performed by the Independent Auditor under the Concession Documents and as are set out in this Agreement (including in SCHEDULE A (Terms of Reference) and as further clarified under SCHEDULE B (Clarifications to the Terms of Reference - Methodologies & Parameters)).

3.2.2 The Independent Auditor hereby confirms and acknowledges that it has received a copy of the Concession Agreement and that it has reviewed the same and understands the role to be performed by it as the Independent Auditor for the Project in terms thereof. The Independent Auditor hereby undertakes to perform all such acts, duties and obligations that are contemplated in the Concession Agreement to be performed by the Independent Auditor and the same shall be deemed to be a part of the Services.

3.2.3 The Independent Auditor understands and acknowledges that certain Concession Documents shall be entered into between, inter alia, the Agency, the Financiers and the Concessionaire (or any of them) in respect of the Project and the Independent Auditor hereby undertakes (upon being delivered such Concession Documents by the Concessionaire from time to time) to perform all such acts, duties and obligations that are or shall be contemplated in such Concession Documents to be performed by the Independent Auditor in accordance with the terms thereof and the same shall be deemed to be a part of the Services and shall be subject to (if applicable) the Methodologies & Parameters relating to the same.

3.2.4 The Independent Auditor shall, upon request by the Concession Agreement Parties and the Financiers (in respect of the Financier Relevant Period), provide its inputs in the preparation and finalization of the Concession Documents in respect of financial matters set out therein (including the matters that relate to the role of the Independent Auditor and/or to the Financial Model).

3.2.5 The Concessionaire shall be responsible for delivering executed and duly certified copies of such Concession Documents to the Independent Auditor from time to time that contemplate performance of certain roles, duties and/or obligations by the Independent Auditor.

3.3 THE BASE CASE FINANCIAL MODEL & FINANCIAL MODEL

3.3.1 The Independent Auditor hereby confirms that:

(a) it has received soft and hard copies of the Base Case Financial Model;

(b) it has reviewed the Base Case Financial Model and has familiarized itself with the operation, workings and functionalities of the same; and

(c) the Base Case Financial Model’s operability and workings (including the basis and parameters on which it is prepared) are sufficient for the performance of the Services.

3.3.2 The Independent Auditor shall be responsible for:

(a) the operability of the Financial Model for purposes stated and contemplated in this Agreement and in the Concession Documents;

(b) the accuracy of the results and outputs generated by the Financial Model;
(c) updating the Financial Model in accordance with this Agreement and the Concession Documents; and

(d) in addition to (a), (b) and (c) above, to the extent the Financial Model requires updating as a result of occurrence of events or circumstances contemplated by the Concession Documents and/or to the extent otherwise mutually agreed between the Agency, the Concessionaire and the Financiers (in respect of the Financier Relevant Period), notified to the Independent Auditor, the Independent Auditor shall, in each case, update the Financial Model upon receipt of a request jointly issued by the Agency, the Concessionaire and the Financiers (in respect of the Financier Relevant Period).

3.4 **The Phases**

3.4.1 The Independent Auditor’s scope of work for the Services (the *Scope of Work*) shall be broken into the following three (3) phases:

(a) role of the Independent Auditor commencing from the Signing Date till the Commencement Date (the *Phase I*);

(b) role of the Independent Auditor during the Construction Period (the *Phase II*); and

(c) in the event the Agreement Period has been extended in accordance with Section 2.2.2 and Phase II has been completed, role of the Independent Auditor following the Construction Completion Date (the *Phase III*), provided, however, the Scope of Work for such Phase III shall (without limitation) be based on the terms of the Concession Documents and other matters relating to the Project in relation to which the Concession Agreement Parties require the Services of the Independent Auditor and shall be mutually agreed between the Parties at the time of such extension.

3.4.2 The Services to be performed by the Independent Auditor during each of the Phases (as applicable) shall include all such duties, obligations and services:

(a) that are contemplated to be performed by the Independent Auditor under the Concession Documents and the same shall be deemed to be a part of the Scope of Work; and

(b) as are set out in this Agreement (including *Schedule A* (*Terms of Reference*)), provided, that, to the extent contemplated in the Concession Documents, obligations to be performed during a Phase may be performed in another Phase.

3.4.3 The Parties agree that the obligations of the Independent Auditor set out in *Schedule A* (*Terms of Reference*) in respect of each of the Phases shall be subject to the Methodologies & Parameters expressly set out in *Schedule B* (*Clarifications to the Terms of Reference - Methodologies & Parameters*).

3.5 **Other Key Matters Relating To The Services**

3.5.1 The Services shall not include the provision of any accounting or tax advice in relation to the accounting and tax treatment of the transactions (and related flow through during the whole of the Concession Agreement) that are agreed between the Concessionaire and the Agency in the form of the Base Case Financial Model; provided, that in the event of occurrence of a Change in Law with regard to the taxes applicable to the Concessionaire and/or the Project, the Independent Auditor shall confirm occurrence of such Change in

| AGENCY INITIALS | CONCESSIONARE INITIALS | INDEPENDENT AUDITOR’S INITIALS |
Law and certify the consequent financial impact in terms of article 28 (Change in Law) of the Concession Agreement.

3.5.2 The Independent Auditor’s work will require certain information from the Concessionaire, the Independent Engineer, the Agency and the Financiers (in respect of the Financier Relevant Period). Such information may involve the information that is already available with such parties or which the Concessionaire may have to procure from others. It will be the responsibility of the Concessionaire to procure and provide to the Independent Auditor all the information required by the Independent Auditor on timely basis at its cost, expense and efforts. The Independent Auditor’s work will be carried out on the basis that such information, as provided to the Independent Auditor, is accurate and not misleading, and is provided to the Independent Auditor in a timely manner.

3.5.3 All matters contained in any of the IA Certifications and Reports will be made in good faith and on basis of the information available to the Independent Auditor at the time of issuance of such IA Certifications and Reports. The Independent Auditor shall mention key basis, identify and include references (to the extent applicable) to the relevant provision, section or clause of the Concession Documents in respect of each of its IA Certifications and Reports. The Concessionaire and the Agency shall have the right to evaluate the basis (including the applicable provision, section or clause of the Concession Documents) on which the relevant IA Certifications and Reports have been issued.

3.5.4 Subject to Section 3.3 (The Base Case Financial Model & Financial Model), wherever any scenarios are to be updated in the Financial Model, such updates shall be made by the Independent Auditor in the Base Case Financial Model provided by the Concessionaire. Further, the Independent Auditor shall not be responsible for the assumptions incorporated in the Base Case Financial Model by the Concessionaire. However, the Independent Auditor shall check the relevance of those assumptions while updating the Financial Model.

3.5.5 Notwithstanding anything to the contrary, the Services shall not include the provision of legal advice and the Independent Auditor makes no representations in respect of its ability to address questions of legal interpretation and shall neither be responsible for nor shall engage in any legal interpretations of the Concession Documents and in case any inputs are required in respect of the same, the Independent Auditor shall refer the matter to the Concessionaire and the Agency.

3.5.6 In the course of providing the Services, the Independent Auditor may provide oral comments, or drafts of each of the written IA Certifications and Reports either in hard or soft copies. As these represent work in progress and not the Independent Auditor’s final deliverables, the Independent Auditor will not assume a duty of care in respect of them. The final results of the Independent Auditor’s work will be contained in the final deliverables as mentioned in relevant provisions of this Agreement.

3.5.7 With respect to financial matters relating to the Project which do not impact the existing financial obligations (actual or contingent) of the Agency (under the Concession Documents), the Independent Auditor shall make the relevant determinations (including updating Financial Model, if required) in accordance with the Concession Documents independently without reference to either of the Concession Agreement Parties but may consult the Concession Agreement Parties in the event it requires any information or clarification. In the event the Independent Auditor updates the Financial Model in accordance with the terms of the Concession Documents, it shall Notify the Concession Agreement Parties of the justification of such update supported by the relevant provision(s) of the relevant Concession Document(s) and provide a soft copy of the updated Financial Model to the Concession Agreement Parties within one (1) day of such update.
3.5.8 The IA Certifications and Reports provided by the Independent Auditor under this Agreement (excluding any information of the Concession Agreement Parties therein) are for the internal use of the Concession Agreement Parties including (without limitation) their board of directors or governing body, audit committee and/or statutory auditors.

3.5.9 The Concession Agreement Parties may disclose the IA Certifications and Reports (or any portion or summary of the IA Certifications and Reports):

(a) to the shareholders of the Concessionaire;
(b) to the extent required under the Concession Documents;
(c) to the extent, and for the purposes, required by Applicable Law (and the Concessionaire will promptly notify the Independent Auditor of such legal requirement to the extent it is permitted to do so);
(d) to other persons subject to execution of an access letter substantially in the form of SCHEDULE F (Form of Access Letter) (Sample Access Letter); or
(e) to the extent that it relates to Tax Advice (as defined below);

3.5.10 If the Concession Agreement Parties (or any of them) disclose IA Certifications and Reports (or any portion thereof) in terms of Section 3.5.9 above, they shall not alter, edit or modify it from the form provided by the Independent Auditor.

3.5.11 The Concession Agreement Parties may disclose to anyone IA Certifications and Reports (or any portion thereof) solely to the extent that it relates to tax matters, including tax advice, tax opinions, tax returns, or the tax treatment or tax structure of any transaction to which the Services relate (the Tax Advice). With the exception of tax authorities and other legal authorities, the Concession Agreement Parties shall inform those to whom it discloses Tax Advice that they may not rely on it for any purpose without the Independent Auditor’s prior written consent.

3.5.12 The Concession Agreement Parties may incorporate into documents that they intend to use, the Independent Auditor’s summaries, calculations or tables based on the Concession Agreement Parties’ information contained in the IA Certifications and Reports, but not the Independent Auditor’s recommendations, conclusions or findings. The Concession Agreement Parties must assume sole responsibility for the contents of those documents and they must not externally refer to the Independent Auditor (the Firm) in connection with them.

3.5.13 The Concession Agreement Parties may not rely on any draft IA Certifications and Reports. The Independent Auditor shall not be required to update any final IA Certifications and Reports for circumstances of which it becomes aware, or events occurring, after its delivery; provided, that, if so required under the Concession Documents, the Independent Auditor shall provide separate/updated IA Certifications and Reports also taking into account such new circumstances or events.

3.6 CONCESSIONAIRE’S COOPERATION

3.6.1 The Concessionaire hereby agrees to provide all reasonable cooperation and assistance to the Independent Auditor in terms of this Agreement for the performance of the Services.

Further, the Concessionaire agrees to:
(a) cooperate with and furnish any Works Documents, data and information reasonably required by the Independent Auditor and available with the Concessionaire in respect of its performance of the Services;

(b) arrange for other consultants and advisors of the Concessionaire, including financial and legal advisor, to be available for discussions as may be necessary in relation to the performance of the Services during regular business hours at no cost to the Independent Auditor;

(c) use reasonable endeavours to ensure that the Contractor(s), in accordance with the relevant Concession Documents, reasonably cooperate with the Independent Auditor and provide to the Independent Auditor such information and assistance as may be necessary to assist the Independent Auditor in performing the Services; and

(d) notify the Independent Auditor in writing from time to time of any amendments to the Concession Documents that are relevant to the Services and provide the Independent Auditor with copies thereof.

3.6.2 The Concessionaire further agrees to furnish information to the Independent Auditor that is true and accurate in all material respects. The Concessionaire shall promptly divulge to the Independent Auditor its knowledge of any facts or circumstances that may arise which could make information previously provided to the Independent Auditor untrue or inaccurate in any material respect at any time after the Concessionaire has provided such information to the Independent Auditor during the Agreement Period.

3.7 **SUB-CONTRACTING**

3.7.1 The Independent Auditor shall not sub-contract the performance of the Services or any part thereof without the prior written consent of the Concession Agreement Parties, which consent may be withheld by a Concession Agreement Party in its sole and absolute discretion.

3.7.2 Notwithstanding the grant of consent by a Concession Agreement Party in accordance with sub-section 3.7.1 above, any engagement by the Independent Auditor of any sub-contractor shall not release or discharge the Independent Auditor of any of its liabilities, responsibilities and/or obligations under this Agreement.
4. **Fee**

4.1 **MONTHLY FEE**

4.1.1 As consideration and as full and complete compensation for the Services provided by the Independent Auditor hereunder in respect of Phase I and Phase II, the Independent Auditor shall be paid:

(a) Not Used; and

(b) a monthly fee for each calendar month of the Agreement Period covering Phase I and Phase II in an amount equal to PKR \( \bullet \) (Pakistani Rupees \( \bullet \)) per month, subject to escalation as may be mutually agreed between the Parties after completion of twelve (12) months from the Signing Date (the **Monthly Fee**).

4.2 **PHASE III FEE**

4.2.1 In the event the Parties elect, in accordance with Section 2.2.2, to extend the Agreement Period and appoint the Independent Auditor to provide Services in respect of Phase III, a separate fee shall be negotiated by the Concessionaire Agreement Parties with the Independent Auditor.

4.3 **TAXES**

4.3.1 All taxes the Monthly Fee, including sales tax on services, shall be borne by and shall be on account of the Independent Auditor and shall be deemed to be included in the Monthly Fee. Subject to Section 4.3.2 below, the Independent Auditor shall be responsible for payment of all taxes applicable to provision of the Services. The Independent Auditor shall be registered with the Sindh Revenue Board and issue sales tax invoices to the Concessionaire from time to time.

4.3.2 The Concessionaire shall deduct the relevant withholding tax in accordance with the Applicable Laws from amounts payable to the Independent Auditor under this Agreement. Evidence of all deductions made, along with supporting documents/receipts, and evidence of withholding tax duly paid by the Concessionaire to the Federal Board of Revenue (or any other authority) shall be provided by the Concessionaire to the Independent Auditor and the Agency on request.

4.3.3 Following the Signing Date, in the event any new taxes or levies are levied on the Services being provided by the Independent Auditor and subject to the same constituting a Change in Law, the impact thereof will be borne by the Concessionaire by increasing the net Monthly Fee payable to the Independent Auditor provided however, that the afore-stated shall not apply in respect of any increases in deductions on account of: (i) withholding tax; and (ii) any other taxes that are adjustable against the income of the Independent Auditor in accordance with Applicable Laws.

4.4 **FEE INCREASE**

4.4.1 The Independent Auditor shall be deemed to have satisfied itself as to the correctness and sufficiency of the Monthly Fee as compensation for the due and proper performance of Services and any other obligations under this Agreement and the Concession Documents during Phase I and Phase II respectively. The Monthly Fee payable each month shall cover the Services, other obligations under this Agreement and the Concession Documents and all things necessary for the proper performance, execution and completion of the Services.

4.4.2 The Monthly Fee is strictly based on the Services and the time for completion of the Services envisaged by this Agreement and the Concession Documents. In case of
extension of the envisaged time for completion, whether in terms of the Services through
increase in the scope, dimensions or quantum, or in terms of time taken for completion,
the matter will be discussed by the Independent Auditor with the Concession Agreement
Parties and the Financiers (in respect of the Financier Relevant Period) and, if required,
appropriate increase in the Monthly Fee shall be mutually agreed between the Parties.

4.5 **OUT OF POCKET EXPENSES**

4.5.1 In respect of Phase II, in addition to the Monthly Fee, out of pocket expenses (for
example travelling, boarding, lodging, conveyance, printing, stationery, communication
etc.) incurred during a month will be billed by the Independent Auditor at actual on a
monthly basis as part of the invoice submitted under Section 4.6.1 for the immediately
succeeding month; provided that such expenses shall not exceed, for a month of the
Agreement Period, five percent (5%) of the Monthly Fee for such month (or a pro-rata
amount in respect of a period less than one month immediately prior to the expiry or
termination of this Agreement) excluding travelling expenses, if any.

4.6 **INVOICING AND PAYMENT**

4.6.1 During the Agreement Period, the Monthly Fee shall be invoiced by the Independent
Auditor to the Concessionaire (with a copy to the Independent Engineer and the Agency)
and shall be paid monthly in advance for each month. Subject to Section 4.5 (Out of
Pocket Expenses) above, out of pocket expenses may be billed as incurred along with
documentary evidence of such expenses.

4.6.2 Upon issuance of the invoice in terms of Section 4.6.1 above, the Independent
Engineer and the Independent Auditor shall issue the Independent Auditor Payment Amount
Certificate within ten (10) days of receipt of the invoice. Upon issuance of the
Independent Auditor Payment Amount Certificate, the Concessionaire shall provide a
copy of the Independent Auditor Payment Amount Certificate to the Concessionaire
Independent Auditor Payment Account Bank along with the Independent Auditor’s
invoice (or revised invoice, if applicable in terms of Section 4.6.5) within three (3)
Business Days of receipt of the Independent Auditor Payment Amount Certificate by the
Concessionaire. Notwithstanding anything to the contrary set out herein, all due and
payable amounts of the Monthly Fee set out in the Independent Auditor’s invoices
(except any disputed amounts) (the **Independent Auditor Payment Amount**) shall be
debited from the Concessionaire Independent Auditor Payment Account by the
Concessionaire Independent Auditor Payment Account Bank and credited to the
Independent Auditor Payment Account, as per the Concessionaire Independent Auditor
Payment Account Standing Instructions within three (3) Business Days of receipt by the
Concessionaire Independent Auditor Payment Account Bank of the Independent Auditor
Payment Amount Certificate (the **Independent Auditor Payment Date**). If payment of
any amount to the Independent Auditor under this Agreement becomes due prior to
issuance of the Concessionaire Independent Auditor Payment Account Standing
Instructions, the Concessionaire shall ensure payment of such amount to the
Independent Auditor within five (5) days of receipt by the Concessionaire of the
Independent Auditor Payment Amount Certificate in relation to such payment.

4.6.3 All invoices shall be in the name of the Concessionaire who shall solely be responsible
for the payment to the Independent Auditor of the Independent Auditor Payment Amount.
The Concessionaire shall further be solely responsible for the payment of all out-of-
pocket expenses payable in accordance with Section 4.5 (Out of Pocket Expenses).

4.6.4 In case the Independent Auditor Payment Amounts set out in the Independent Auditor’s
invoices remain unpaid for a period of forty five (45) days following the date of issuance
of the Independent Auditor Payment Amount Certificate, the Independent Auditor will be
at liberty to suspend Services under this Agreement temporarily (with Notice to the

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AGENCY INITIALS   CONCESSIONAIRE INITIALS   INDEPENDENT AUDITOR’S INITIALS
Concession Agreement Parties), and without incurring any liability on its part on any grounds whatsoever (other than any accrued liability under this Agreement). In case the Independent Auditor Payment Amounts set out in the Independent Auditor’s invoice remains unpaid for a period of ninety (90) days following the date of issuance of the Independent Auditor Payment Amount Certificate, the Independent Auditor will be at liberty (at any time following the lapse of the afore-stated ninety (90) days period) and during such time that the default is so outstanding to resign from its Appointment under Notice to the Concession Agreement Parties and the Financiers (in respect of the Financier Relevant Period), and without incurring any liability on its part on any grounds whatsoever (other than any accrued liability under this Agreement).

4.6.5 Not Used.

4.6.6 If the Concession Agreement Parties or the Financiers (in respect of the Financier Relevant Period) dispute any part of the invoiced amount, the Independent Auditor shall re-submit to the Concessionaire a revised invoice for the undisputed amount taking into account objections raised. In such case, all references in this Agreement to the Independent Auditor’s invoice (including in Sections 4.6.2, 4.6.4, 4.7 and 4.8) shall mean to refer to such revised invoice of the Independent Auditor (setting out correctly the undisputed amounts) that is submitted to the Concessionaire. All disputed amounts shall become due and payable following resolution of the disputes.

4.7 ESTABLISHMENT AND MAINTENANCE OF THE CONCESSIONAIRE INDEPENDENT AUDITOR PAYMENT ACCOUNT AND ISSUANCE OF CONCESSIONAIRE INDEPENDENT AUDITOR PAYMENT ACCOUNT STANDING INSTRUCTIONS

4.7.1 Pursuant to section 6.6 (Independent Auditor Payment Account) of the Concession Agreement, the Concessionaire is required to establish and maintain the Concessionaire Independent Auditor Payment Account and issue irrevocable Concessionaire Independent Auditor Payment Account Standing Instructions in respect thereof.

4.7.2 The Concessionaire shall establish and maintain the Concessionaire Independent Auditor Payment Account within fifteen (15) Business Days of the Signing Date and until the Trigger Date.

4.7.3 Within two (2) Business Days from the establishment of the Concessionaire Independent Auditor Payment Account, the Concessionaire shall issue irrevocable Concessionaire Independent Auditor Payment Account Standing Instructions containing, inter alia, instructions to the Concessionaire Independent Auditor Payment Account Bank to debit the Concessionaire Independent Auditor Payment Account on each Independent Auditor Payment Date (upon receipt an Independent Auditor Payment Amount Certificate relating to such Independent Auditor Payment Date) in an amount equal to the Independent Auditor Payment Amount and credit the same to the Independent Auditor Payment Account.

4.7.4 The Concessionaire Independent Auditor Payment Account Standing Instructions issued by the Concessionaire shall be irrevocable and shall remain effective, in each case, until the Trigger Date, and no withdrawal from the Concessionaire Independent Auditor Payment Account may be made by the Concessionaire, except as provided in this Agreement.

4.7.5 The Concessionaire Independent Auditor Payment Account Standing Instructions (or any part thereof) issued by the Concessionaire may be revoked pursuant to a written revocation Notice duly executed and confirmed by:

(a) in case of the period falling between the issuance of the Concessionaire Independent Auditor Payment Account Standing Instructions and the Financing
Termination Date, the authorized representatives of the Agency, the Concessionaire, the Independent Auditor and the Financiers (including any agent of the same) (in respect of the Financier Relevant Period);

(b) in case of the period falling after the Financing Termination Date, the authorized representatives of the Agency, the Concessionaire and the Independent Auditor.

4.7.6 The Concessionaire Independent Auditor Payment Account Standing Instructions may be amended at any time pursuant to a Notice issued by the Concessionaire to the Concessionaire Independent Auditor Payment Account Bank instructing amendment of the Concessionaire Independent Auditor Payment Account Standing Instructions (or any part thereof) and the same shall be confirmed and acknowledged by the Concessionaire Independent Auditor Payment Account Bank, provided, that such Notice shall be only effective if the same is also duly signed by the authorized representatives of the Agency and the Independent Auditor and following Financial Close and until the Financing Termination Date, by the authorized representatives of the Agency, the Independent Auditor and the Financiers (including any agent of the same) (in respect of the Financier Relevant Period).

4.7.7 The Concessionaire Independent Auditor Payment Account shall be strictly operated and maintained in accordance with the Concessionaire Independent Auditor Payment Account Standing Instructions. Further, the Concessionaire hereby undertakes and covenants that it shall not until the Trigger Date create, incur, permit, assume or suffer to exist any Encumbrance or transfer or dispose of all or any of its rights and benefits under or in respect of the Concessionaire Independent Auditor Payment Account except in accordance with the Concession Agreement and the Financing Documents.

4.8 FUNDING OF THE CONCESSIONAIRE INDEPENDENT AUDITOR PAYMENT ACCOUNT

4.8.1 The Concessionaire shall fund the Concessionaire Independent Auditor Payment Account in an amount equal to the Independent Auditor Payment Amount at least five (5) Business Days prior to each Independent Auditor Payment Date until expiry or termination of this Agreement, in accordance with the standing instructions set out in (a) the Equity Funding & Utilization Agreement, in relation to Phase I and Phase II, and (b) the Escrow Agreement, in relation to Phase III.
5. **INDEPENDENT AUDITOR’S PERSONNEL**

5.1 **AUTHORIZED SIGNATORIES**

5.1.1 The Independent Auditor shall, within five (5) Business Days of the Signing Date, designate and Notify to each Concession Agreement Party and the Financiers (in respect of the Financier Relevant Period) of its duly appointed and nominated authorized signatories (the *Authorized Signatories*) that shall be authorized by the Independent Auditor to sign for and on its behalf any IA Certifications and Reports and/or Works Documents that are to be issued by the Independent Auditor in terms of this Agreement and/or the Concession Documents. Any IA Certifications and Reports and/or Works Documents to be duly executed and signed by the Independent Auditor in terms of this Agreement and/or the Concession Documents shall be only effective and valid if the same are duly executed and signed by the Authorized Signatories on behalf of the Independent Auditor.

5.1.2 The Independent Auditor shall have the right to substitute any of its Authorized Signatories by issuing a seven (7) Business Days prior Notice to each of the Concession Agreement Parties and the Financiers (in respect of the Financier Relevant Period), with a copy (certified as being true and correct) of such Notice issued to other stakeholders of the Project (as requested by the Concession Agreement Parties and the Financiers (in respect of the Financier Relevant Period) from time to time).

5.2 **AUTHORIZED REPRESENTATIVE**

5.2.1 The Independent Auditor shall, within five (5) Business Days of the Signing Date, designate and Notify to each Concession Agreement Party and the Financiers (in respect of the Financier Relevant Period) of its duly appointed and nominated authorized representative (the *Authorized Representative*) that will direct and control the overall performance by the Independent Auditor of the Services and shall serve as the Independent Auditor’s interface with the Concession Agreement Parties and other relevant stakeholders of the Project with respect to all aspects of the performance of the Services.

5.2.2 The Authorized Representative shall be responsible, on behalf of the Independent Auditor, for the monitoring and supervision of the Services. The Authorized Representative or any replacement from time to time shall have full authority to act on behalf of the Independent Auditor and to liaise, on behalf of the Independent Auditor in respect of the Services, between the Independent Auditor, the Independent Engineer, the Financiers (in respect of the Financier Relevant Period), the Concessionaire, the Agency, the Contractor(s) and other relevant stakeholders in the Project.

5.2.3 The Independent Auditor shall have the right to substitute any of its Authorized Representative by issuing a seven (7) Business Days prior Notice to each of the Concession Agreement Parties and the Financiers (in respect of the Financier Relevant Period).

5.3 **INDEPENDENT AUDITOR’S RESPONSIBILITY**

5.3.1 The Independent Auditor shall be solely responsible for observance by all its representatives, agents, executives, employees, subcontractors and other personnel engaged by the Independent Auditor for the performance of Services or any part thereof (the *Services Personnel*) of all the provisions of this Agreement. The Independent Auditor shall be responsible for all acts and omissions of the Services Personnel as fully as if they were the acts and omissions of the Independent Auditor.
5.3.2 The Independent Auditor shall employ and engage sufficiently qualified, suitable, experienced and competent Services Personnel in its performance of Services and shall replace within three (3) days any Services Personnel involved in the performance of the Services from the time that a Concession Agreement Party and/or the Financiers (in respect of the Financier Relevant Period) considers such Services Personnel unfit or otherwise unsatisfactory.
6. **CONFLICT OF INTEREST, ETHICAL STANDARDS, INDEPENDENCE & STANDARD OF CARE**

6.1 **CONFLICT OF INTEREST**

6.1.1 The Independent Auditor confirms that, with respect to the Project and its performance of the Services:

(a) there are no conflicts of interest with present or former clients of the Independent Auditor that will prevent it from providing objective, accurate and unbiased Services including the IA Certifications and Reports and the Works Documents to be prepared, issued, reviewed, approved etc. by the Independent Auditor in connection with the Project;

(b) any agreements, arrangements or understandings (if any) between the Independent Auditor and the Agency and/or the Concessionaire or any Affiliate thereof have been disclosed to the Concession Agreement Parties and the Financiers; and

(c) it shall not retain or engage any Services Personnel in connection with the Services for which any of the above conditions (a) or (b) apply. Without limiting the generality of Section 6.1.1, the Independent Auditor shall not perform services for or provide advice to any other Person, or engage in any other activity, that may give rise to any actual or perceived conflict of interest in the performance of the Services. If during the Agreement Period any such actual or perceived conflict of interest or risk of actual or perceived conflict of interest arises, the Independent Auditor shall immediately Notify the Concession Agreement Parties of that conflict or risk of conflict, in writing, including full particulars of all relevant facts and circumstances with respect thereto and such further information as may be requested by a Concession Agreement Party and immediately take steps to avoid or mitigate the effects of such conflict of interest or risk of conflict of interest.

6.2 **ETHICAL STANDARDS**

6.2.1 The Independent Auditor undertakes that it shall provide the Services in accordance with the highest ethical and professional standards that are applicable to professionals providing services that are similar to the Services.

6.3 **INDEPENDENCE**

6.3.1 The Independent Auditor shall act independently and in an unbiased manner. The Independent Auditor shall perform the Services for the benefit and in the best interests of the Project and not that of any other Person or entity. The Independent Auditor shall not act on any instructions issued by any party in respect of the Project unless the same are:

(a) contemplated by the Concession Documents to be issued by such party; or

(b) jointly issued by the Concession Agreement Parties and the Financiers (in respect of the Financier Relevant Period) if not contemplated by the Concession Document.

6.3.2 While the Independent Auditor may take into account opinions, representations or directions made or given by a Concession Agreement Party, the Independent Auditor shall not be bound to comply with any such opinion, representation or direction in connection with any matter on which the Independent Auditor is required to exercise its professional and impartial judgment.
6.3.3 The Parties accept and acknowledge that in the performance of the Services, the Independent Auditor is an independent monitor and auditor and shall not be considered an employee, agent or representative of the Financiers (in respect of the Financier Relevant Period), the Concessionaire, the Agency, the Contractor(s) or any other stakeholder in the Project or any Affiliate of any of them, for any purpose.

6.3.4 The Parties accept and acknowledge that all correspondence between them and the Independent Auditor shall be copied to the other Parties. Unless a meeting is being held between the Concessionaire and the Independent Auditor in respect of any administrative matters, clarifications or for the purposes of routine interactions contemplated to be held between the Concessionaire and the Independent Auditor in terms of the Concession Documents (such as procuring issuance of various certificates by the Concessionaire from the Independent Auditor), the Concession Agreement Parties and the Financiers (in respect of the Financier Relevant Period) shall have the right to have a representative present during any meeting between any of the Concession Agreement Parties and the Independent Auditor and reasonable Notice shall be provided to each Party prior to any such meeting.

6.4 **STANDARD OF CARE**

6.4.1 The standard of care applicable to the Services shall be the degree of skill and diligence normally practiced by professionals performing services that are similar to the Services.

6.5 **Bribes and Integrity**

6.5.1 The Independent Auditor certifies that neither the Independent Auditor nor any of its Services Personnel or affiliates have given or agreed to give to any person either directly or indirectly through any natural or juridical person, any commission, gratification, bribe, finder’s fee or kickback, whether described as consultation fee or otherwise, with the object of obtaining or inducing the procurement of this Agreement.

6.5.2 The Independent Auditor represents and covenants that no bribe, gift, benefit, nor other inducement has been nor shall be paid, given, promised or offered directly or indirectly to any official or employee of any of the Concession Agreement Parties or to a member of the family of such a person, with a view to influencing the entry into this Agreement or the administration of this Agreement.
7. ASSIGNMENT

7.1 RESTRICTION ON ASSIGNMENT

7.1.1 Subject to Section 7.2 (Permitted Assignment) below, neither this Agreement nor any right, title, benefit, interest, privilege or delegation hereunder may be assigned or transferred in whole or in part by any Party without the prior written consent of the other Parties and the Financiers (in respect of the Financier Relevant Period) and any attempted assignment or transfer without such written consent shall be void.

7.2 PERMITTED ASSIGNMENT

7.2.1 Notwithstanding Section 7.1 (Restriction on Assignment), the Agency and the Independent Auditor’s written consent of the Concessionaire’s assignment or transference of its rights, title, benefits, interests, privileges or delegations (present and future) under this Agreement shall not be required for assignment or transference by the Concessionaire in favour of the Financiers, provided, however, prior to effecting such assignment, the Concessionaire shall Notify the Independent Auditor of such assignment and the names of the Financiers so as to ensure that there exists no conflict of interest for the Independent Auditor with the same. In the event the Independent Auditor identifies existence of a conflict of interest with the Financiers as Notified by the Concessionaire, such conflict shall be resolved in accordance with mutual agreement between the Independent Auditor, the Concessionaire and the relevant Financiers.

7.2.2 The Parties agree that, if required by the Financiers, they shall enter into agreements evidencing the Independent Auditor’s and Agency’s consent to the Concessionaire’s assignment of its rights, title, benefits, interests, privileges or delegations (present and future) under this Agreement to the Financiers.

7.2.3 The Independent Auditor shall provide the Financiers such documents and assistance as Financiers may reasonably request, through the Concessionaire, in connection with obtaining financing for the Project. The Independent Auditor shall, if required by the Financiers and if Notified by the Concessionaire, liaise and co-operate with the Financiers (and its representatives and advisers) and provide copies of all IA Certifications and Reports and/or Works Documents it provides to the Concession Agreement Parties hereunder, together with all information in connection with the Services which the Financier may reasonably require.
8. **Termination**

8.1 **Termination**

8.1.1 Subject to the mutual written consent of each of the Concession Agreement Parties and the Financiers (in respect of the Financier Relevant Period), this Agreement may be terminated by the Concessionaire in any of the following circumstances set out under Section 8.1.1 (a) to (d) below, upon issuance of at least fifteen (15) days prior Notice (the **Termination Notice Period**), provided, however, in case of Section 8.1.1(e), the Concessionaire may by Notice terminate this Agreement immediately:

(a) if any of the Concession Agreement Parties and/or the Financiers (in respect of the Financier Relevant Period) has reason to believe that the Independent Auditor has not discharged its duties in a fair, appropriate and diligent manner;

(b) if the Concession Agreement Parties and the Financiers (in respect of the Financier Relevant Period) mutually agree to terminate this Agreement or if the Parties and the Financiers mutually agree to terminate this Agreement;

(c) if the Parties and the Financiers mutually agree to terminate this Agreement;

(d) any other circumstance arises which in the reasonable opinion of any of the Concession Agreement Parties and/or the Financiers warrants termination of this Agreement; or

(e) in the event:

(i) the Independent Auditor is adjudged insolvent and/or bankrupt and/or winding up proceedings are filed against the Independent Auditor and/or the Independent Auditor files winding up proceedings in a court of law and/or any action for malpractice and/or misadministration is filed against the Independent Auditor in a court of law; or

(ii) of failure by the Independent Auditor to have complied with the requirements of Section 6.1 (Conflict of Interest) and Section 6.5 (Bribes and Integrity),

in each case (a) to (e) above, without incurring any liability on its part and in any respect, whatsoever.

8.1.2 This Agreement may be terminated by the Independent Auditor:

(a) if it reasonably determines (to the satisfaction of the Concession Agreement Parties and the Financiers (in respect of the Financier Relevant Period) that the continued provision of the Services (in whole or part) is illegal pursuant to the Applicable Laws; or

(b) in accordance with Section 12.5A (New Matters Transpiring); or

(c) if any Independent Auditor Payment Amounts remain unpaid to the Independent Auditor for ninety (90) days from the date of the Concessionaire’s receipt of the Independent Auditor’s invoice (or revised invoice, if applicable) in accordance with Section 4.6.4.

8.1.3 During the Termination Notice Period, including on any termination in accordance with Sections 8.1.1(e) and 8.1.2 and until the Termination Date (the **Interim Period**), the Independent Auditor shall perform the Services in the ordinary course of business.
(unless directed otherwise by the Concession Agreement Parties); provided, however, that during such Interim Period, the Independent Auditor shall (upon request by the Concession Agreement Parties or the Financiers (in respect of the Financier Relevant Period) and at the Concessionaire’s cost) liaise, to the reasonable extent, with any other appointee(s) or potential appointee(s) that is/are to be appointed by the Concession Agreement Parties and the Financiers (in respect of the Financier Relevant Period) to replace the Independent Auditor, for handing over the relevant IA Certifications and Reports, the Works Documents, records and information relating to the Services performed. During the Termination Notice Period, any due and payable Monthly Fee and out of pocket expenses shall be payable.

8.1.4 Notwithstanding anything to the contrary set out herein, the termination of this Agreement shall not have effect till such time as the replacement Independent Auditor has been appointed (the Termination Date).

8.1.5 In the event of expiry or termination of this Agreement (or of any amended and restated agreement), the replacement Independent Auditor shall be appointed in accordance with section 6.2.3 of the Concession Agreement with mutual consent of the Concession Agreement Parties. Further, in the event appointment of a replacement Independent Auditor is necessitated due to expiry of this Agreement, the appointment process pursuant to section 6.2.3 of the Concession Agreement shall be commenced at least forty-five (45) days prior to the date of expiry of this Agreement.

8.1.6 In the event the Concession Agreement is terminated, this Agreement shall automatically terminate on the completion of the obligations of the Independent Auditor required to be performed by it under the Concession Documents after such termination of the Concession Agreement.
9. **INSURANCE**

9.1 **INSURANCE**

9.1.1 No life, accident, travel or any other insurance coverage carried by the Concession Agreement Parties, the Financiers, the Independent Engineer, the Contactors, the Sponsors or any other stakeholder in the Project (excluding the Independent Auditor) shall apply to or provide coverage to the Independent Auditor or any of its directors, partners, employees, consultants or agents or for the dependents of any such persons. The Independent Auditor shall be responsible for its own appropriate insurance coverage. The Independent Auditor hereby represents that all necessary and appropriate insurance coverage(s), as required by Applicable Laws, have been placed and procured and are in force to cover liabilities and injuries of the Independent Auditor’s directors, partners, employees, consultants, and agents in accordance with Applicable Laws.
10. REpresentations

10.1 Representations

10.1.1 Each Party hereby represents and warrants to each of the other Parties that:

(a) it has the legal right, power and authority to execute this Agreement, perform its obligations hereunder and that, in each case, it has obtained all necessary consents and approvals (including taking any corporate approvals and actions, as applicable) to do so;

(b) it has taken all steps required to authorize it to execute this Agreement;

(c) this Agreement constitutes its legal, valid and binding obligation(s) that are enforceable against it;

(d) the execution of this Agreement and the performance of its obligations under this Agreement will not violate any judgment, decree or order, or any statute, rule or regulation binding on or applicable to it; and

(e) the person executing this Agreement on its behalf is legally authorized to execute, issue and deliver this Agreement on its behalf and all necessary consents and approvals to do the same have been obtained.

10.1.2 The Independent Auditor hereby further represents and warrants to each of the other Parties that:

(a) it is knowledgeable and has familiarized itself regarding the Project and the Services contemplated by this Agreement;

(b) it is knowledgeable and has familiarized itself regarding the financial and accounting standards relating to the Services and provision of the same;

(c) it understands its obligations (including provision of Services) under this Agreement;

(d) it has the financial capacity and professional expertise to fulfil its obligations under this Agreement;

(e) it has the requisite ability, skills, personnel and capacity to perform the Services with the degree of skill, care, and diligence expected of recognized professional persons/firms supplying services of a similar nature;

(f) it complies with the requirements of Article 6 (Conflict of Interest, Ethical Standards, Independence & Standard of Care); and

(g) it has the power and authority to enter into and deliver this Agreement and that this Agreement forms the valid, binding and enforceable obligations of the Agency.

10.1.3 The representations and warranties contained hereinabove are given and made on and as of the date hereof and shall survive the expiry or termination of this Agreement and shall be repeated as of and on each such date a Party performs its respective obligations under this Agreement.
10.1.4 The Independent Auditor acknowledges that the Concession Agreement Parties have entered into this Agreement in reliance on the representations and warranties made by the Independent Auditor in this Article 10 (Representations).
11. **CONFIDENTIALITY**

11.1 **CONFIDENTIALITY**

11.1.1 The Independent Auditor hereby agrees that all knowledge and information which the Independent Auditor may acquire in respect of the Project from the Concession Agreement Parties, the Financiers and other stakeholders of the Project or by virtue of the performance of the Services under this Agreement, shall be regarded by the Independent Auditor as strictly confidential and held by the Independent Auditor in confidence, and shall not be directly or indirectly disclosed by the Independent Auditor to any person or entity except with the prior written permission of the Concession Agreement Parties and the Financiers (in respect of the Financier Relevant Period), as appropriate. The Independent Auditor may disclose such information to the extent that it:

(a) is or becomes public other than through a breach of this Agreement;

(b) is subsequently received by the recipient from a third party who, to the recipient’s knowledge, owes no obligation of confidentiality to the disclosing party with respect to that information;

(c) was known to the recipient at the time of disclosure or is thereafter created independently;

(d) is disclosed as necessary to enforce the recipient’s rights under this Agreement; or

(e) must be disclosed under Applicable Laws, a legal process or professional regulation, including internal processes of the network of firms.

11.1.2 Subject to Applicable Laws, the Independent Auditor may provide information of the Concession Agreement Parties to other Firms, their partners, agents and employees (the **Firm Persons**) and external service providers of the Independent Auditor (the **Service Providers**) who may collect, use, transfer, store or otherwise process it (collectively, the **Process** in various jurisdictions in which they operate for purposes related to:

(a) the provision of the Services;

(b) complying with regulatory, and legal obligations to which the Independent Auditor is subject, with prior intimation to the Concession Agreement Parties;

(c) conflict checking in relation to the Services;

(d) risk management and quality reviews only pertaining to the Services; and

(e) the Independent Auditor’s internal financial accounting, information technology and other administrative support services (collectively, the **Processing Purposes**).

The Independent Auditor shall be responsible for maintaining the confidentiality of the information of the Concession Agreement Parties regardless of by whom such information is Processed on its behalf.

11.1.3 The Independent Auditor’s duty of confidentiality under this Article 11 (**Confidentiality**) shall expire:

(a) five (5) years following the Agreement Period; or
(b) the confidential information ceasing to remain confidential and entering the public domain other than through a breach of this Agreement by the Independent Auditor:

11.1.4 Any Party may use electronic media to correspond or transmit information to the other Party and such use shall not in itself constitute a breach of any confidentiality obligations under this Agreement.

11.2 **Usage**

11.2.1 The Independent Auditor hereby represents, warrants and undertakes that any information it discloses to the Concession Agreement Parties and the Financiers in performance of the Services hereunder belongs to the Independent Auditor and the Independent Auditor either has full rights to such information or the same is publicly available without constraint as to use.

11.2.2 Any information, advice, recommendations or other contents of any IA Certifications and Reports and Works Documents including all material produced or acquired under the terms of this Agreement, whether written, graphic, film, magnetic tape, or otherwise and where provided to the Concession Agreement Parties and the Financiers under this Agreement shall be:

(a) the property of the Concession Agreement Parties and the Concession Agreement Parties shall have the right to exclusively use aforesaid material for the purposes of the Project and/or publish or disseminate the same, in any language. The rights provided for in this Section 11.2 (Usage) shall survive the termination or expiration of this Agreement; and

(b) used by the Parties for the purposes of the Project including as set out in the Concession Documents or as required pursuant to the Applicable Laws.
12. MISCELLANEOUS

12.1 COMMUNICATIONS & NOTICES

12.1.1 All Notices under this Agreement shall be in writing, signed by or on behalf of the person giving it and shall be addressed to the Person to whom it is to be given and delivered by messenger or reputable overnight courier or transmitted by facsimile or electronic mail (provided a Notice provided by email is subsequently provided by courier) to that person’s address. A Notice given to a Person in accordance with this Section shall be treated as having been given and received:

(a) on the day of delivery, if given by hand delivery and delivered before 5:00 p.m. on a Business Day, otherwise on the immediately following Business Day;

(b) on the day of transmission, if transmitted by facsimile and the transmission report states that the transmission was sent in full and without error and the transmission was completed before 5:00 p.m. on a Business Day, otherwise on the immediately following Business Day; or

(c) on the day of actual delivery (and if such day is not a Business Day, then on the immediately following Business Day) if delivered by overnight courier.

12.1.2 For the purposes of this Section, a Party (the Sender) may take the address and facsimile number of another Party (the Recipient) to be the address and number set out in SCHEDULE C (Notices) or where the Recipient Notifies the Sender of another address or number, the last address or number so Notified to it; provided however that, a Notification for change of address or number shall be effective fourteen (14) days after the date of receipt of Notification of change.

12.1A LANGUAGE

12.1A.1 All Notices required to be given under this Agreement and all communications, documentation and proceedings which are in any way relevant to this Agreement shall be in writing and in English language.

12.2 SUCCESSORS IN INTEREST

12.2.1 This Agreement shall be binding upon and shall inure to the benefit of the successors and permitted assigns of the Parties hereto.

12.3 FORCE MAJEURE EVENT

12.3.1 If either Party is temporarily unable by reason of a Force Majeure Event to meet any of its obligations under this Agreement, and if such affected Party gives to the other Party written Notice of the event within seven (7) days after its occurrence, such obligations of the affected Party as it is unable to perform by reason of such Force Majeure Event shall be suspended for as long as the inability continues.

12.3.2 Notwithstanding Section 12.3.1 above, the Independent Auditor shall continue to perform the Services as far as it is reasonably practical and shall seek all reasonable alternative means for performance not prevented by the Force Majeure Event.

12.3.3 This Section 12.3 (Force Majeure Event) shall not apply to the obligation of the Concessionaire to make payments due to the Independent Auditor for the Services performed during the pendency of the Force Majeure Event. Except for such payments
that relate to the Services performed during the pendency of Force Majeure Event, no other compensations and payments shall be payable to Independent Auditor.
12.3A SUSPENSION

12.3A.1 In the event the Construction Works or Operations and Maintenance are suspended, or contemplated to be suspended, for a period exceeding sixty (60) days for any reason whatsoever (the Non Default Suspension), the Concessionaire may, by issuing a fifteen (15) day prior Notice and with the written consent of the Agency and the Financiers (in respect of the Financier Relevant Period) (such consent not to be unreasonably withheld or delayed), mutually agree with the Independent Auditor on the reduced scope of Services to be performed during such extended period and any adjustments to the Monthly Fee as a result of the same (the Revised Suspension Monthly Price). During such suspension period, the Independent Auditor shall only be entitled, to the Revised Suspension Monthly Price, in relation to a Non Default Suspension and shall not be entitled to any other amount relating to the Monthly Fee or any other reimbursement from the Concessionaire of any costs, expenses, losses or damages of any nature howsoever arising or resulting from such suspension.

12.3A.2 Subsequent to any suspension of Services in accordance with Section 12.3A.1 above, the Independent Auditor shall immediately resume the performance of Services (or any part thereof) upon receipt of a fifteen (15) day prior written Notice from the Concessionaire requiring it to resume the Services.

12.4 INDEMNITIES

12.4.1 The Concessionaire shall indemnify/hold harmless the Independent Auditor from, and against, any and all costs, expenses, losses, claims, demands, actions, suits or proceedings paid, incurred or suffered or made or initiated against it by any third party arising out of the Concessionaire’s fraud or wilful misconduct. The indemnity shall be limited to the amount of aggregate Monthly Fee payable to the Independent Auditor hereunder. This provision shall survive the termination or expiration of this Agreement for three (3) years.

12.4.2 The Independent Auditor shall, during and after the Agreement Period, indemnify/hold harmless the Concession Agreement Parties and the Financiers and each of their (as applicable) directors, executives, officers, officials, agents, employees (together, Indemnified Parties) from, and against, any and all costs, expenses, losses, claims, demands, actions, suits or proceedings paid, incurred or suffered or made or initiated against any of the Indemnified Parties arising out of, or in connection with the Independent Auditor’s fraud, wilful misconduct, gross negligence and/or deceit in performance of its Services. This provision shall survive the termination or expiration of this Agreement for three (3) years.

12.5 LIMITATION OF LIABILITY

12.5.1 Neither Party shall be liable to the other Party(ies) in contract, tort, warranty, strict liability (except as may be expressly provided in any Agency Agreement), or any other legal theory for any indirect, consequential, incidental, punitive, or exemplary damages.

12.5.2 In no event shall the Independent Auditor be liable to the Concession Agreement Parties, whether in contract, tort or otherwise, for any amount in excess of the aggregate Monthly Fee paid to the Independent Auditor (other than out of pocket expenses) pursuant to this Agreement.

12.5.3 In no event shall the Concessionaire be liable to the Independent Auditor, whether in contract, tort or otherwise, for any amount in excess of the aggregate Monthly Fee actually received by the Independent Auditor (other than out of pocket expenses) pursuant to this Agreement.
12.5.4 The limitations in this Section 12.5 (Limitation of Liability) will not apply to losses or damages caused by the Independent Auditor’s fraud, wilful misconduct, gross negligence and/or deceit or to the extent prohibited by Applicable Law or professional regulations.

12.5.5 The Concessionaire may not make a claim or bring proceedings relating to the Services or otherwise under this Agreement against any other Firm or the Firm Persons to the extent that no direct contractual relationship exists between you and any Firm or any other Firm Persons. The Concessionaire shall make any claim or bring proceedings only against the Firm or the Firm Persons on the basis that the Firm or the Firm Persons are a party with whom the Concessionaire has contracted.

12.5A NEW MATTERS TRANSPRING

If, following the Signing Date, any new matter relating to the Services, which is not set out under the Concession Documents or this Agreement, comes to the Independent Auditor’s knowledge which if known before accepting the Appointment pursuant to this Agreement could have affected Independent Auditor’s decision to enter into this Agreement, then the Independent Auditor will be at liberty to reconsider continuity of its Appointment without assuming any liability, whatsoever, and in any respect, whatsoever and may, in its discretion, terminate this Agreement in accordance with Article 8 (Termination); provided, however, that for the purposes of this Section 12.5A, any matter referred to the Independent Auditor by the Concession Agreement Parties, whether or not expressly treated as a function of the Independent Auditor under the Concession Documents or this Agreement, shall not be construed as a new matter.

12.6 AMENDMENT

12.6.1 This Agreement and/or any provisions of this Agreement may be amended, supplemented or transferred only if the Parties and the Financiers (in respect of the Financier Relevant Period) so agree in writing.

12.7 INVALIDITY & SEVERABILITY

12.7.1 If for any reason whatsoever any provision of this Agreement is or becomes invalid, illegal or unenforceable or is declared by any court of competent jurisdiction or any other instrumentality to be invalid, illegal or unenforceable, the validity, legality or enforceability of the remaining provisions shall not be affected in any manner, and the Parties hereto will negotiate in good faith with a view to agreeing upon one or more provisions which may be substituted for such invalid, unenforceable or illegal provisions, as nearly as is practicable unless the Concession Agreement Parties and the Financiers (in respect of the Financier Relevant Period) in their discretion decide that the effect of such substitution is to defeat the original intention of the Parties in which event the Concession Agreement Parties and the Financiers (in respect of the Financier Relevant Period) shall be entitled to terminate this Agreement by providing Notice pursuant to the provisions of Section 8.1 (Termination).

12.7.2 The illegality, invalidity or unenforceability of any provision of this Agreement under the law of any jurisdiction shall not affect its legality, validity or enforceability under the law of any other jurisdiction nor the legality, validity or enforceability of any other provision of this Agreement.

12.8 GOVERNING LAW

12.8.1 This Agreement shall be governed by and construed in accordance with the Applicable Laws of Pakistan.
12.9 **Dispute Resolution**

12.9.1 Any dispute arising out of or in connection with this Agreement shall in the first instance be resolved through amicable settlement between the disputing Parties no later than fifteen (15) days from the date of reference to discuss and attempt to amicably resolve the dispute. If the dispute is not resolved through amicable settlement, then the same shall be settled by reference to the arbitrator mutually appointed by the disputing Parties whose decision shall be final and binding on the disputing Parties. The arbitration shall be conducted under the provisions of the Arbitration Act, 1940 and any amendments/enactments thereof.

12.9.2 The seat and venue of the arbitration shall be Karachi, Pakistan.

12.10 **Counterparts**

12.10.1 This Agreement may be executed in several counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same agreement.

12.11 **No Partnership**

12.11.1 Nothing contained in this Agreement shall be construed or interpreted as constituting a partnership or agency between the Parties. Neither Party shall have any authority to bind the other in any manner whatsoever.

12.12 **Waiver**

12.12.1 Waiver by either Party of any default by the other Party in the observance and performance of any provision of or obligations or under this Agreement:

(a) shall not operate or be construed as a waiver of any other or subsequent default hereof or of other provisions or obligations under this Agreement;

(b) shall not be effective unless it is in writing and executed by a duly authorized representative of such Party; and

(c) shall not affect the validity or enforceability of this Agreement in any manner.

12.12.2 Neither the failure by a Concession Agreement Party to insist on any occasion upon the performance of the terms, conditions and provisions of this Agreement or any obligation thereunder nor time or other indulgence granted to the Independent Auditor shall be treated or deemed as a waiver of such breach or acceptance of any variation or the relinquishment of any right by the Concession Agreement Parties.

12.13 **Intellectual Property Rights**

12.13.1 The Independent Auditor may use data, software, designs, utilities, tools, models, systems and other methodologies and know-how (the Materials) that the Independent Auditor owns in performing the Services and shall retain all intellectual property rights in such Materials.

12.13.2 All intellectual property rights in the IA Certifications and Reports (including any improvements or knowledge developed while performing the Services) shall vest in and be jointly owned by the Concession Agreement Parties. The Concessionaire shall transfer its intellectual property rights in the IA Certifications and Reports to the Agency
on the Transfer Date in accordance with section 24.1.1(b)(iv) of the Concession Agreement.

12.13.3 Each Concession Agreement Party hereby authorizes the other to utilize the IA Certifications and Reports for purposes of the Project.
Scope of services for the role of the Independent Auditor for the Project as per the terms and conditions under the Concession Agreement shall include the following:

1. To work in close coordination with the Independent Engineer and exchange information as required for the performance of their respective tasks.
2. To review the Financial Model of the Project with a view to understand the dynamics and structure of the project from a financial perspective.
3. To give presentations to various Government tiers on the Financial Model when required. Also, be present in all meetings of the Agency at almost all levels during various approvals, needs and issues etc. related to the Korangi Link Road Project.
4. Monitor, the estimation of all costs incurred on the Project and compliance of financial provisions by the Concessionaire under the Concession Agreement.
5. In consultation with the Independent Engineer, establish the need for increase in costs and the reasons therefore, as provided for in the Concession Agreement, with respect to the design, construction, testing and commissioning of the Concession Assets.
6. Establish the Total Project Cost of the Project based on the mechanism outlined in the terms of the Concession Agreement.
7. On intimation from the Concessionaire, Financiers or the Agency establish the occurrence of a Material Adverse Effect on the Project and recommend, based on the terms of the Concession Agreement, a mechanism to overcome the same.
8. Upon the issuance of the Construction Completion Certificate, the Independent Auditor along with the Independent Engineer shall undertake to verify the Total Project Cost as determined by the Concessionaire and submitted by the Concessionaire, based on the calculations and the measurements, work done, costs incurred, invoices and amounts paid by the Concessionaire. The Total Project Cost consisting of the actual capital cost of the Project upon its completion and all authorized variations thereto, so determined and certified shall be presented to the Agency, the Concessionaire and the Financiers.
9. The Independent Auditor shall not be involved in day-to-day supervision. The work of the Independent Auditor is therefore:
   ► monitoring
   ► certification
   ► issuing monthly progress reports
   ► cost certification
   ► expert adjudicator on financial matters relating to force majeure, terminations, project delays or other project issues as and when they arise of the Project’s issues, funding mechanisms, project risks and intimate the party concerned of their responsibility as laid down in the Concession Agreement and Financing Documents.
10. The Independent Auditor shall be required to follow a system of periodic reports in such frequency and formats as determined by the Concessionaire and the Agency.
**Scope Of Work Of The Independent Auditor In Different Phases Of The Project:**

1  **Phase I: Pre-Construction Activities Of Independent Auditor**

   The Independent Auditor will review all relevant aspects of the Project and will, in particular, address the following issues:

   1.1 Assist the Agency in reviewing the Financial Model and give recommendations on the Financial Model along with running sensitivities on it.

   1.2 The Independent Auditor shall also give presentations to Agency on the Financial Model and other financial matters related to the Project as and when required.

   1.3 Issue certificates as per the requirements of the Project Agreements.

   1.4 Monitor and assist in the Financial Closure of the Project.

   1.5 Assisting the project stakeholders throughout the CP completion process.

   1.6 The Independent Auditor shall perform all such other obligations as set out in the Concession Documents.

2  **Phase II: Role Of Independent Auditor During Construction Stage**

   During construction, the Independent Auditor will carry out the following tasks:

   2.1 Monitor financial progress against anticipated program included in the Financial Model.

   2.2 Review proposed changes in the Financial Model / budget and their consequences on the Pre-Estimated Project Cost and Total Project Cost.

   2.3 Monitor the overall cost of the project as construction proceeds and identify cost change implications.

   2.4 Endorsement of Total Project Cost in accordance with the Concession Agreement.

   2.5 In collaboration with the Independent Engineer, issue certificates related to Construction Performance Security as and when required as per the Concession Agreement.

   2.6 Provide periodically, in collaboration with the Independent Engineer, Construction Monthly Progress Report.

   2.7 Evaluate and endorse calculations prepared by the Concessionaire in relation to amounts to be paid to the Concessionaire upon occurrence of certain events (including Change of Scope, Relief Events, Force Majeure Events, Agency Events of Default and Concessionaire Events of Default and other events set out in the Concession Documents).

   2.8 Issue certifications to facilitate disbursement of funding from stakeholders with respect to construction and other expenditures in accordance with the Financial Model.

   2.9 In respect of the occurrence of a Force Majeure event in accordance with the provisions of the Project Agreements, the Independent Auditor shall consult with the Concessionaire, Agency and Financiers in order to determine the amount of resultant
compensations, if any, in accordance with the provisions of the Project Agreements and issue necessary certifications in this respect.

2.10 In respect of the occurrence of a termination event in accordance with the provisions of the Project Agreements, the Independent Auditor shall consult with the Concessionaire, Agency and Financiers in order to determine the amount of resultant compensations, if any, in accordance with the provisions of the Project Agreements and issue necessary certifications in this respect.

2.11 The Independent Auditor shall perform all such other obligations as set out in the Concession Documents.

3 **PHASE III: ROLE OF INDEPENDENT AUDITOR DURING POST CONSTRUCTION STAGE**

The Independent Auditor shall also be responsible to perform the following obligations and duties:

3.1 In collaboration with the Independent Engineer, issue certificates related to O&M Performance Security as and when required as per the Concession Agreement.

3.2 Actualize the Financial Model on periodic basis, as per the Project Agreements, based on the prevailing KIBOR, CPI, WPI or any other index as stated in the Project Agreements.

3.3 Compute Annuity Amount Payments, Annuity Amount Payment Damages and Adjustable Annuity Amount Payment Damages on periodic basis and issue certificates in accordance with the Project Agreements.

3.4 Determine and certify Advertising Proceeds payable to the Agency (as Class B Dividend or otherwise) and the Concessionaire Management Fee payable to the Concessionaire, if any.

3.5 Determine and certify Additional Facilities Proceeds payable to the Agency (as Class B Dividend or otherwise) and the Commercial Right Management Fee payable to the Concessionaire, if any.

3.6 In case of Force Majeure event, Relief Event or Termination Event or any other event (including Change of Scope) whereby the project stakeholders require input from the Independent Auditor in accordance with the Project Agreements, assist the stakeholders in issuing relevant certificates as and when required.

3.7 Assist the Agency, the Concessionaire and Financiers on financial matters that arise from time to time.

3.8 At each year end, the Independent Auditor will quantify and inform the impact of the Taxes Component on the Agency, on account of Change in Law in the relevant year, in its report through a separate letter to the Agency and the Finance Department of the Government of Sindh.

3.9 The Independent Auditor shall perform all such other obligations as set out in the Concession Documents.
PART I – GENERAL

1. **Applicable to all the Services provided, work performed and Works Documents**

**METHODOLOGIES & PARAMETERS:**

The Services provided, work performed and Works Documents generated by Independent Auditor will be based on the underlying documents, as required to be provided to Independent Auditor by the Concessionaire, the Financiers (in respect of the Financier Relevant Period), the Independent Engineer and the Agency (as applicable in terms of Concession Documents). Further, all the deliverables generated, and the Works Documents prepared will mention the facts, assumption and methodologies on which such deliverables and Works Documents will be based. None of the deliverables generated or the Works Documents prepared will be construed as an assurance report in accordance with any assurance standards.

2. **Follow a system of periodic reports in such frequency and formats as determined by the Concessionaire, the Agency and the Financiers (in respect of the Financier Relevant Period).**

**METHODOLOGIES & PARAMETERS:**

The Services to be performed by Independent Auditor requires communication and reporting by Independent Auditor of various financial aspects of the Project.

A reporting mechanism, describing the format and frequency of the Independent Auditor’s reports will be agreed with the Concession Agreement Parties and additionally, in respect of the Financier Relevant Period, with the Financiers provided that the frequency of such reports, subject to Financing Documents, will in no case be more than once a month.
Without prejudice to Article 3 (Services & Related Matters) of the Agreement, during Phase I, Independent Auditor shall review and address all relevant aspects of the Project including, in particular, undertaking the following:

1. **Assist the Agency in reviewing the Financial Model and give recommendations on the Financial Model along with running sensitivities on it.**

### METHODOLOGIES & PARAMETERS:

As the Concession Agreement already stands executed and that the Base Case Financial Model forms an integral part of it, Independent Auditor shall not be required to:

(i) assist the Agency in reviewing the Base Case Financial Model for finalization of the same;

(ii) provide recommendations to Agency for finalization of the Base Case Financial Model (together with running sensitivities on it) for finalization of the same.

2. **Give various presentations to Chairman, Planning & Development Department (GoS), Chief Secretary, Finance Department (GoS), Local Government & Housing Town Planning Department (GoS), PPP Unit, Korangi Link Road Project Financing Committee, Korangi Link Road Project Technical and Financial Evaluation Committee (TFEC) and the PPP Policy Board on the financial model and other financial matters, as and when required.**

### METHODOLOGIES & PARAMETERS:

The Independent Auditor shall from time to time (as may be required) give presentations to the Concessionaire, its Financiers (in respect of the Financier Relevant Period), the Chairman, Planning & Development Department (GoS), Chief Secretary, Finance Department (GoS), Local Government & Housing Town Planning Department (GoS), PPP Unit, Project Financing Committee, Technical and Financial Evaluation Committee (TFEC), the PPP Policy Board and other stakeholders in the Project on the Financial Model and other financial matters relating to the Project. The Independent Auditor shall make its relevant personnel available for and shall duly make, in each case, all such presentations of which timely notice is provided to the Independent Auditor’s relevant coordinating person. The timings for such presentations shall be mutually agreed.

Meetings held for presentations pursuant to this Section 2 shall not be more than a cumulative of thirty (30) man hours in any calendar month (including all of the time for preparation of such meetings, waiting, travelling etc.) provided however, in certain cases where the Independent Auditor is required to attend such meetings in excess of thirty (30) man hours in any calendar month, the Independent Auditor shall make its relevant personnel available for the same upon request of the Concessionaire, the Agency and, following Financial Close, the Financiers (in respect of the Financier Relevant Period) on mutually agreed terms.
3. **Monitor and assist in the Financial Close of the Project.**

**Methodologies & Parameters:**

The Independent Auditor shall liaise with the Agency, the Financiers and the Concessionaire to achieve Financial Close for the Project. The work will be based on the relevant documents, as requested by the Independent Auditor and to be provided by the Concessionaire and the Financiers, to determine whether the Financial Close has been achieved. The estimation of the Pre-Estimated Project Cost, as set out in the Base Case Financial Model and as updated from time to time until Financial Close, will be the Independent Auditor’s sole source to trace the cost of the Project (including any contingencies and other related funds requirements) and no direct verification work of the estimates provided in the Base Case Financial Model, or independent work in respect of estimation of the Pre-Estimated Project Cost and funds requirements therewith will be performed.
PART III – SERVICES – PHASE II OBLIGATIONS

Without prejudice to Article 3 (Services & Related Matters) of the Agreement, during Phase II, Independent Auditor shall review and address all relevant aspects of the Project including, in particular, undertaking the following:

1. **Monitor financial progress against anticipated programme included in the Base Case Financial Model. Review proposed changes in the Financial Model / budget and their consequences on Pre-Estimated Project Cost and Total Project Cost. Monitor the overall cost of the Project as construction proceeds. Identify cost change implications.**

**METHODOLOGIES & PARAMETERS:**

Subject to Section 3.3 (the Base Case Financial Model & Financial Model) of the Agreement, the Parties acknowledge that the Base Case Financial Model is based on a functioning spreadsheet, based on which, the work (wherever mentioned in this Agreement in relation to the Financial Model) shall be performed.

The monitoring of the financial progress against anticipated programme will be the comparison of the actual cost of the Project (as provided by the Independent Engineer) based on the stage of completion of the Project, quantities applied, the agreed rates between the Concessionaire and the Agency, and the relevant underlying supporting documents with the progress as identified and incorporated in the Financial Model. Provision of all the documentation required by Independent Auditor in respect of this work will be the responsibility of the Concessionaire, Agency and the Independent Engineer.

Independent Auditor understands that the Concession Documents will identify scenarios in which the changes in the Financial Model will be incorporated. Such changes will result in changes to the ultimate disbursements / compensations to the Concessionaire, and in certain circumstances, to the Agency.

Independent Auditor’s Services to be provided in respect of the obligations set out in this Clause 1 will be to relate the changes proposed by either the Concessionaire, the Agency or the Financiers under the provisions of the Concession Documents and the documentary evidences, as provided to Independent Auditor by the Concession Agreement Parties and the Financiers (in respect of the Financier Relevant Period). Identification of such events, suggesting the changes in the Financial Model and provision of all the related relevant documents required by Independent Auditor, will be the responsibility of the Concessionaire, the Agency, the Financiers (in respect of the Financier Relevant Period) and the Independent Engineer (as applicable in terms of the Concession Documents). Based on Independent Auditor’s work performed hereunder, and the output generated from the Financial Model after having made the required changes, Independent Auditor shall present its views to be agreed between the Agency, the Concessionaire and the Financiers (in respect of the Financier Relevant Period). Subject to Section 3.3 (the Base Case Financial Model & Financial Model) of the Agreement, any such views will be based on the assumption that the Base Case Financial Model provided by the Concessionaire is valid as to its relational functionality and is capable of taking assumption stress i.e. it can work with the same efficiency under all the envisaged scenarios of Concession Agreement that may be fed therein. Such views will only be expressed based on the agreement of the Concessionaire, the Financiers (in respect of the Financier Relevant Period) and Agency.
2. *Endorsement of Total Project Cost in accordance with the Concession Documents.*

**METHODOLOGIES & PARAMETERS:**

The Parties agree that the term ‘actual capital cost’ (as used in the deflection of Total Project Cost set out in the Concession Agreement) relates to the cost certified by the Independent Engineer on the basis of the quantities applied and the agreed rates between the Concessionaire and the Agency, as used in the preparation of the Base Case Financial Model (and as referred to in Clause 1 of this Part III of SCHEDULE B (CLARIFICATIONS TO THE TERMS OF REFERENCE - METHODOLOGIES & PARAMETERS)).

Independent Auditor’s work in relation to this will be performing procedures, as agreed with the Agency, the Concessionaire and the Financiers (in respect of the Financier Relevant Period), on a schedule of actual cost to be provided by the Concessionaire, as certified by the Independent Engineer, and reporting its observations on such schedule on item by item basis.

The work performed by Independent Auditor for this will be based on the underlying documents, as required to be provided to Independent Auditor by the Concessionaire, the Financiers (in respect of the Financier Relevant Period), the Independent Engineer and the Agency (as applicable in terms of Concession Documents). Further, the work performed by Independent Auditor will result in its observations to be provided to the Concessionaire, the Financiers (in respect of the Financier Relevant Period) and the Agency in a long form report, which is not to be construed an assurance report in accordance with any assurance standards.

3. *Evaluate and endorse calculations prepared by the Concessionaire of amounts of compensations to be paid to the Concessionaire upon occurrence of certain events (including Change of Scope, Relief Events, Agency Events of Default and Concessionaire Events of Default and other events set out in the Concession Documents).*

**METHODOLOGIES & PARAMETERS:**

The Parties acknowledge and agree that in case of occurrence of certain events (including Change of Scope, Permitted Events, Relief Events, Agency Events of Default and Concessionaire Events of Default and other events set out in the Concession Documents) (the Relief Compensation Relief Events), the Concessionaire shall be eligible for certain compensating payments based on the mechanisms provided in the Concession Documents. Independent Auditor’s work in this regard will be based on the agreement between the Concession Agreement Parties as to occurrence of such Relief Compensation Relief Events. Further, Independent Auditor’s work will be based on the calculations prepared by the Concessionaire to determine whether the calculations prepared by the Concessionaire are in line with the provisions of the Concession Documents (as fed into the Financial Model) and as per the results generated from the Financial Model.

In this process, Independent Auditor may request underlying documents from the Concessionaire, the Financiers (in respect of the Financier Relevant Period), the Independent Engineer, the Agency or other third parties. It is understood that provision of such underlying documents will be the responsibility of the Concessionaire in the absence of which, performance by Independent Auditor of its relevant obligations provided in this Clause 3 may not be possible.

In respect of matters relating to the Concession Agreement, it is agreed that any matter relating to the credit worthiness / financial ability of the amalgamated or re-constituted entity or as to whether the Concessionaire remaining solvent despite the payment of referred claims (as mentioned in the relevant section of the Concession Agreement) will
solely be based on the information from the audited accounts of the relevant entities to be provided by the Concessionaire, which will not be independently tested or verified in any respect. Further, any opinion mentioned by Independent Auditor will be based on such information only, the basis of conclusion of which will form part of the relevant communication from Independent Auditor and it will not be construed as an assurance opinion under any assurance standards.

4. **Issue certifications to facilitate disbursement of funding from stakeholders with respect to funding of construction and other expenditures in accordance with the Financial Model.**

**METHODOLOGIES & PARAMETERS:**

This relates to disbursement of the funds for the Project based on the expenditure scheduling as included in the Financial Model.

It is acknowledged by Independent Auditor that the Project financing arrangements (both equity and debt) will require a schedule of funding to be followed based on the progress of the Project. Accordingly, Independent Auditor’s work in this respect will be based on the agreed Project schedule (as set out in the Financial Model and the relevant Concession Documents) on the Independent Engineer’s certifications as to the disbursements to be made from period to period. Independent Auditor shall issue such Works Documents (as may be required by the funding arrangements) based on the described work in accordance with the Concession Documents.
SCHEDULE C – NOTICES

TO AGENCY:
ATTENTION: PROJECT DIRECTOR
ADDRESS: Ground Floor, Tughlaq House, Shahra-e-Attaturk Road, Karachi, Pakistan
TELEPHONE: 92-21-99213214

TO CONCESSIONAIRE:
ATTENTION: 
ADDRESS: 
TELEPHONE: 

TO INDEPENDENT AUDITOR:
ATTENTION: 
ADDRESS: 
TELEPHONE: 

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AGENCY INITIALS          CONCESSIONAIRE INITIALS           INDEPENDENT AUDITOR’S INITIALS
SCHEDULE D – FORM OF CONCESSIONAIRE INDEPENDENT AUDITOR PAYMENT ACCOUNT STANDING INSTRUCTIONS

[ON THE LETTERHEAD OF THE CONCESSIONAIRE]

DATE: [●]
REFERENCE: [●]

TO,
[INSERT TITLE]
[INSERT NAME OF BANK]
[INSERT BRANCH]
[INSERT ADDRESS]
Pakistan,

RE: STANDING INSTRUCTIONS IN CONCESSIONAIRE INDEPENDENT AUDITOR PAYMENT ACCOUNT STANDING INSTRUCTIONS (as defined below)

Dear Sir/Madam,

1. ISSUANCE OF STANDING INSTRUCTIONS NOTICE

We, [Concessionaries Name], (through _______________) (the “CONCESSIONAIRE”) refer you, [INSERT BANK NAME] (a banking company established under the laws of Pakistan having its registered office located at [●]) (the “Account Bank”) to the following bank account established and maintained in the name of the Concessionaire at the Account Bank’s branch located at [●]:

(i) Account Number [●], Account Title [●] (the “Concessionaire Independent Auditor Payment Account”);

And, we, the Concessionaire, hereby issue this notice (the Standing Instructions Notice) containing the Standing Instructions (as defined below) for the maintenance and operation of the Concessionaire Independent Auditor Payment Account and for matters relating to the same.

2. DEFINITIONS

In this Standing Instructions Notice, the following capitalized words shall bear the meaning ascribed to the same as below:

(a) Account Bank shall bear the meaning ascribed thereto in Paragraph 1;

(b) Concessionaire means [SPV NAME], a company incorporated under the laws of Pakistan, having its registered office located at [Address];

(c) Concession Agreement means the agreement entitled ‘Concession Agreement’ dated [DATE] (as amended, supplemented and/or modified from time to time) and entered into between Governor of Sindh (through Secretary, Local Government Department) (as the Agency) and [SPV Name] (as the Concessionaire);

(d) Concessionaire Independent Auditor Payment Account shall bear the meaning ascribed thereto in Paragraph 1;
(e) **Financiers** means the financial institutions, banks, Islamic financiers, funds, trusts or trustees of the holders of debentures or other securities their successors and assigns, that extend financing for the Project to the Concessionaire pursuant to the financing documents;

(f) **Financing Termination Date** means the date, as notified by the Concessionaire, on which all amounts due and payable by the Concessionaire to the Financiers are paid in accordance with the financing documents;

(g) **Independent Auditor** means [●], a firm validly existing under the laws of Pakistan having its place of business located at [●], Pakistan;

(h) **Independent Auditor Payment Account** means the account established by the Independent Auditor with the Independent Auditor Account Bank bearing the Account [●], bearing the Account Title [●];

(i) **Independent Auditor Payment Account Bank** means [●], corporate center branch located at [●], Pakistan;

(j) **Independent Auditor Payment Amount** means the amount due and payable to the Independent Auditor as set out in the Independent Auditor Payment Amount Certificate;

(k) **Independent Auditor Payment Amount Certificate** means the certificate to be issued by the Concessionaire on its letterhead setting out the Independent Auditor Payment Date and the Independent Auditor Payment Amount along with the Independent Auditor’s invoice annexed thereto for such Independent Auditor Payment Amount;

(l) **Independent Auditor Payment Date** means the due date for payment of the Independent Auditor Payment Amount as set out in the Independent Auditor Payment Amount Certificate;

(m) **Project** includes but not limited to the following having total length of approximately 12.0 km road and other structures:

- 3 + 3 Lane Bridge approximately 1.0 km length over Malir River (between Korangi Causeway and Jam Sadiq Bridge) with all guide (upstream and downstream) bunds, spurs, river training works, cunette, spurs etc. will be constructed (considering the recommendations of Hydraulic/Physical Model study report of Malir River provided by the Agency).
- To conduct Hydraulic/Physical model study for shifting of Malir Left Bund and proposed bridge considering above mentioned report, river topography, rainfall pattern, catchment area, invert levels of outfall drain(s) of adjacent areas and subsoil conditions and take approval from the relevant department (Sindh Irrigation Department) with the due support from the Agency.
- 2 lane Flyover over Korangi Bridge
- Construction of road over Left Bank of Korangi river to connect Korangi road of approximately 1.5 km length
- Construction of 2 + 2 lane interchange / loop ramps at Korangi Bridge / Link road to Korangi Creek
- 2+2 Lane coastal/river road (Link Road to Korangi Creek) with shoulders on either side including revetement and earthwork for embankment / bund of approximately 5.9 km length
- Construction of Culverts
- New Construction of PRL road to connect Link Road to Korangi Creek of approximately 1.0 km length
- Rehabilitation / Widening of Existing PRL road of approximately 1.6 km length

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AGENCY INITIALS  CONCESSIONAIRE INITIALS  INDEPENDENT AUDITOR’S INITIALS
- Construction of stormwater drain approximately 1.0 km length
- Realignment of existing Creek Avenue
- Construction of Roundabout at creek avenue to link with Malir Expressway
- Rehabilitation of existing bunds.
- Earthwork for embankment of recreational/commercial area (around 450m x 40m) with entrance and exit lanes and pavement works for car parking areas of 600 to 650 vehicles
- Street Lights
- Procure, operate and maintain 1 crane for stranded vehicle
- Stormwater drainage chamber/pit with its disposal line for pumping stormwater near Attock Petrol Pump
- Plantation using Miyawaki technique at all available land pockets (but not limited to the areas mentioned below) within the project area with the approval of the Horticulture Department.
  o landside embankment slopes of right and left bund of the Malir River
  o South west side of creek avenue / Korangi causeway road (green belt area near start point),
  o Rotary area of right turn flyover,
  o Landside embankment slope of new bund
  o U turn rotary near Airman Gold course

(n) **Standing Instructions** means the legally binding, enforceable and irrevocable (subject to Paragraph 5.1 and Paragraph 5.3 below) standing instructions contained in this Standing Instructions Notice for the operation and maintenance of the Concessionaire Independent Auditor Payment Account;

(o) **Standing Instructions Notice** shall bear the meaning ascribed thereto in Paragraph 1.

3. **INTERPRETATION**

3.1 In this Standing Instructions Notice:

(a) Words in this Standing Instructions Notice importing the singular shall include the plural or vice versa.

(b) Save where the contrary is indicated, any reference in this Standing Instructions Notice to:

(i) a Paragraph or an Annexure shall be construed as a reference to a paragraph or an annexure of this Standing Instructions Notice;

(ii) any instrument, memorandum, agreement, contract or document shall be construed as a reference to that instrument, memorandum, agreement, contract or document (together with any recitals or sections thereto) all as amended, varied, restated, novated or supplemented from time to time;

(iii) any person shall be construed so as to include their respective administrators, successors in interest and permitted assigns from time to time;

(iv) a statute, enactment or order shall be construed as a reference to such statute, enactment or order as the same may have been, or may from time to time be, amended or re-enacted and all subsidiary legislation and other instrument made under or deriving validity therefrom;

(v) the singular shall include the plural and vice versa, where appropriate;
(vi) the words ‘including’ and ‘includes’ and any grammatical variants of those
words, will be read as if followed by the words ‘without limitation;’

(vii) a reference to a person shall be construed to include a juridical person;

(viii) a time of day shall be construed as a reference to Pakistan Standard
Time; and

(ix) headings in this Standing Instructions Notice are for ease of reference
only and shall be ignored in construing this Standing Instructions Notice.

(c) The Annexures (if any) appended to this Standing Instructions Notice shall form
an integral part of this Standing Instructions Notice.

4. **THE INSTRUCTIONS IN RESPECT OF MATTERS RELATING TO THE CONCESSIONAIRE INDEPENDENT AUDITOR PAYMENT ACCOUNT**

4.1 The Concessionaire hereby instructs the Account Bank to debit the Concessionaire
Independent Auditor Payment Account on each Independent Auditor Payment Date
(upon receipt of a Independent Auditor Payment Amount Certificate relating to such
Independent Auditor Payment Date) in an amount equal to the relevant Independent
Auditor Payment Amount and credit the same to the Independent Auditor Payment
Account.

5. **REVOCATION AND AMENDMENT OF STANDING INSTRUCTIONS**

5.1 The Concessionaire Independent Auditor Payment Account Standing Instructions (or any
part thereof) issued by the Concessionaire may be revoked pursuant to a written
revocation Notice duly executed, countersigned and confirmed by:

(a) in case of the period falling between the signing date of these Standing Instructions
and the Financing Termination Date, the authorized representatives of the Agency,
the Independent Auditor and the Financiers (including any agent of the same);

(b) in case of the period falling after the Financing Termination Date, the authorized
representatives of the Agency and the Independent Auditor, in each case
acknowledged by the Account Bank.

5.2 The Concessionaire Independent Auditor Payment Account shall be strictly operated and
maintained in accordance with the Standing Instructions.

5.3 These Standing Instructions may be amended from time to time with the written mutual
consent of the Account Bank and the Agency provided that any such amendment shall
be only effective if the same is accepted, confirmed and countersigned by:

(a) in case of the period falling between the signing date of these Standing Instructions
and the Financing Termination Date, the authorized representatives of the Agency,
the Independent Auditor and the Financiers (including any agent of the same);

(b) in case of the period falling after the Financing Termination Date, the authorized
representatives of the Agency and the Independent Auditor,

in each case, acknowledged by the Account Bank.

6. **SEVERABILITY**

6.1 If for any reason whatsoever any provision of this Standing Instruction Notice is or
becomes invalid, illegal or unenforceable or is declared by any court of competent
jurisdiction or any other instrumentality to be invalid, illegal or unenforceable, the validity, legality or enforceability of the remaining provisions shall not be affected in any manner, and the Account Bank, the Concessionaire, the Agency, and till the Financing Termination Date, the Financiers (including any agent of the same), will negotiate in good faith with a view to agreeing upon one or more provisions which may be substituted for such invalid, unenforceable or illegal provisions, as nearly as is practicable.

7. **GOVERNING LAW & DISPUTE RESOLUTION**

7.1 This Standing Instructions Notice shall be governed by and construed in accordance with the laws of Pakistan and the courts of law at Karachi, Pakistan with competent jurisdiction shall entertain all disputes arising hereunder.

**FOR AND ON BEHALF OF**

**THE CONCESSIONAIRE**

-----------------------------------------------------------------------------------------------------------------------------

NAME:

DESIGNATION:
ACKNOWLEDGMENT AND CONSENT NOTICE:

We, the Account Bank, hereby undertake the following:

1. We have received the Standing Instructions Notice issued by the Concessionaire and we hereby acknowledge the receipt of the same;

2. We have reviewed and understand all the provisions, terms and conditions as stipulated in the Standing Instructions Notice;

3. By signing this acknowledgement and consent notice, we hereby confirm our acceptance to all the instructions as stipulated in the Standing Instructions Notice and all the terms and conditions stated therein;

4. We shall act in accordance with the instructions of the Concessionaire, as stipulated in the Standing Instructions Notice, subject to the same being in conformity with applicable laws (including the State Bank of Pakistan circulars, notifications and directions issued, from time to time).

By confirming, signing and delivery of this acknowledgment and consent notice to the Concessionaire, certified true copies of the same are also being sent to the Agency, the Independent Auditor and the Financiers (including any agent of the same).

This acknowledgement and consent notice is being signed by a duly authorized representative of the Account Bank.

FOR AND ON BEHALF OF ACCOUNT BANK

..............................................................

NAME:
DESIGNATION:

..............................................................

AGENCY INITIALS    CONCESSIONAIRE INITIALS    INDEPENDENT AUDITOR’S INITIALS
Dear Sirs/Madam

We have been requested by [Concession Agreement Party(ies) Name] (the Concession Agreement Party(ies)) to provide you with a copy of the report we prepared on its/their instruction on [●] (the Report).

Whilst we are prepared to provide a copy of the Report to you, it is only on the basis that you acknowledge and agree that:

1. the Report was prepared solely for the use of the Concession Agreement Party(ies) and addressed issues specific to them. Accordingly, we may not have addressed issues of relevance to you;
2. the Report was concluded on [●] and we have not undertaken any further work since that time. Material events may therefore have occurred which will not be reflected in the Report;
3. the Report relies on information provided by the Concession Agreement Party(ies) and we have not independently verified the information provided;
4. any use you make of the Report, is entirely at your own risk. Accordingly, you will not rely upon the Report nor shall you make any claim that you have done so. Similarly, where any information or explanation is given by us, the onus shall be upon you to verify any such information or explanation directly with the Concession Agreement Party(ies) rather than rely upon us;
5. you shall not disclose the Report (or any portion or summary of the Report) except:
   5.1 to your directors, officers or employees on a need to know basis, provided, that they will be bound by the terms herein;
   5.2 to your lawyers (subject to these disclosure restrictions), who may use it only to give you advice relating to the Report;
   5.3 to the extent, and for the purposes, required by subpoena or similar legal process (of which you will promptly notify us);
   5.4 to other persons or entities with our prior written consent which shall be in our sole discretion; or
   5.5 you may disclose to anyone the Report (or any portion or summary thereof) to the extent it relates to tax matters, including tax advice, tax opinions, tax returns, or the
tax treatment or tax structure (the **Tax Advice**). However, with the exception of tax authorities, you shall inform those to whom you disclose Tax Advice that they may not rely on it for any purpose without our prior written consent.

6. you shall make no claim against us, our partners, employees or affiliates, or other members of the global partners, employees or affiliates (collectively, the **Firm Parties**) that relates in any way to the Report, any information contained therein, or your access to the Report;

7. you acknowledge and agree that the Firm Parties, including ourselves, accept no responsibility and shall have no liability in contract, tort or otherwise to you or any other person or entity in relation to the contents of the Report;

8. to the fullest extent permitted by applicable law, you shall indemnify, defend and hold harmless the Firm Parties from and against any claim or expense, including reasonable attorneys' fees, suffered or incurred by any Firm Party relating to any breach by you of any agreements/conditions contained herein or the use or disclosure of the Report or any portion thereof by anyone who received it directly or indirectly by, through or at the request of you; and

9. this letter shall be governed solely by the laws of Pakistan and the courts of Karachi, Pakistan shall have the non-exclusive jurisdiction in respect of any dispute arising from or in connection with this letter.

We would be grateful if you would sign the copy of this letter where indicated and return it to us as soon as possible.

**FOR AND ON BEHALF OF**

[●]

**NAME:**

**DESIGNATION:**
IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed by their duly authorised representatives as of the day, month and year first above written.

For and on behalf of LOCAL GOVERNMENT & HOUSING TOWN PLANNING DEPARTMENT, GOVERNMENT OF SINDH through its authorised signatory

Name:  
Designation:  

IN THE PRESENCE OF WITNESSES:

1- Name:  
Address:  
CNIC No:  

2- Name:  
Address  
CNIC No:  

FOR AND ON BEHALF OF  
LOCAL GOVERNMENT & HOUSING TOWN PLANNING DEPARTMENT, GOVERNMENT OF SINDH through its authorised signatory

Name:  
Designation:  

IN THE PRESENCE OF WITNESSES:

1- Name:  
Address:  
CNIC No:  

2- Name:  
Address  
CNIC No:  

For and on behalf of [SPV Name] through its authorised signatory

IN THE PRESENCE OF

WITNESSES:

1- Name:
   Address:
   CNIC No:
   
2- Name:
   Address:
   CNIC No:

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For and on behalf of [•] through its authorised signatory

Name:
Designation: ......................................................

IN THE PRESENCE OF
WITNESSES:

1- Name:
Address:
CNIC No: ......................................................

2- Name:
Address
CNIC No: ......................................................

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THE INDEPENDENT ENGINEER AGREEMENT

BY & BETWEEN

GOVERNOR OF SINDH
(THROUGH THE SECRETARY, LOCAL GOVERNMENT & HOUSING TOWN PLANNING DEPARTMENT)
(AS THE AGENCY)

AND

[*] (AS THE CONCESSIONAIRE)

AND

[*] (AS THE INDEPENDENT ENGINEER)

DATED: AS OF ____________

AT: KARACHI, PAKISTAN

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AGENCY INITIALS    CONCESSIONAIRE INITIALS    INDEPENDENT ENGINEER’S INITIALS
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THE INDEPENDENT ENGINEER AGREEMENT

This INDEPENDENT ENGINEER AGREEMENT (this Agreement) is made at Karachi, Pakistan on this ____ day of ________, 2021 (the Signing Date) by and between:

THE GOVERNOR OF SINDH (THROUGH SECRETARY, LOCAL GOVERNMENT & HOUSING TOWN PLANNING DEPARTMENT) having his offices at Local Government Department, Ground Floor, Tughlaq House, Sindh Secretariat, Karachi, Pakistan for and on behalf of the Government of Sindh (the Agency);

AND

[●], a company incorporated under the Applicable Laws of Pakistan, having its registered office located at [●] (the Concessionaire, which expression shall, where the context so permits, be deemed to mean and include its successors-in-interest and permitted assigns);

AND

[•], a company incorporated under the applicable laws of Pakistan, having its registered office located [•] (the Independent Engineer, which expression shall, where the context so permits, be deemed to mean and include its, successors in interest, administrators and permitted assigns);

(the Agency and the Concessionaire are hereinafter collectively referred to as the Concession Agreement Parties and each individually as a Concession Agreement Party, as the context may require); and
(the Agency, the Concessionaire and the Independent Engineer are hereinafter collectively referred to as the **Parties** and each individually as **Party**, as the context may require).
Recitals

(a) WHEREAS, the Agency is desirous to implement has identified and prepared the Project on a PPP basis;

(b) WHEREAS, the Agency and the Concessionaire have entered into the Concession Agreement for the purposes of implementation of the Project;

(c) WHEREAS, Concession Agreement requires appointment of the Independent Engineer by the Concession Agreement Parties that shall perform various duties and obligations as are contemplated under the Concession Documents;

(d) WHEREAS, subject to the terms of this Agreement, the Concession Agreement, the Parties are desirous of appointing the [●] as the Independent Engineer for the Project;

(e) AND WHEREAS, the Parties desire to set forth the terms and conditions under which the Independent Engineer shall perform the Services and shall act as the Independent Engineer for the purposes set out in the Concession Documents and the Concessionaire shall pay for the same.

NOW, THEREFORE, in view of the foregoing and in consideration of the mutual benefits to be derived and the representation and warranties, covenants and agreements contained herein and other good and valuable consideration, the sufficiency of which is hereby acknowledged and intending to be legally bound, the Parties hereby agree as follows:
1. **DEFINITIONS & INTERPRETATION**

1.1 **DEFINITIONS**

Unless specified otherwise herein, in this Agreement (including the Recitals), all capitalized terms shall have the meanings assigned to them under the Concession Agreement (as defined below).

In addition, the following terms shall have the following meanings, unless the context otherwise requires:

**Agency** shall bear the meaning ascribed thereto in the Preamble;

**Agreement** means this “Independent Engineer Agreement” including the main body of this Agreement and the Schedules attached hereto shall bear the meaning ascribed thereto in the Preamble;

**Agreement Period** means the period commencing on the Signing Date and (unless extended in accordance with Section 2.2.2) ending on the earlier of:

(a) the Termination Date; or

(b) the date occurring after the lapse of twenty-four (24) months from the Signing Date;

**Appointment** shall bear the meaning ascribed thereto in Section 2.1.1;

**Authorized Representative** shall bear the meaning ascribed thereto in Section 5.2.1;

**Authorized Signatories** shall bear the meaning ascribed thereto in Section 5.1.1;

**Business Days** means a day (other than Saturday, Sunday or a gazetted holiday) on which banks in Karachi, Pakistan are generally open for business;

**Commercial Operations Date** shall bear the meaning ascribed thereto in the Concession Agreement;

**Concession Agreement** means the agreement entitled the Concession Agreement dated [•], and entered into between the Agency and the Concessionaire in respect of the Project;

**Concession Agreement Parties, Concession Agreement Party** shall bear the meaning ascribed thereto in the Preamble;

**Concession Documents** means:

(a) the Agency Agreements (including the Concession Agreement and the Equity Funding and Utilization Agreement);
(b) the Project Agreements;

(c) the Financing Documents; and

(d) any other agreements that are entered into and/or are to be entered into for the purposes of the Project and designated as “Concession Documents” with the mutual consent of the Parties;

Concessionaire shall bear the meaning ascribed thereto in the Preamble;

Concessionaire Independent Engineer Payment Account means the account opened and maintained by the Concessionaire with the Concessionaire Independent Engineer Payment Account Bank for the purposes set out in this Agreement;

Concessionaire Independent Engineer Payment Account Bank means the financial institution/banking company mutually agreed between the Independent Engineer and the Concessionaire, for the purposes of establishing and maintaining the Concessionaire Independent Engineer Payment Account;

Concessionaire Independent Engineer Payment Account Standing Instructions means the irrevocable (subject to Section 4.7.5 and Section 4.7.6) standing instructions issued by the Concessionaire to the Concessionaire Independent Engineer Payment Account Bank in respect of the Concessionaire Independent Engineer Payment Account in accordance with this Agreement and substantially in the form and content attached hereto at SCHEDULE E (Form of Concessionaire Independent Engineer Payment Account Standing Instructions);

Construction Supervision Fee shall bear the meaning ascribed thereto in Section 4.3.1;

Construction Supervision Fee Cap shall bear the meaning ascribed thereto in Section 4.3.1;

Construction Supervision Phase means the period commencing on, the commencement of the Construction Works and ending on the Construction Completion Date;

Construction Supervision Services means such part of the Services that are to be performed by the Independent Engineer in respect of supervising construction (including Construction Works) of the Project, as described in SCHEDULE A (Services);

Construction Supervision Staff shall bear the meaning ascribed thereto in Section 5.3.2;

CPI shall bear the meaning ascribed thereto in Section 4.4.3(b);

Design Review Fee means the lump sum fee payable in respect of the Design Review Services, the same being the aggregate of the Design Review Fee (Final
Alignment Stage), Design Review Fee (Approved Preliminary Engineering Design), Design Review Fee (Detailed Engineering Design Stage) and Design Review Fee (Approved Detailed Engineering Design Issuance);

Design Review Phase means the time period commencing on the Signing Date and ending on the date of approval of the Detailed Engineering Design in accordance with the terms of the Concession Agreement;

Fees shall bear the meaning ascribed thereto in Section 4.1.1;

Financier Relevant Period means the period commencing on Financial Close and expiring on the date that is the earlier of:

(a) the date of termination or expiry of this Agreement; and

(b) the Financing Termination Date;

Force Majeure Event shall bear the meaning ascribed thereto in the Concession Agreement;

Indemnified Parties shall bear the meaning ascribed thereto in section 12.5.2;

IE Certifications and Reports means any consents, approvals, reports, certifications, letters, determinations or other communications (duly signed by the authorised representative of the Independent Engineer), as and when required, pursuant to the Concession Documents;

Independent Auditor shall bear the meaning ascribed thereto in the Concession Agreement;

Independent Engineer shall bear the meaning ascribed thereto in the Preamble;

Independent Engineer's Facilities shall bear the meaning ascribed thereto in Section 3.7.1;

Independent Engineer Payment Account means the bank account of the Independent Auditor that is established and maintained with commercial bank operating in Pakistan and which is notified by the Independent Engineer to the Concessionaire in writing (with a copy to the Agency and the Independent Auditor) within five (5) days of the Signing Date;

Independent Engineer Payment Amount shall bear the meaning ascribed thereto in Section 4.6.2;

Independent Engineer Payment Amount Certificate means the certificate to be jointly issued by the Independent Engineer and the Independent Auditor in the Agreed Form to the Concessionaire (with a copy to the Agency) and submitted by the Concessionaire to the Concessionaire Independent Engineer Payment Account Bank setting out the Independent Engineer Payment Amount along with the Independent Engineer’s invoice (or revised invoice, if applicable) annexed thereto for such Independent Engineer Payment Amount;
Independent Engineer Payment Date shall bear the meaning ascribed thereto in Section 4.6.2;

Interim Period shall bear the meaning ascribed thereto in Section 8.1.4;

Key Stakeholders means the Agency, the Concessionaire and the Financiers (in respect of the Financier Relevant Period);

Key Performance Indicators means the key performance indicators (and corresponding penalties/liquidated damages for non-compliance) set out in SCHEDULE F (Key Performance Indicators) and as to be reflected and included verbatim in the O&M Manual;

Non Default Suspension shall bear the meaning ascribed thereto in Section 12.4.1;

Notified, Notice, Notify and its grammatical variations means as notified in writing;

O&M Phase means the Operations Period;

O&M Phase Services means all works and services to be performed and the deliverables to be delivered, in each case, by the Independent Engineer during the O&M Phase:

(a) in accordance with and pursuant to this Agreement, including as set out in Article 3 (Services & Related Matters) and SCHEDULE A (Services);

(b) for performance of its role as an Independent Engineer during the O&M Phase under the Concession Documents;

Parties, Party shall bear the meaning ascribed thereto in the Preamble;

Phases means collectively the Design Review Phase, the Construction Supervision Phase and, if applicable, the O&M Phase and Phase means any of them individually;

Preamble means the preamble to this Agreement;

Design Review Fee (Approved Detailed Engineering Design Issuance) shall bear the meaning ascribed thereto in SCHEDULE C (Fees);

Design Review Fee (Detailed Engineering Design Stage) shall bear the meaning ascribed thereto in SCHEDULE C (Fees);

Design Review Fee (Final Alignment Stage) shall bear the meaning ascribed thereto in SCHEDULE C (Fees);

Design Review Fee (Approved Preliminary Engineering Design) shall bear the meaning ascribed thereto in SCHEDULE C (Fees);
Design Review Services shall bear the meaning ascribed thereto in SCHEDULE A (Services);

Recipient shall bear the meaning ascribed thereto in Section 12.1.2;

Revised Suspension Fee shall bear the meaning ascribed thereto in Section 12.4.1;

Scope of Work shall bear the meaning ascribed thereto in Section 3.4.1;

Sender shall bear the meaning ascribed thereto in Section 12.1.2;

Services means all works and services to be performed and the deliverables to be delivered as part of its Scope of Work, in each case, by the Independent Engineer:

(a) in accordance with and pursuant to this Agreement, including as set out in Article 3 (Services & Related Matters) and SCHEDULE A (Services);

(b) in performance of its role as an Independent Engineer under the Concession Documents;

Services Personnel shall bear the meaning ascribed thereto in Section 5.4.1;

Signing Date shall bear the meaning ascribed thereto in the Preamble;

Termination Date shall bear the meaning ascribed thereto in Section 8.1.5;

Termination Notice Period shall bear the meaning ascribed thereto in Section 8.1.1;

Works Documents means any drawing, specification, instruction, process and equipment list, plot, plan, data, file, analysis, manual, chart, calculation, operating manual, service and maintenance manual, engineering and design document, quality assurance test method and procedure, other manual and information of similar nature, communication, information, report, document, notice, certificate, agreement, note, budget, approval, consent, correspondence, opinion or any other document or instrument of any nature whatsoever relating to the Project.

1.2 INTERPRETATION

1.2.1 Words used in this Agreement importing the singular shall include the plural or vice versa.

1.2.2 Save where the contrary is indicated, any reference in this Agreement to:

(a) an Article, Section, Clause or Schedule shall be construed as a reference to an article, section, clause or schedule of this Agreement;

(b) any instrument, memorandum, agreement, contract or document shall be construed as a reference to that instrument, memorandum, agreement,
contract or document (together with any recitals, schedules or sections thereto) all as amended, varied, restated, novated or supplemented from time to time;

(c) any person shall be construed so as to include their respective administrators, successors in interest and permitted assigns from time to time;

(d) a statute, enactment or order shall be construed as a reference to such statute, enactment or order as the same may have been, or may from time to time be, amended or re-enacted and all subsidiary legislation and other instrument made under or deriving validity therefrom;

(e) the singular shall include the plural and vice versa, where appropriate;

(f) the words 'including' and 'includes', and any grammatical variants of those words, will be read as if followed by the words 'without limitation';

(g) a reference to a person shall be construed to include a juridical person;

(h) a time of day shall be construed as a reference to Pakistan Standard Time;

(i) headings in this Agreement are for ease of reference only and shall be ignored in construing this Agreement; and

(j) the recitals, preamble, introduction and Schedules to this Agreement shall form an integral part of this Agreement.
2. **Term**

2.1 **The Appointment**

2.1.1 Subject to the terms of this Agreement, the Concession Agreement Parties hereby:

(a) appoint [•] to act as the Independent Engineer for the Project; and

(b) authorize the Independent Engineer to perform the Services in respect of the Project;

in each case above, during the Agreement Period (the *Appointment*) and the Independent Engineer hereby accepts such Appointment and undertakes to perform the Services in accordance with the requirements of this Agreement and the Concession Documents.

2.2 **Term and Extension**

2.2.1 Subject to Section 2.2.2, the Appointment of the Independent Engineer in terms of this Agreement shall be for the Agreement Period and shall come into effect on the Signing Date.

2.2.2 The Concession Agreement Parties, shall be entitled to extend the Agreement Period on the same terms and conditions as stated hereto for such further period(s) as necessary to ensure that the Independent Engineer is appointed up to the Project Construction Completion Date; provided, that such extension shall not exceed one (1) year in aggregate, by written Notice to the Independent Engineer at least one (1) month prior to the expiry of the Agreement Period. Any extension of the Agreement Period following the Project Construction Completion Date shall be subject to mutual written agreement between the Parties. In the event the Parties mutually agree to extend the Agreement Period for the continued provision of Services in the O&M Phase, the scope of work for the O&M Phase Services and a separate fee shall be negotiated in accordance with Section 3.3 (*O&M Phase*).

2.3 **Reliance**

2.3.1 The Concession Agreement Parties are, and the Financiers (in respect of the Financier Relevant Period and to the extent agreed with the same) shall, rely upon the Independent Engineer’s expertise to perform the Services in such a manner so as to undertake and perform the role of the Independent Engineer contemplated under the Concession Documents and the Independent Engineer hereby acknowledges such reliance of the Concession Agreement Parties and the Financiers (in respect of the Financier Relevant Period).

2.3.2 The Independent Engineer hereby represents that it has the required ability, skills, technical support, personnel and capacity to perform the Services.
3. Services & Related Matters

3.1 General

3.1.1 The Independent Engineer hereby undertakes that it shall:

(a) perform the Services diligently and within the timelines set out in the Concession Documents;

(b) exercise, in the performance of the Services, all skill, care and diligence to be expected of a qualified and competent professional, experienced in each of the disciplines to which the Services relate;

(c) cooperate with other parties to the Concession Documents in respect of matters relating to the Independent Engineer for the purposes of, inter alia, facilitating implementation of the Project;

(d) review the Concession Documents delivered by the Concessionaire and all Works Documents that are provided to it pursuant to the Concession Documents in its capacity as the Independent Engineer;

(e) coordinate and liaise with the Independent Auditor in respect of matters that require the Independent Auditor’s inputs for performance of Services;

(f) prepare, review and issue (in accordance with the Concession Documents) all Works Documents contemplated to be issued by the Independent Engineer under the Concession Documents;

(g) as and when requested or required, consult with the parties to the Concession Documents and/or any other relevant stakeholders of the Project for the performance of Services and request (where available and applicable) any Works Document(s) that is of a technical nature and is required by the Independent Engineer to perform the Services;

(h) as and when requested or required, pursuant to the Concession Documents, review and comment on any Works Documents provided to it pursuant to the Concession Documents and request further Works Documents as may be required;

(i) prepare, issue, deliver, review, certify, determine and/or approve (by whatsoever nomenclature referred to in the Concession Documents) (as applicable) all Works Documents contemplated to be prepared, issued, delivered, reviewed and/or approved (as applicable) by the Independent Engineer under the Concession Documents and/or pursuant to this Agreement;

(j) visit, if considered relevant by it, any of the offices of the Concessionaire or any other location where relevant personnel or records of the Concessionaire are located;
(k) in respect of the O&M Phase and as part of O&M Phase Services commencing from the Commercial Operations Date, monitor the Concessionaire’s compliance with the Key Performance Indicators relating to the Operations and Maintenance of the Project and determine penalties/liquidated damages in accordance with SCHEDULE F (Key Performance Indicators) in the event of any non-compliance of the Key Performance Indicators due to reasons attributable to the Concessionaire (excluding any Permitted Event) and set out such penalties/liquidated damages in a certificate to be issued in accordance with the Concession Documents;

(l) comply with the Applicable Laws in its performance of Services; and

(m) perform, provide inputs, and/or advise on matters (as applicable) relating to the Financing Documents including (without limitation), preparation and delivery of various IE Certifications and Reports, matters relating to disbursements/contributions, cost overruns, base equity requirements and perform other roles and functions contemplated to be performed by the Independent Engineer (by whatsoever name/nomenclature referred to) under the Financing Documents.

3.2 **Performance of Obligations of Independent Engineer Under the Concession Documents**

3.2.1 The Services shall include all such duties and obligations as are to be performed by the Independent Engineer under the Concession Documents and as are set out in this Agreement (including in SCHEDULE A (Services)).

3.2.2 The Independent Engineer hereby confirms and acknowledges that it has received a copy of the Concession Agreement and that it has reviewed the same and understands the role to be performed by it as the Independent Engineer for the Project in terms thereof. The Independent Engineer hereby undertakes to perform all such acts, duties and obligations that are contemplated in the Concession Agreement to be performed by the Independent Engineer and the same shall be deemed to be a part of the Services.

3.2.3 The Independent Engineer understands and acknowledges that certain Concession Documents shall be entered into between, *inter alia*, the Agency, the Financiers and the Concessionaire (or any of them) in respect of the Project and the Independent Engineer hereby undertakes (upon being delivered such Concession Documents by the Concessionaire from time to time) to perform all such acts, duties and obligations that are or shall be contemplated in such Concession Documents to be performed by the Independent Engineer in accordance with the terms thereof and the same shall be deemed to be a part of the Services.

3.2.4 The Independent Engineer shall, upon request by the Concession Agreement Parties and the Financiers (in respect of the Financier Relevant Period), provide its inputs in the preparation and finalization of the Concession Documents in respect
of technical, engineering and other matters requiring the Independent Engineer’s inputs (including the matters that relate to the role of the Independent Engineer).

3.2.5 The Concessionaire shall be responsible for delivering executed and duly certified copies of such Concession Documents to the Independent Engineer from time to time that contemplate performance of certain roles, duties and/or obligations by the Independent Engineer.

3.2.6 In the performance of the Services, the Independent Engineer shall:

(a) act reasonably to ensure the safety and security of the Project;

(b) not cause unreasonable delay in providing Services and/or the carrying out of the Construction Works by the Concessionaire by reason of its presence on the Project Site; and

(c) not cause any damage to the Project Site or any of the Concession Assets.

3.2.7 The Independent Engineer shall use all reasonable endeavours to comply with any timetable for the execution of the Services as previously agreed between the Concession Agreement Parties and the Independent Engineer.

3.3 O&M PHASE

3.3.1 The Parties acknowledge that the Services to be performed pursuant to this Agreement do not presently include the O&M Phase Services to be performed during the O&M Phase. On or prior to the expiry of the Agreement Period, the Parties may engage the Independent Engineer for the performance of the O&M Phase Services. In such case, the Independent Engineer shall perform the O&M Phase Services on such terms and conditions as are mutually agreed between the Parties.

3.3.2 The Parties hereby further acknowledge that the scope of O&M Phase Services set out in this Agreement is indicative and shall be further developed and agreed between the Parties prior to engagement of the Independent Engineer for performance of the O&M Phase Services.

3.3.3 In addition to matters set out in Section 3.3.1 and section 3.3.2 above, the Parties acknowledge that certain Services (including certain services similar to the O&M Phase Services) will be required to be performed during the Construction Supervision Phase following achievement of the Substantial Completion. To the extent the Concession Agreement Parties and the Financiers (in respect of the Financier Relevant Period) require the Independent Engineer to perform such services, the same shall mutually agree on the scope of such services, together with the fees payable in respect of the same.

3.4 THE PHASES

3.4.1 Subject to Section 3.3.2, the Independent Engineer’s scope of work for Services (the Scope of Work) shall be broken into the following three (3) phases:
(a) the Design Review Services during the Design Review Phase;

(b) the Construction Supervision Services during the Construction Supervision Phase; and

(c) subject to Section 3.3 (O&M Phase), the O&M Phase Services during the O&M Phase,

provided that, to the extent contemplated in the Concession Documents, obligations to be performed during a Phase may be performed in another Phase.

3.4.2 The Services to be performed by the Independent Engineer during each of the Phases outlined in Section 3.4.1 (as applicable) shall include all such duties, obligations and services:

(a) that are contemplated to be performed by the Independent Engineer under the Concession Documents and the same shall be deemed to be a part of the Scope of Work of Services; and

(b) as are set out in this Agreement (including SCHEDULE A (Services)).

provided that, to the extent contemplated in the Concession Documents, obligations to be performed during a Phase may be performed in another Phase.

3.5 Other Key Matters Relating to Services

3.5.1 All matters contained in any of the IE Certifications and Reports will be made in good faith and on basis of the information available to the Independent Engineer, subject to Section 3.1.1(g), at the time of issuance of such IE Certifications and Reports. The Independent Engineer shall mention key basis, identify and include references (to the extent applicable) to the relevant provision, section or clause of the Concession Documents in respect of each of its IE Certifications and Reports. The Concession Agreement Parties shall have the right to evaluate the basis (including the applicable provision, section or clause of the Concession Documents) on which the relevant IE Certifications and Reports have been issued.

3.5.2 In the course of providing the Services, the Independent Engineer may provide oral comments, or drafts of each of the written IE Certifications and Reports either in hard or soft copies. As these represent work in progress and not the Independent Engineer’s final deliverables, the Independent Engineer will not assume a duty of care in respect of them. The final results of the Independent Engineer’s work will be contained in the final deliverables as mentioned in relevant provisions of this Agreement.

3.5.3 Notwithstanding anything to the contrary, the Services shall not include the provision of legal and/or financial advice and the Independent Engineer makes no representations in respect of its ability to address questions of legal interpretation and/or financial matters and shall neither be responsible for nor shall engage in any legal interpretations and/or financial matters of the Concession Documents.
and in case any inputs are required in respect of the same, the Independent Engineer shall refer the matter to the Concessionaire and the Agency.

3.6 CONCESSIONAIRE’S COOPERATION

3.6.1 The Concessionaire hereby agrees to provide reasonable cooperation and assistance to the Independent Engineer in terms of this Agreement for the performance of the Services. Further, the Concessionaire agrees to:

(a) cooperate with and furnish any Works Documents, data and information reasonably required by the Independent Engineer and available with the Concessionaire in respect of its performance of the Services;

(b) arrange for other consultants and advisors of the Concessionaire, including technical and legal, to be available for discussions as may be necessary in relation to the performance of the Services during regular business hours at no cost to the Independent Engineer;

(c) use reasonable endeavours to ensure that the Contractors, in accordance with the relevant Concession Documents, reasonably co-operate with the Independent Engineer and provide to the Independent Engineer such information and assistance as may be necessary to assist the Independent Engineer in performing the Services; and

(d) Notify the Independent Engineer in writing from time to time of any amendments to the Concession Documents that are relevant to the Services and provide the Independent Engineer copies thereof.

3.7 INDEPENDENT ENGINEER’S FACILITIES

3.7.1 The Concessionaire shall provide the facilities prior to the commencement of the Construction Supervision Phase in accordance with the terms hereof and SCHEDULE D (Independent Engineer’s Facilities) (the Independent Engineer's Facilities).

3.8 REPORTING SERVICES

3.8.1 The Independent Engineer shall provide such IE Certifications and Reports and shall undertake such reporting obligations, as part of its Services, as are contemplated under this Agreement and as are contemplated or are to be contemplated in the Concession Documents. The Independent Engineer shall deliver from time to time such IE Certifications and Reports to the Key Stakeholders as are requested by the same.

3.8.2 The IE Certifications and Reports submitted by the Independent Engineer pursuant to this Agreement shall be written in English.
3.9 **SUB-CONTRACTING**

3.9.1 The Independent Engineer shall not sub-contract the performance of the Services or any part thereof without the prior written consent of the Concession Agreement Parties, which consent may be withheld by a Concession Agreement Party at its discretion.

3.9.2 Notwithstanding the grant of consent by a Concession Agreement Party and the Financiers (in respect of the Financier Relevant Period), in accordance with subsection 3.9.1, any engagement by the Independent Engineer of any sub-contractor shall not release or discharge the Independent Engineer of any of its liabilities, responsibilities or obligations under this Agreement.
4. Fees

4.1 The Fees

4.1.1 As consideration and full and complete compensation for Services provided by the Independent Engineer hereunder in respect of each Phase, the Independent Engineer shall be paid:

(a) the Design Review Fee, in accordance with Section 4.2 (Fees During the Design Review Phase);

(b) the Construction Supervision Fee, in accordance with Section 4.3.1 (Construction Supervision Fee and Related Fees); and

(c) fees for performance of O&M Phase Services, in accordance with Section 4.3.2 (Fees Payable During the O&M Phase);

(collectively referred to as the Fees).

4.1.2 Notwithstanding anything to the contrary contained in this Agreement, all payment of Fees to the Independent Engineer shall commence from the Commencement Date. In the event the Project is terminated under the Concession Agreement prior to the Commencement Date, the Parties hereby agree that the Concessionaire shall have no liability whatsoever to make any payments to the Independent Engineer and that the Concessionaire shall be discharged from its obligation to make any payment to the Independent Engineer as envisaged herein.

4.2 Fees During the Design Review Phase

4.2.1 Design Review Fee

For the Design Review Services rendered by the Independent Engineer during the Design Review Phase, the Concessionaire shall pay a lump sum fee equal to the Design Review Fee to the Independent Engineer.

4.2.2 Terms of the Payment of the Design Review Fee

(a) The Independent Engineer shall invoice the Concessionaire the Design Review Fee (as set out in Schedule C (Fees)) for the Services rendered during the Design Review Phase, in the following manner:

(a) first (1st) instalment of Design Review Fee, being the Design Review Fee (Final Alignment Stage), shall be invoiced by the Independent Engineer to the Concessionaire within thirty (30) days of submission of the Proposed Preliminary Design by Concessionaire to the Independent Engineer;

(b) second (2nd) instalment of Design Review Fee, being the Design Review Fee (Approved Preliminary Engineering Design), shall be invoiced by the Independent Engineer to the Concessionaire within
thirty (30) days of issuance of the Approved Preliminary Engineering Design by the Independent Engineer;

(c) third (3rd) instalment of Design Review Fee, being the Design Review Fee (Detailed Engineering Design Stage), shall be invoiced by the Independent Engineer to the Concessionaire within thirty (30) days of the issuance of the Approved Detailed Engineering Design by the Independent Engineer and submission of the same to the Agency; and

(d) fourth (4th) instalment of Design Review Fee, being the Design Review Fee (Approved Detailed Engineering Design Issuance), shall be invoiced by the Independent Engineer to the Concessionaire within thirty (30) days of issuance of the Commencement Certificate.

4.3 OTHER FEES

4.3.1 CONSTRUCTION SUPERVISION FEE AND RELATED FEES

For the Services rendered by the Independent Engineer during the Construction Supervision Phase, the Concessionaire shall pay the Independent Engineer the Fees (the Construction Supervision Fee) in accordance with SCHEDULE C (Fees).

The Construction Supervision Fee payable to the Independent Engineer in respect of the Construction Supervision Staff shall be calculated on the basis of SCHEDULE C (Fees); provided, that the same shall be capped at PKR [•] (Pakistani Rupees [•] only) (the Construction Supervision Fee Cap). In the event the Construction Supervision Phase extends twenty (20) months of the Commencement Date due to reason not attributable to any Party, the Parties shall mutually agree to the amount payable for such extended period (including on the basis of any unexhausted/unutilized person-months), subject to Section 2.2 (Term and Extension).

Notwithstanding anything contained in this Agreement, in the event this Agreement is terminated after the Commencement Date when one or more instalments of the Construction Supervision Fee are then outstanding, the Construction Supervision Fee payable to the Independent Engineer shall be paid pro rata to the number of days worked in the following manner:

(a) where this Agreement is terminated prior to the first (1st) Construction Supervision Fee becoming payable, the first (1st) instalment shall be adjusted proportionately to the ratio of: (i) the number of days worked since the Commencement Date; to (ii) the total number of days between the Commencement Date and the first instalment date; and

(b) in all other cases, the first (1st) upcoming instalment of the Construction Supervision Fee following such termination shall be adjusted proportionately to the ratio of (i) the number of days worked since the
payment of the last instalment; to (ii) the total number of days between such instalments.

4.3.2 **FEES PAYABLE DURING THE O&M PHASE**

Subject to engagement of the Independent Engineer to perform the O&M Phase Services during the O&M Phase, the Independent Engineer shall be paid such fee for performance of such O&M Phase Services as is mutually agreed between the Parties in accordance with Section 3.3 (*O&M Phase*) and **SCHEDULE C (Fees)**.

4.4 **FEE INCREASE**

4.4.1 The Independent Engineer shall be deemed to have fully satisfied itself as to the correctness and sufficiency of the Fees as compensation for the due and proper performance of the Services and any other obligations under the Concession Documents and acknowledges that it has entered into this Agreement for the Fee payable after fully satisfying itself in respect of all factors which may have affected or which may affect the Fees. The Fees payable shall cover the Independent Engineer’s Services, all out of pocket expenses, other obligations under the Concession Documents and all things necessary for the proper performance, execution and completion of the Services.

4.4.2 Notwithstanding anything to the contrary, the personnel engaged by the Independent Engineer shall be on a daily and full-time basis and no over-time or other additional compensations, other than the Fees, shall be payable by the Concessionaire to the Independent Engineer or such personnel for performance of Services. The Parties acknowledge that the Fees (together with any provisions relating to over-time) is based on a working day of twelve (12) hours per day and in case the Independent Engineer is required to work in excess of such hours in any day upon the instructions of the Concessionaire, over-time may be charged by the Independent Engineer on mutually agreed basis.

4.4.3 Payments against the Construction Supervision Fee shall be adjusted as follows:

(a) the remuneration paid in Pak Rupees pursuant to the billing rates, as agreed for the Construction Supervision Fee and set forth in **SCHEDULE C (Fees)** shall be adjusted annually (and, for the first time, with effect from the remuneration earned in the thirteenth (13th) calendar month after the Commencement Date) by applying the formula as stated below.

\[
RI = R_{Io} \times \frac{I_1}{I_{Io}}
\]

Where,

- \( RI \) = Adjusted Remuneration for Construction Supervision Fee
- \( R_{Io} \) = Remuneration payable on the basis of the remuneration rates for Construction Supervision Fee as per **SCHEDULE C (Fees)**
- \( I_1 \) = Official Index for salaries in the country/province for the first month for which the adjustment is to have effect; and
- \( I_{Io} \) = Official Index on which the Adjustment is made.
$I_0 = \text{Official Index for salaries in the country/province for the month of the date of the contract.}$

(b) the Official Index shall be the Consumer Price Index (CPI) as issued by the Federal Bureau of Statistics, Government of Pakistan through its monthly/annual publications for the preceding year (average of the past twelve (12) month period).

4.5 **TAXES**

4.5.1 All taxes relating to the Fees (including sales tax on services and withholding tax) shall be borne by and shall be on account of the Independent Engineer and shall be deemed to be included in the Fees. Subject to Section 4.5.2, the Independent Engineer shall be responsible for payment of all taxes as applicable to its provision of the Services. The Independent Engineer shall be registered with the Sindh Revenue Board and issue sales tax invoices to the Concessionaire from time to time.

4.5.2 The Concessionaire shall be entitled to deduct the relevant withholding tax in accordance with the Applicable Laws from amounts payable to the Independent Engineer under this Agreement. Evidence of all deductions made along with supporting documents/receipts, and evidence of withholding tax duly paid by the Concessionaire to the Federal Board of Revenue (or any other authority) shall be provided by the Concessionaire to the Independent Engineer on request.

4.5.3 Following the Signing Date, in the event any new taxes or levies are levied on the Services being provided by the Independent Engineer and subject to the same constituting a Change in Law, the impact thereof shall be borne by the Concessionaire by increasing the net Fee payable to the Independent Engineer provided, that the afore-stated shall not apply in respect of any increases in deductions on account of: (a) withholding tax; and (b) any other taxes that are adjustable against the income of the Independent Engineer in accordance with Applicable Laws.

4.6 **INVOICING AND PAYMENT**

4.6.1 All invoices for Fees will be invoiced by Independent Engineer at such times as are specified in **SCHEDULE C (Fees)** and shall be in the name of the Concessionaire (with a copy to the Independent Auditor and the Agency) who shall solely be responsible for the payment to the Independent Engineer of the Independent Engineer Payment Amount.

4.6.2 Upon issuance of the invoice in terms of Section 4.6.1, the Independent Engineer and the Independent Auditor shall issue the Independent Engineer Payment Amount Certificate within ten (10) days of receipt of the invoice. Upon issuance of the Independent Engineer Payment Amount Certificate, the Concessionaire shall provide a copy of the Independent Engineer Payment Amount Certificate to the Concessionaire Independent Engineer Payment Account Bank along with the Independent Engineer's invoice (or revised invoice, if applicable in terms of
Section 4.6.3) within three (3) Business Days of receipt of the Independent Engineer Payment Amount Certificate by the Concessionaire. Notwithstanding anything to the contrary set out herein, all due and payable amounts under this Agreement set out in the Independent Engineer’s invoices (except any disputed amounts) (the Independent Engineer Payment Amount) shall be debited from the Concessionaire Independent Engineer Payment Account, as per the Concessionaire Independent Engineer Payment Account Standing Instructions, within three (3) Business Days of receipt by the Concessionaire Independent Engineer Payment Account Bank of the Independent Engineer Payment Amount Certificate (the Independent Engineer Payment Date). If payment of any amount to the Independent Engineer under this Agreement becomes due prior to issuance of the Concessionaire Independent Engineer Payment Account Standing Instructions, the Concessionaire shall ensure payment of such amount to the Independent Engineer within five (5) days of receipt by the Concessionaire of the Independent Engineer Payment Amount Certificate in relation to such payment.

4.6.3 If the Concession Agreement Parties or the Financiers (in respect of the Financier Relevant Period) dispute any part of the invoiced amount within five (5) days of the Concessionaire’s receipt of the invoice (or a revised invoice, if applicable), the Independent Engineer shall re-submit to the Concessionaire a revised invoice for the undisputed amount taking into account objections raised. In such case, all references in this Agreement to the Independent Engineer’s invoice shall mean to refer to such revised invoice of the Independent Engineer (setting out correctly the undisputed amounts) that is submitted to the Concessionaire. All disputed amounts shall become due and payable following resolution of the disputes. If the Concession Agreement Parties or the Financiers (in respect of the Financier Relevant Period) do not dispute or object to the invoice within five (5) days of the Concessionaire’s receipt of the invoice (or a revised invoice, if applicable), it shall be deemed not to have been disputed or objected to by the Concession Agreement Parties or the Financiers (in respect of the Financier Relevant Period).

4.7 ESTABLISHMENT AND MAINTENANCE OF THE CONCESSIONAIRE INDEPENDENT ENGINEER PAYMENT ACCOUNT AND ISSUANCE OF CONCESSIONAIRE INDEPENDENT ENGINEER PAYMENT ACCOUNT STANDING INSTRUCTIONS

4.7.1 Pursuant to section 5.6 (Independent Engineer Payment Account) of the Concession Agreement, the Concessionaire is required to establish and maintain the Concessionaire Independent Engineer Payment Account and issue irrevocable Concessionaire Independent Engineer Payment Account Standing Instructions in respect thereof.

4.7.2 The Concessionaire shall establish and maintain the Concessionaire Independent Engineer Payment Account within fifteen (15) Business Days of the Signing Date and until the Trigger Date.

4.7.3 Within two (2) Business Days from the establishment of the Concessionaire Independent Engineer Payment Account, the Concessionaire shall issue irrevocable Concessionaire Independent Engineer Payment Account Standing Instructions containing, inter alia, instruction to the Concessionaire Independent Engineer Payment Account Bank to debit the Concessionaire Independent
Engineer Payment Account on each Independent Engineer Payment Date (upon receipt of an Independent Engineer Payment Amount Certificate relating to such Payment Date) in an amount equal to the Independent Engineer Payment Amount and credit the same to the Independent Engineer Payment Account.

4.7.4 The Concessionaire Independent Engineer Payment Account Standing Instructions issued by the Concessionaire shall be irrevocable and shall remain effective, in each case, until the Trigger Date, and no withdrawal from the Concessionaire Independent Engineer Payment Account may be made by the Concessionaire, except as provided in this Agreement.

4.7.5 The Concessionaire Independent Engineer Payment Account Standing Instructions (or any part thereof) issued by the Concessionaire may be revoked pursuant to a written revocation Notice duly executed and confirmed by:

(a) in case of the period falling between the issuance of the Concessionaire Independent Engineer Payment Account Standing Instructions and the Financing Termination Date, the authorized representatives of the Agency, the Concessionaire, the Independent Engineer and the Financiers (including any agent of the same) (in respect of the Financier Relevant Period); and

(b) in case of the period falling after the Financing Termination Date, the authorized representatives of the Agency, the Concessionaire and the Independent Engineer.

4.7.6 The Concessionaire Independent Engineer Payment Account Standing Instructions may be amended at any time pursuant to a Notice issued by the Concessionaire to the Concessionaire Independent Engineer Payment Account Bank instructing amendment of the Concessionaire Independent Engineer Payment Account Standing Instructions (or any part thereof) and the same shall be confirmed and acknowledged by the Concessionaire Independent Engineer Payment Account Bank, provided, that such Notice shall be only effective if the same is also duly signed by the authorized representative of the Agency and Independent Engineer, following Financial Close and until the Financing Termination Date, by the authorized representatives of the Agency, the Independent Engineer and the Financiers (including any agent of the same) (in respect of the Financier Relevant Period).

4.7.7 The Concessionaire Independent Engineer Payment Account shall be strictly operated and maintained in accordance with the Concessionaire Independent Engineer Payment Account Standing Instructions. Further, the Concessionaire hereby undertakes and covenants that it shall not until the Trigger Date create, incur, permit, assume or suffer to exist any Encumbrance or transfer or dispose of all or any of its rights and benefits under or in respect of the Concessionaire Independent Engineer Payment Account except in accordance with the Concession Agreement and the Financing Documents.
4.8 **FUNDING OF THE CONCESSIONAIRE INDEPENDENT ENGINEER PAYMENT ACCOUNT**

4.8.1 The Concessionaire shall fund the Concessionaire Independent Engineer Payment Account in an amount equal to the Independent Engineer Payment Amount at least five (5) Business Days prior to each Independent Engineer Payment Date until expiry or termination of this Agreement. in accordance with the standing instructions set out in (a) the Equity Funding & Utilization Agreement, in relation to Design Review Phase and the Construction Supervision Phase, and (b) the Escrow Agreement, in relation to the O&M Phase.
5. **THE INDEPENDENT ENGINEER’S PERSONNEL**

5.1 **AUTHORIZED SIGNATORIES**

5.1.1 The Independent Engineer shall, within five (5) Business Days of the Signing Date, designate and Notify to each Concession Agreement Party and the Financiers (in respect of the Financier Relevant Period) of its duly appointed and nominated authorized signatories (the **Authorized Signatories**) that shall be authorized by the Independent Engineer to sign for and on its behalf any IE Certifications and Reports and/or Works Documents that are to be executed and signed by the Independent Engineer in terms of the Concession Documents. Any IE Certifications and Reports and/or Works Document to be duly executed and signed by the Independent Engineer in terms of the Concession Documents shall be only effective and valid if the same is duly executed and signed by the Authorized Signatories on behalf of the Independent Engineer.

5.1.2 The Independent Engineer shall have the right to substitute any of its Authorized Signatories by issuing a seven (7) Business Days prior Notice to each of the Concession Agreement Parties and the Financiers (in respect of the Financier Relevant Period), with a copy (certified as being true and correct) of such Notice issued to other stakeholders of the Project (as requested by the Concession Agreement Parties and the Financiers (in respect of the Financier Relevant Period) from time to time).

5.2 **AUTHORIZED REPRESENTATIVE**

5.2.1 The Independent Engineer shall, within five (5) Business Days of the Signing Date, designate and Notify to each Concession Agreement Party and the Financiers (in respect of the Financier Relevant Period) of its duly appointed and nominated authorized representative being an authorized representative (the **Authorized Representative**) that will direct and control the overall performance by the Independent Engineer of the Services and shall serve as the Independent Engineer’s interface with the Concession Agreement Parties and other relevant stakeholders of the Project with respect to all aspects of the performance of the Services.

5.2.2 The Authorized Representative shall be responsible, on behalf of the Independent Engineer, for the monitoring and supervision of the Services. The Authorized Representative or any replacement approved by the Concession Agreement Parties from time to time shall have full authority to act on behalf of the Independent Engineer and to liaise, on behalf of the Independent Engineer in respect of the Services, between the Independent Engineer, the Independent Auditor, the Financiers (in respect of the Financier Relevant Period), the Concessionaire, the Agency, the Contractors and other relevant stakeholders in the Project.

5.2.3 The Independent Engineer shall have the right to substitute any of its Authorized Representative by issuing a seven (7) Business Days prior Notice to each of the Concession Agreement Parties and the Financiers (in respect of the Financier Relevant Period), with a copy (certified as being true and correct) of such Notice...
issued to other stakeholders of the Project (as requested by the Concession Agreement Parties and the Financiers (in respect of the Financier Relevant Period) from time to time).

5.3 PERSONNEL

5.3.1 The Independent Engineer shall, in respect of each Phase, employ and engage qualified, suitable, experienced and competent Services Personnel in its performance of Services, as detailed in SCHEDULE A (Services) in respect of the Design Review Services and the Construction Supervision Services respectively. The Independent Engineer shall, within three (3) days of receipt of a Notice from any Concession Agreement Party or the Financier (in respect of Financier Relevant Period), and replace any Services Personnel involved in the performance of the Services that the Concession Agreement Party and/or the Financiers (in respect of the Financier Relevant Period) consider unfit or otherwise unsatisfactory.

5.3.2 The Services Personnel engaged by the Independent Engineer for performance of the Services shall be the construction supervising staff, during the Construction Supervision Phase of the Project (the Construction Supervision Staff). The Construction Supervision Staff shall be supported by the back office of the Independent Engineer.

5.4 THE INDEPENDENT ENGINEER’S RESPONSIBILITY

5.4.1 The Independent Engineer shall be solely responsible for observance by all its representatives, agents, executives, employees, subcontractors and other personnel engaged by the Independent Engineer for the performance of Services or any part thereof (the Services Personnel) of all the provisions of this Agreement. The Independent Engineer shall be responsible for all acts, omissions, failure to perform, breaches or defaults of its Services Personnel, as fully as if they were the acts, omissions, failures, breaches or defaults of the Independent Engineer under this Agreement.
6. **CONFLICT OF INTEREST, ETHICAL STANDARDS, INDEPENDENCE & STANDARD OF CARE**

6.1 **CONFLICT OF INTEREST**

6.1.1 The Independent Engineer confirms that, with respect to the Project and its performance of Services:

(a) there are no conflicts of interest with present or former clients of the Independent Engineer that will prevent it from providing objective, accurate and unbiased Services including the IE Certifications and Reports and the Works Documents to be prepared, issued, reviewed, approved etc. by the Independent Engineer) in connection with the Project;

(b) any agreements, arrangements or understandings (if any) between the Independent Engineer and the Agency and/or the Concessionaire or any affiliate thereof have been disclosed to the Concession Agreement Parties and the Financiers; and

(c) it shall not retain or engage any Services Personnel in connection with the Services for which any of the above conditions (a) or (b) apply.

6.1.2 Without limiting the generality of Section 6.1.1, the Independent Engineer shall not perform services for or provide advice to any other Person, or engage in any other activity that may give rise to any actual or perceived conflict of interest in the performance of the Services. If during the Agreement Period any such actual or perceived conflict of interest or risk of actual or perceived conflict of interest arises, the Independent Engineer shall immediately Notify the Concession Agreement Parties of that conflict or risk of conflict, in writing, including full particulars of all relevant facts and circumstances with respect thereto and such further information as may be requested by a Concession Agreement Party and immediately take steps to avoid or mitigate the effects of such conflict of interest or risk of conflict of interest.

6.2 **ETHICAL STANDARDS**

6.2.1 The Independent Engineer undertakes that it shall provide the Services in accordance with the highest ethical and professional standards that are applicable to professionals providing services that are similar to the Services.

6.3 **INDEPENDENCE**

6.3.1 The Independent Engineer shall act independently and in an unbiased manner. The Independent Engineer shall perform its Services for the benefit and in the best interests of the Project and not that of any other Person or entity. The Independent Engineer shall not act on any instructions issued by any party in respect of the Project unless the same are:

(a) contemplated by the Concession Documents to be issued by such party; or
(b) jointly issued by the Concession Agreement Parties and the Financiers (in respect of the Financier Relevant Period).

6.3.2 While the Independent Engineer may take into account opinions, representations or directions made or given by a Concession Agreement Party, the Independent Engineer shall not be bound to comply with any such opinion, representation or directions in connection with any matter on which the Independent Engineer is required to exercise its professional and impartial judgment.

6.3.3 The Parties accept and acknowledge that in the performance of Services, the Independent Engineer is an independent supervisor and monitor and shall not be considered an employee, agent or representative of the Financiers (in respect of the Financier Relevant Period), the Concessionaire, the Agency, the Contractors or any other relevant stakeholder in the Project or any affiliate of any of them, for any purpose.

6.3.4 The Parties accept and acknowledge that all correspondence between them and the Independent Engineer shall be copied to the other Parties. Unless a meeting is being held between the Concessionaire and the Independent Engineer in respect of any administrative matters, clarifications or for the purposes of routine interactions contemplated to be held between the Concessionaire and the Independent Engineer in terms of the Concession Documents (such as procuring issuance of various certificates by the Concessionaire from the Independent Engineer), the Concession Agreement Parties and the Financiers (in respect of the Financier Relevant Period) shall be entitled to have a representative present during any meeting between any of the Concession Agreement Parties and the Independent Engineer and reasonable Notice shall be provided to each Party prior to any such meeting.

6.4 STANDARD OF CARE

6.4.1 The standard of care applicable to the Services shall be the degree of skill and diligence normally practiced by professionals performing services that are similar to the Services.

6.5 Bribes and Integrity

6.5.1 The Independent Engineer certifies that neither the Independent Engineer nor any of its Services Personnel or affiliates have given or agreed to give to any Person either directly or indirectly through any natural or juridical Person, any commission, gratification, bribe, finder’s fee or kickback, whether described as consultation fee or otherwise, with the object of obtaining or inducing the procurement of this Agreement.

6.5.2 The Independent Engineer represents and covenants that no bribe, gift, benefit, nor other inducement has been nor shall be paid, given, promised or offered directly or indirectly to any official or employee of any of the Concession Agreement Parties or to a member of the family of such a Person, with a view to influencing the entry into this Agreement or the administration of this Agreement.
7. **Assignment**

7.1 **Restriction on Assignment**

7.1.1 Subject to Section 7.2 (Permitted Assignment) below, neither this Agreement nor any right, title, benefit, interest, privilege or delegation hereunder may be assigned or transferred in whole or in part by any Party without the prior written consent of the other Parties and the Financiers (in respect of the Financier Relevant Period) and any attempted assignment or transfer without such written consent shall be void.

7.2 **Permitted Assignment**

7.2.1 Notwithstanding Section 7.1 (Restriction on Assignment), the Agency and the Independent Engineer’s written consent of the Concessionaire’s assignment or transference of its rights, title, benefits, interests, privileges or delegations (present and future) under this Agreement shall not be required for assignment or transference by the Concessionaire in favour of the Financiers, provided, however, prior to effecting such assignment, the Concessionaire shall Notify the Independent Engineer of such assignment and the names of the Financiers so as to ensure that there exists no conflict of interest for the Independent Engineer with the same. In the event the Independent Engineer identifies existence of a conflict of interest with the Financiers as Notified by the Concessionaire, such conflict shall be resolved in accordance with mutual agreement between the Independent Engineer, the Concessionaire and the relevant Financiers.

7.2.2 The Parties agree that, if required by the Financiers, they shall enter into agreements evidencing the Independent Engineer’s and Agency’s consent to the Concessionaire’s assignment of its rights, title, benefits, interests, privileges or delegations (present and future) under this Agreement to the Financiers.

7.2.3 The Independent Engineer shall provide the Financiers such documents and assistance as Financiers may reasonably request, through the Concessionaire, in connection with obtaining financing for the Project. The Independent Engineer shall, if required by the Financiers and if Notified by the Concessionaire, liaise and co-operate with the Financiers (and its representatives and advisers) and provide copies of all IE Certifications and Reports and/or Works Documents it provides to the Concession Agreement Parties hereunder, together with all information in connection with the Services which the Financiers may reasonably require.
8. **TERMINATION**

8.1 **TERMINATION**

8.1.1 Subject to the mutual consent of each of the Concession Agreement Parties and the Financiers (in respect of the Financier Relevant Period), this Agreement may be terminated by the Concessionaire in any of the following circumstances set out under Section 8.1.1(a) to 8.1.1(c) below upon issuance of at least fifteen (15) days prior Notice (the **Termination Notice Period**), provided, however, in case of Section 8.1.1(d) the Concessionaire may by notice terminate this Agreement immediately:

(a) if any of the Concession Agreement Parties and/or the Financiers (in respect of the Financier Relevant Period) has reason to believe that the Independent Engineer has not discharged its duties in a fair, appropriate and diligent manner;

(b) if the Concession Agreement Parties and the Financiers (in respect of the Financier Relevant Period) mutually agree to terminate this Agreement or if the Parties and the Financiers mutually agree to terminate this Agreement;

(c) if the Parties and the Financiers mutually agree to terminate this Agreement;

(d) any other circumstance arises which in the reasonable opinion of any of the Concession Agreement Parties and/or the Financiers (in respect of the Financier Relevant Period) warrants termination of this Agreement; or

(e) in the event:

(i) any Independent Engineer Party is adjudged insolvent and/or bankrupt and/or winding up proceedings are filed against any Independent Engineer and/or the Independent Engineer Party files winding up proceedings in a court of law and/or any action for malpractice and/or misadministration is filed against the Independent Engineer Party in a court of law; or

(ii) of failure by the Independent Engineer to have complied with the requirements of Section 6.1 (Conflict of Interest) and Section 6.5 (Bribes and Integrity),

in each case (a) to (e) above, without incurring any liability on its part and in any respect, whatsoever.

8.1.2 In the event the Concession Agreement is terminated, this Agreement shall automatically terminate on the completion of the obligations of the Independent Engineer required to be performed by it after such termination of the Concession Agreement.

8.1.3 This Agreement may be terminated by the Independent Engineer:
(a) if it reasonably determines (to the satisfaction of the Concession Agreement Parties and the Financiers (in respect of the Financier Relevant Period)) that the continued provision of the Services (in whole or part) is illegal pursuant to the Applicable Laws; or

(b) if any undisputed Independent Engineer Payment Amounts remain unpaid to the Independent Engineer for ninety (90) days from the date of the Concessionaire’s receipt of the Independent Engineer’s invoice (or revised invoice, if applicable) in accordance with the Article 4 (Fees).

8.1.4 During the Termination Notice Period, including on any termination in accordance with Sections 8.1.1(e) and 8.1.2 and until the Termination Date (the Interim Period) the Independent Engineer shall perform the Services in the ordinary course of business (unless directed otherwise by the Concession Agreement Parties), provided, that during such Interim Period, the Independent Engineer shall (upon request by the Concession Agreement Parties and/or the Financiers (in respect of the Financier Relevant Period) and at the Concessionaire’s cost) liaise, to the reasonable extent, with any other appointee(s) or potential appointee(s) that is/are to be appointed by the Concession Agreement Parties and the Financiers (in respect of the Financier Relevant Period) to replace the Independent Engineer, for handing over the relevant IE Certifications and Reports, Works Documents, records and information relating to the Services performed. During the Termination Notice Period, any due and payable Fees shall be payable.

8.1.5 Notwithstanding anything to the contrary set out herein, the termination of this Agreement shall not have effect till such time as the replacement Independent Engineer has been appointed (the Termination Date).

8.1.6 In the event of expiry or termination of this Agreement (or of any amended and restated agreement), the replacement Independent Engineer shall be appointed in accordance with article 5 (Independent Engineer) of the Concession Agreement with mutual consent of the Concession Agreement Parties. Furthermore, in the event appointment of a replacement Independent Engineer is necessitated due to expiry of this Agreement, the appointment process pursuant to article 5 (Independent Engineer) of the Concession Agreement shall be commenced at least forty-five (45) days prior to the date of expiry of this Agreement.
9. **INSURANCE**

9.1 **INSURANCE**

9.1.1 No life, accident, travel or any other insurance coverage carried by the Concession Agreement Parties, the Financiers, the Independent Engineer, the Contactors, the Sponsors or any other stakeholder in the Project (excluding the Independent Engineer) shall apply to or provide coverage to the Independent Engineer or any of its directors, partners, employees, consultants or agents or for the dependents of any such persons. The Independent Engineer shall be responsible for its own appropriate insurance coverage. The Independent Engineer hereby represents that all necessary and appropriate insurance coverage(s), as required by Applicable Laws, have been placed and procured and are in force to cover liabilities and injuries of the Independent Engineer’s directors, partners, employees, consultants, and agents in accordance with Applicable Laws.
10. REPRESENTATIONS

10.1 REPRESENTATIONS

10.1.1 Each Party hereby represents and warrants to each of the other Parties that:

(a) it has the legal right, power and authority to execute this Agreement, perform its obligations hereunder and that, in each case, it has obtained all necessary consents and approvals (including taking any corporate approvals and actions, as applicable) to do so;

(b) it has taken all steps required to authorize it to execute this Agreement;

(c) this Agreement constitutes its legal, valid and binding obligation(s) that are enforceable against it;

(d) the execution of this Agreement and the performance of its obligations under this Agreement will not violate any judgment, decree or order, or any statute, rule or regulation binding on or applicable to it; and

(e) the person executing this Agreement on its behalf is legally authorized to execute, issue and deliver this Agreement on its behalf and all necessary consents and approvals to do the same have been obtained.

10.1.2 The Independent Engineer hereby further represents and warrants to each of the Concession Agreement Parties that:

(a) it is knowledgeable and has familiarized itself regarding the Project and the Services contemplated by this Agreement;

(b) it is knowledgeable and has familiarized itself regarding the technical and engineering standards relating to the Services and provision of the same;

(c) it understands its obligations (including provision of Services) under this Agreement;

(d) it has the financial capacity and professional expertise to fulfil its obligations under this Agreement;

(e) it has the requisite ability, skills, technical support, personnel and capacity to perform the Services with the degree of skill, care, and diligence expected of recognized professional persons/firms supplying services of a similar nature; and

(f) it complies with the requirements of Article 6 (Conflict of Interest, Ethical Standards, Independence & Standard of Care).

10.1.3 The representations and warranties contained hereinabove are given and made on and as of the date hereof and shall survive the expiry or termination of this
Agreement and shall be repeated as of and on each such date a Party performs its respective obligations under this Agreement.

10.1.4 The Independent Engineer acknowledges that the Concession Agreement Parties have entered into this Agreement in reliance on the representations and warranties made by the Independent Engineer in this Article 10 (Representations).
11. **CONFIDENTIALITY**

11.1 **CONFIDENTIALITY**

11.1.1 The Independent Engineer hereby agrees that all knowledge and information which the Independent Engineer may acquire in respect of the Project from the Concession Agreement Parties, the Financiers and other stakeholders of the Project or by virtue of the performance of the Services under this Agreement, shall be regarded by the Independent Engineer as strictly confidential and held by the Independent Engineer in confidence, and shall not be directly or indirectly disclosed by the Independent Engineer to any person or entity except with the prior written permission of the Concession Agreement Parties and the Financiers (in respect of the Financier Relevant Period), as appropriate. Upon the completion or termination of the Services, the Independent Engineer shall return:

(a) to the Financiers any confidential materials furnished by the Financiers to the Independent Engineer for the purpose of performance of the Services;

(b) to the Agency any confidential materials furnished by the Agency to the Independent Engineer for the purpose of performance of the Services; and

(c) to the Concessionaire any confidential materials furnished by or on behalf of the Concessionaire to the Independent Engineer pursuant to this Agreement.

11.1.2 The Independent Engineer may disclose such information to the extent that it:

(a) is or becomes public other than through a breach of this Agreement;

(b) is subsequently received by the recipient from a third party who, to the recipient’s knowledge, owes no obligation of confidentiality to the disclosing party with respect to that information;

(c) was known to the recipient at the time of disclosure or is thereafter created independently;

(d) is disclosed as necessary to enforce the recipient’s rights under this Agreement; or

(e) must be disclosed under Applicable Laws, a legal process or professional regulation, including internal processes of the network of firms.

11.1.3 The Independent Engineer’s duty of confidentiality under this Article 11 (Confidentiality) shall expire:

(a) five (5) years following expiry of the Agreement Period; or

(b) the confidential information ceasing to remain confidential or entering the public domain other than through a breach of this Agreement by the Independent Engineer.
11.1.4 Any Party may use electronic media to correspond or transmit information to the other Party and such use shall not in itself constitute a breach of any confidentiality obligations under this Agreement.

11.2 **Usage**

11.2.1 The Independent Engineer hereby represents, warrants and undertakes that any information it discloses to the Concession Agreement Parties and the Financiers in performance of the Services hereunder belongs to the Independent Engineer and the Independent Engineer either has full rights to such information or the same is publicly available without constraint as to use.

11.2.2 Any information, advice, recommendations or other contents of any IE Certifications and Reports and Works Documents including all material produced or acquired under the terms of this Agreement, whether written, graphic, film, magnetic tape, or otherwise and where provided to the Concession Agreement Parties and the Financiers under this Agreement shall be:

(a) the property of the Concession Agreement Parties and the Concession Agreement Parties shall have the right to exclusively use aforesaid material for the purposes of the Project and/or publish or disseminate the same, in any language. The rights provided for in this Section 11.2 **(Usage)** shall survive the termination or expiration of this Agreement; and

(b) used by the Parties for the purposes of the Project including as set out in the Concession Documents or as required pursuant to the Applicable Laws.
12. MISCHELLEANOUS

12.1 COMMUNICATIONS & NOTICES

12.1.1 All Notices under this Agreement shall be in writing, signed by or on behalf of the Person giving it and shall be addressed to the person to whom it is to be given and delivered by messenger or reputable overnight courier or transmitted by facsimile or electronic mail (provided a Notice provided by email is subsequently provided by courier) to that Person's address. A Notice given to a Person in accordance with this Section shall be treated as having been given and received:

(a) on the day of delivery, if given by hand delivery and delivered before 5.00 p.m. on a Business Day, otherwise on the immediately following Business Day;

(b) on the day of transmission, if transmitted by facsimile and the transmission report states that the transmission was sent in full and without error and the transmission was completed before 5.00 p.m. on a Business Day, otherwise on the immediately following Business Day; or

(c) on the day of actual delivery (and if such day is not a Business Day, then on the immediately following Business Day) if delivered by overnight courier.

12.1.2 For the purposes of this Section, a Party (the Sender) may take the address and facsimile number of another Party (the Recipient) to be the address and number set out in SCHEDULE B (Notices) or where the Recipient Notifies the Sender of another address or number, the last address or number so Notified to it, provided however that, a Notification for change of address or number shall be effective fourteen (14) days after the date of receipt of Notification of change.

12.2 LANGUAGE

12.2.1 All Notices required to be given under this Agreement and all communications, documentation and proceedings which are in any way relevant to this Agreement shall be in writing and in English language.

12.3 SUCCESSORS IN INTEREST

12.3.1 This Agreement shall be binding upon and shall inure to the benefit of the successors and permitted assigns of the parties hereto.

12.3A FORCE MAJEURE EVENT

12.3A.1 If either Party is temporarily unable by reason of a Force Majeure Event to meet any of its obligations under this Agreement, and if such affected Party gives to the other Party written Notice of the event within seven (7) days after its occurrence, such obligations of the affected Party as it is unable to perform by reason of such Force Majeure Event shall be suspended for as long as the inability continues.
12.3A.2 Notwithstanding Section 12.3A.1 above, the Independent Engineer shall continue to perform the Services as far as it is reasonably practical and shall seek all reasonable alternative means for performance not prevented by the Force Majeure Event.

12.3A.3 This Section 12.3A (Force Majeure Event) shall not apply to the obligation of the Concessionaire to make payments due to the Independent Engineer for the Services performed during the pendency of the Force Majeure Event. Except for such payments that relate to the Services performed during the pendency of Force Majeure Event, no other compensations and payments will be payable to Independent Engineer.

12.4 Suspension

12.4.1 In the event the Construction Works or the Operation and Maintenance are suspended, or contemplated to be suspended, for a period exceeding sixty (60) days for any reason whatsoever (the Non Default Suspension), the Concessionaire may, by issuing a fifteen (15) days prior written Notice and with consent of the Agency and the Financiers (in respect of the Financier Relevant Period) (such consent not to be unreasonably withheld or delayed), mutually agree with the Independent Engineer on the reduced scope of Services to be performed during such extended period and any adjustments to the Fee as a result of the same (the Revised Suspension Fee). During such suspension period, the Independent Engineer shall only be entitled to the Revised Suspension Fee in relation to the Non Default Suspension and shall be entitled to any other amount or any other reimbursement from the Concessionaire of any costs, expenses, losses or damages of any nature howsoever arising or resulting from such suspension.

12.4.2 Subsequent to any suspension of Services in accordance with Section 12.4.1 above, the Independent Engineer shall immediately resume the performance of Services (or any part thereof) upon receipt of a fifteen (15) days prior written Notice from the Concessionaire requiring it to resume the Services.

12.5 Indemnities

12.5.1 The Concessionaire shall indemnify/hold harmless the Independent Engineer from, and against, any and all costs, expenses, losses, claims, damages, injuries, deaths, demands, actions, suits or proceedings paid, incurred or suffered or made or initiated against it by any third party arising out of, or in connection with the Concessionaire’s fraud, default or wilful misconduct. The indemnity shall be limited to the amount of aggregate Fees paid to the Independent Engineer hereunder. This provision shall survive the termination or expiration of this Agreement for one (1) year.

12.5.2 The Independent Engineer shall, during and after the Agreement Period, indemnify/hold harmless the Concession Agreement Parties and the Financiers and each of their (as applicable) directors, executives, officers, officials, agents, employees (together, Indemnified Parties) from and against, any and all costs,
expenses, losses, claims, demands, actions, suits or proceedings paid, incurred or suffered or made or initiated against any of the Indemnified Parties arising out of, or in connection with the Independent Engineer’s fraud, negligence and/or wilful default in performance of its Services. Subject to Section 12.5 (Indemnities), the indemnity shall be limited to the amount of aggregate Fees paid to the Independent Engineer hereunder. This provision shall survive the termination or expiration of this Agreement for three (3) years.

12.6 **LIMITATION OF LIABILITY**

12.6.1 In no event will the Independent Engineer be liable to the Concession Agreement Parties, whether in contract, tort or otherwise, for any amount in excess of the aggregate Fee payable to the Independent Engineer pursuant to this Agreement. Notwithstanding the foregoing, the limitation on the Independent Engineer’s liability shall not apply in the event of any death or personal injury caused or resulting from any action of, and/or fraud or wilful default caused or committed by, the Independent Engineer.

12.6.2 The limitation of liability of the Concession Agreement Parties shall be allocated amongst the Concession Agreement Parties and in no event will the Concession Agreement Parties be liable to the Independent Engineer, whether in contract, tort or otherwise, for any amount in excess of the aggregate Fee actually received by the Independent Engineer pursuant to this Agreement.

12.7 **LIQUIDATED DAMAGES**

12.7.1 The Independent Engineer shall pay to the Concession Agreement Parties and the Financiers, liquidated damages of PKR 5,000/- (Pakistani Rupees Five Thousand only) for each day of delay if the Services are not completed pursuant to the timelines stipulated in the Concession Documents for any reason attributable to the Independent Engineer. Notwithstanding anything contrary contained in this Agreement, the Independent Engineer’s maximum aggregate liability for the aforesaid liquidated damages shall be limited to:

(a) in respect of Design Review Services, ten percent (10%) of the Design Review Fees;

(b) in respect of the Construction Supervision Services, ten percent (10%) of the higher of: (i) the Construction Supervision Fee Cap; and (ii) the actual Construction Supervision Fee;

(c) in respect of O&M Phase Services, as mutually agreed between the Parties and the Financiers (in respect of the Relevant Financier Period).

The Parties acknowledge that the liquidated damages calculated specified in Section 12.7.1 have been calculated by the Parties as representing the actual daily loss to the Concession Agreement Parties and the Financiers (in respect of the Relevant Financiers Period) in case of breach by the Independent Engineer of its obligations and are not a penalty.
13. **AMENDMENT**

13.1. This Agreement and/or any provisions of this Agreement may be amended, supplemented or transferred only if the Parties and the Financiers (in respect of the Financier Relevant Period) so agree in writing.
14. INVALIDITY & SEVERABILITY

14.1 If for any reason whatsoever any provision of this Agreement is or becomes invalid, illegal or unenforceable or is declared by any court of competent jurisdiction or any other instrumentality to be invalid, illegal or unenforceable, the validity, legality or enforceability of the remaining provisions shall not be affected in any manner, and the Parties hereto will negotiate in good faith with a view to agreeing upon one or more provisions which may be substituted for such invalid, unenforceable or illegal provisions, as nearly as is practicable unless the Concession Agreement Parties and the Financiers (in respect of the Financier Relevant Period) in their discretion decide that the effect of such substitution is to defeat the original intention of the Parties in which event the Concession Agreement Parties and the Financiers (in respect of the Financier Relevant Period) shall be entitled to terminate this Agreement by providing Notice pursuant to the provisions of Section 8.1 (Termination).

14.2 The illegality, invalidity or unenforceability of any provision of this Agreement under the law of any jurisdiction shall not affect its legality, validity or enforceability under the law of any other jurisdiction nor the legality, validity or enforceability of any other provision of this Agreement.
15. **GOVERNING LAW**

15.1 This Agreement shall be governed by and construed in accordance with the laws of Pakistan.
16. **DISPUTE RESOLUTION**

16.1 Any dispute arising out of or in connection with this Agreement shall in the first instance be resolved through amicable settlement between the disputing Parties no later than fifteen (15) days from the date of reference to discuss and attempt to amicably resolve the dispute. If the dispute is not resolved through amicable settlement, then the same shall be settled by reference to the arbitrator mutually appointed by the disputing Parties whose decision shall be final and binding on the disputing Parties. The arbitration shall be conducted under the provisions of the Arbitration Act, 1940 or any amendments/enactments thereof.

16.2 The seat and venue of the arbitration shall be Karachi, Pakistan
17. **COUNTERPARTS**

17.1 This Agreement may be executed in several counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same agreement.
18. **NO PARTNERSHIP**

18.1 Nothing contained in this Agreement shall be construed or interpreted as constituting a partnership or agency between the Parties. Neither Party shall have any authority to bind the other in any manner whatsoever.
19. **WAIVER**

19.1 Waiver by either Party of any default by the other Party in the observance and performance of any provision of or obligations or under this Agreement:

(a) shall not operate or be construed as a waiver of any other or subsequent default hereof or of other provisions or obligations under this Agreement;

(b) shall not be effective unless it is in writing and executed by a duly authorized representative of such Party; and

(c) shall not affect the validity or enforceability of this Agreement in any manner.

19.2 Neither the failure by a Concession Agreement Party to insist on any occasion upon the performance of the terms, conditions and provisions of this Agreement or any obligation thereunder nor time or other indulgence granted to the Independent Engineer shall be treated or deemed as a waiver of such breach or acceptance of any variation or the relinquishment of any right by the Concession Agreement Parties.
IN WITNESS WHEREOF the Parties hereto have caused this Agreement to be executed by their duly authorized representatives as of the day, month and year first above written.

FOR AND BEHALF OF AGENCY

For and on behalf of LOCAL GOVERNMENT & HOUSING TOWN PLANNING DEPARTMENT, GOVERNMENT OF SINDH through its authorised signatory

Name: ........................................
Designation: ........................................

in the presence of
WITNESSES:

1. Name: ........................................
Address: ........................................
CNIC No: ........................................

2. Name: ........................................
Address: ........................................
CNIC No: ........................................

SIGNATURE

Name: ........................................
Designation: ........................................

SIGNATURE

Name: ........................................
Designation: ........................................

WITNESSES:

1. Name: ........................................
Address: ........................................
CNIC No: ........................................

2. Name: ........................................
Address: ........................................
CNIC No: ........................................
**FOR AND BEHALF OF CONCESSIONAIRE**

For and on behalf of [•] through its authorised signatory

Name: [•]  
Designation: [•]

…………………………………..  
SIGNATURE

in the presence of  
**WITNESSES:**

1. Name:  
   Address:  
   NIC No:  

       ………………………………..

2. Name:  
   Address:  
   NIC No:  

       ………………………………..

…………………………………..  
SIGNATURE
FOR AND BEHALF OF INDEPENDENT ENGINEER

For and on behalf of [•] through its authorised signatory

Name: [•]  
Designation: [•]

in the presence of

WITNESSES:

1. Name:  
   Address:  
   NIC No:  

2. Name:  
   Address:  
   NIC No:

SIGATURE

\[ \text{SIGNATURE} \]

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**SCHEDULE A – SERVICES – PART I – GENERAL**

1.1 **THE SERVICES:**

1.1.1 The Independent Engineer shall, in principle, be responsible for review/approving/certifying of designs, drawings, construction supervision, progress monitoring, and affirmation of all certifications done by the Concessionaire or its Contractor, in each case, in accordance with and as contemplated by the Concession Documents and this Agreement.

1.1.2 Subject to the terms of this Agreement and the Concession Documents, the Independent Engineer shall supervise that all the technical and engineering requirements (including any other requirements as may be expressly mentioned) of the Concession Documents are met by the Concessionaire or its Contractor and in case of any discrepancy/deviations, shall inform the Stakeholders.

1.2 **GENERAL**

Without prejudice to Article 3 (Services & Related Matters) and the Clauses set out in **PART II – DESIGN REVIEW PHASE** and **PART III – CONSTRUCTION SUPERVISION SERVICES OF SCHEDULE A (SERVICES)** of this Agreement nor in any limiting manner limiting the Scope of Work set out therein, Services to be performed by the Independent Engineer during its Appointment shall include the following:

1.2.1 The Independent Engineer shall:

(a) perform all Services diligently and within the timelines out in this Agreement and the Concession Documents;

(b) exercise, in the performance of the Services, all skill, care and diligence to be expected of a properly qualified and competent professional experienced in each of the disciplines to which the Services relate;

(c) co-operate with the other parties to the Concession Documents in respect of matters relating to the Independent Engineer for the purposes of, *inter alia*, facilitating implementation of the Project;

(d) review the Concession Documents delivered by the Concession Agreement Parties and all Works Documents that are provided to it pursuant to the Concession Documents in its capacity as the Independent Engineer;

(e) co-ordinate and liaison with the Concession Agreement Parties in respect of matters that require the Independent Engineer's inputs for performance of Services;

(f) prepare, review and issue (in accordance with the Concession Documents) all Works Documents contemplated to be issued by the Independent Engineer under the Concession Documents;
(g) as and when requested or required, consult with the parties to the Concession Documents and/or any other relevant stake holders of the Project for the performance of Services and request (where available and applicable) any Works Document that is required by the Independent Engineer to perform the Services;

(h) as and when requested or required pursuant to this Agreement and the Concession Documents, review and comment on any Works Documents provided to it pursuant to the Concession Documents and request further Works Documents as may be required;

(i) prepare, issue, deliver, review and/or approve (as applicable) all Works Documents contemplated to be prepared, issued, delivered, reviewed and/or approved (as applicable) by the Independent Engineer under the Concession Documents and/or by the Independent Engineer pursuant to this Agreement;

(j) visit any of the offices of the Concessionaire or any other location where relevant personnel or records of the Concessionaire are located;

(k) comply with the applicable laws of Pakistan in its performance of Services;

(l) not in any way, in performing the Services, materially adversely interfere with the Concessionaire, the Contractors, the Agency and the Lenders and with the conduct of their business;

(m) prove due diligence and utmost expertise in ensuring that quality control provisions are maintained at all times during its the Agreement Period;

(n) report to the Key Stakeholders in case the quality standards and quality control provisions are not maintained on the Project Site;

(o) perform all such duties and obligations that are to be performed by the Independent Engineer under the Concession Documents as the Independent Engineer;

(p) perform functions, including issuance of directions to the Concessionaire or its Contractors, in respect of the Emergency, De-commissioning of the Concession Assets, as may be required by the Concession Documents;

(q) perform its duties in respect of insurance claims and proceeds, as set out in the Concession Agreement;

(r) perform functions in respect of Change of Scope, as set out in the Concession Agreement;

(s) perform the respective roles and duties that are to be performed by the Independent Engineer upon termination of the Concessionaire Agreement or upon expiry of the Concession Period;
(t) as and when requested or required, attend/visit, during normal working hours, any place where work is being carried out in respect of any equipment or material to be incorporated into the Concession Assets with full opportunity to inspect, examine, measure or test any such works, equipment or material;

(u) as and when requested or required, certify any delays in the achievement of Substantial Completion Date and/or Project Construction Completion Date (including the party responsible for such delay) and coordinate with the Independent Auditor in respect of matters relating to the same;

(v) consult with the Key Stakeholders in respect to the sufficiency and/or insufficiency of the insurance proceeds, required to repair, replace, reinstate or rectify the relevant loss or damage to the Concession Assets;

(w) upon receipt of invoice from the Contractors, in relation to the Construction Works, certify to all the Key Stakeholders of the completion of the relevant milestone under the construction contracts entered into and between the Concessionaire and the Contractors;

(x) provide for the Authorized Representative to be present and observe performance of all the tests pursuant to the Concession Documents;

(y) provide operational recommendations in risk management reports to the Key Stakeholders, from time to time, during the Agreement Period;

(z) upon receipt of a notice of “Change in Law” from the Concessionaire pursuant to the Concession Agreement, as and when requested or required, certify the “Additional Cost”, in accordance with the Concession Agreement;

(aa) inspect the Concession Assets including the Project at the time of handling over thereof by the Concessionaire to the Finance Parties/Agency and perform functions in respect to such handing over as provided in the Concession Agreement;

(bb) Present to the Concession Agreement Parties as and when required on the progress of the project and other milestones; and

(cc) Pursuant to Section 2.4.2 of the Project Site License Agreement, review and approve the status report submitted by the Concessionaire, on an annual basis, on the occurrence and status of occupations, thefts, encroachments and Encumbrances arising from time to time on the Project Site to ensure compliance by the Concessionaire of its obligations to protect the Project Site from such encroachments under the Concession Documents.

(dd) Performing all such other obligations and responsibilities as set out in the Agency Agreements and the Project Agreements.
1.3 **Concession Documents Obligations:**

1.3.1 The Independent Engineer shall perform all such duties, functions and roles that are to be undertaken and performed by the Independent Engineer in the Concession Documents.
Without prejudice to Article 3 (Services & Related Matters) and the Clauses set out in PART I – GENERAL of SCHEDULE A (Services) of this Agreement nor in any manner limiting the Scope of Work set out therein, certain Services to be performed by the Independent Engineer during the Design Review Phase shall include the following (the Design Review Services):

1.1 QUALIFIED STAFF REQUIREMENT:

1.1.1 The Independent Engineer shall, at the very minimum, employ and engage the personnel in accordance with the parameters provided below for the purposes of performing the Design Review Services. The personnel engaged by the Independent Engineer shall work and supervise the works and perform the Design Review Services on a daily basis. The Design Review Fees covers the entire scope of Design Review Services and shall not be subject to any additional fees (including but not limited to over-time charges). Notwithstanding anything to the contrary, the personnel engaged by the Independent Engineer shall be on a daily and full-time basis and no over-time or other additional compensations, other than the Design Review Fees, shall be payable by the Concessionaire to the Independent Engineer or such personnel for performance of Design Review Services.

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<tr>
<th>S. No.</th>
<th>Position</th>
<th>Qualifications</th>
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<tbody>
<tr>
<td>1</td>
<td>Project Manager</td>
<td>M.S. (Civil Engineering)</td>
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<tr>
<td>2</td>
<td>Chief Surveyor</td>
<td>B.E (Civil)</td>
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<td>3</td>
<td>Senior Geotechnical Engineer</td>
<td>M. Engineering (Geotechnical)</td>
</tr>
<tr>
<td>4</td>
<td>Senior Materials Engineer</td>
<td>M. Sc. (Geology)</td>
</tr>
<tr>
<td>5</td>
<td>Senior Hydrologist</td>
<td>M.S (Civil)</td>
</tr>
<tr>
<td>6</td>
<td>Utilities Engineer</td>
<td>B.E (Civil)</td>
</tr>
<tr>
<td>7</td>
<td>Senior Highway Engineer</td>
<td>ME (Civil/Transportation Engineering)</td>
</tr>
<tr>
<td>8</td>
<td>Senior Structure Engineer</td>
<td>B.E (Civil)</td>
</tr>
<tr>
<td>9</td>
<td>Senior Hydraulics Engineer</td>
<td>M.S (Civil)</td>
</tr>
<tr>
<td>10</td>
<td>Senior Cost Engineer</td>
<td>B.E (Civil)</td>
</tr>
<tr>
<td>11</td>
<td>Senior Traffic Engineer</td>
<td>M. Engg. (Transportation Engineering)</td>
</tr>
<tr>
<td>12</td>
<td>Senior Environment Specialist</td>
<td>M.S (Civil)</td>
</tr>
<tr>
<td>13</td>
<td>Senior Planning Engineer</td>
<td>M.S (Civil)</td>
</tr>
<tr>
<td>14</td>
<td>E&amp;M Engineer</td>
<td>M.S (Electrical Engineering)</td>
</tr>
<tr>
<td>15</td>
<td>Senior Pavement Specialist</td>
<td>M.E (Civil)</td>
</tr>
<tr>
<td>16</td>
<td>Safety Audit Specialist</td>
<td>M.S. (Environmental Engineering)</td>
</tr>
<tr>
<td>17</td>
<td>Assistant Engineers</td>
<td>B.E in relevant fields</td>
</tr>
</tbody>
</table>
1.2 **SPECIAL OBBLIGATIONS:**

1.2.1 Review and approve the adequacy of topographical surveys, geo-technical and sub-soil investigations, hydrology study for the project and other structures.

1.2.2 Review and approve the condition survey of existing utilities & their relocation design and Construction Drawings prepared and submitted by the Concessionaire to the Independent Engineer for the construction of various components of the road, bridges/structures, erosion protection/revetment works, Land reclamation/embankment construction works, Landscaping works, Electrical works, stormwater drainage works, estimates, reports, and other deliverables with regard to:

(a) Adequacy, completeness, optimality and capability of design to perform as required in anticipated operating conditions and to meet the technical requirements specified in this Agreement.

(b) Identification of project design features or any major equipment component that does not appear to meet design, performance requirements or fails to adhere to good engineering practices.

(c) Provide an opinion on the quality of the design with respect to their effect on the anticipated service life of the facility, the degree of maintenance needed to meet performance requirements and long term availability over the term of the Concession.

(d) Comply with the design parameters set out in SCHEDULE A (Scope of Work) of the Concession Agreement.

1.2.3 Review and approve reports prepared and submitted by the Concessionaire, with respect to the traffic, traffic management etc.

1.2.4 Review and approve hydraulic/physical model for construction of bridge over Malir River along with the shifting/realignment of existing left Bund of Malir river.

1.2.5 Review and approve reports prepared and submitted by the Concessionaire or its Contractor, with respect to the traffic, traffic management, progress, and any other report regarding the Bridge and the connecting Roads etc.

1.2.6 Review and approve the implementation schedule of engineering, design, procurement, and construction of the Project submitted by the Concessionaire and determine that adequate provisions have been made for the following:

(a) Design.

(b) Raw material sourcing.

(c) Raw material processing equipment.
(d) Utilities.
(e) Other Equipment procurement.
(f) Construction.
(g) Testing.

1.2.7 Review and approve the Operation and Maintenance program during the Operations Period.

1.2.8 Review and comment on the consistency of all project documents.

1.2.9 Review the available permits or permit applications

1.2.10 Review the Environmental Management Plan (EMP) for the Project during the Construction Period (and the Operations Period, if required).

1.2.11 Review and comment on the utilities arrangement for the Project, including, but not limited to the water supply and electricity supply.

1.2.12 Review and approve the adequacy and reasonableness of the Project co-ordination and monitoring systems.

1.2.13 Review quality assurance and quality control provisions during the design, and construction and O&M phase:
   (a) Independent Engineer is required to prove due diligence and utmost expertise in ensuring that quality control provisions are maintained at all times during the Construction Period and the Operations Period; and
   (b) Independent Engineer will be responsible to report to the Agency/Lenders in case the quality standards and quality control provisions are not maintained on the Project Site.

1.2.14 Audit the safety of project during Construction Period and the Operations Period.

1.2.15 Reviewing the safety measures proposed for the construction of the facilities and their compliance with the safety regulations.

1.2.16 Review, Audit, Comment and approve the working methodology submitted by the Concessionaire regarding the construction of project infrastructure in densely populated areas to avoid disturbance to traffic and public.

1.3 **GENERAL OBLIGATIONS:**

1.3.1 All roles, duties and obligations of the Independent Engineer set out in Article 3 (Services & Related Matters) and **PART I – GENERAL of SCHEDULE A (Services)** shall be deemed to be included (as applicable) in the Services to be performed during the Construction Supervision Phase.
1.4 **CONCESSION DOCUMENTS OBLIGATIONS:**

1.4.1 During the Construction Supervision Phase, the Independent Engineer shall perform all such duties, functions, and roles that are to be undertaken and performed by the Independent Engineer in the time period corresponding to the Construction Supervision Phase.
Without prejudice to Article 3 (Services & Related Matters) and the Clauses set out in PART I – GENERAL of SCHEDULE A (Services) of this Agreement nor in any limiting manner limiting the Scope of Work set out therein, the Services to be performed by the Independent Engineer during the Construction Supervision Phase shall include the following (the Construction Supervision Services):

1.1 **Qualified Staff Requirement:**

1.1.1 The Independent Engineer shall, at the very minimum, employ and engage the personnel in accordance with the parameters provided below for the purposes of performing the Construction Supervision Services. The personnel engaged by the Independent Engineer shall work and supervise the works and perform the Construction Supervision Services on a daily basis. The Construction Supervision Fees covers the entire scope of Construction Supervision Services and shall not be subject to any additional fees (including but not limited to over-time charges). Notwithstanding anything to the contrary, the personnel engaged by the Independent Engineer shall be on a daily and full-time basis and no over-time or other additional compensations, other than the Construction Supervision Fees, shall be payable by the Concessionaire to the Independent Engineer or such personnel for performance of Construction Supervision Services.

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Position</th>
<th>Qualifications</th>
<th>Proposed Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Project Manager</td>
<td>M.S. (Civil Engineering)</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Contracts Specialist</td>
<td>B.E (Civil)</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Senior Planning Engineer</td>
<td>M.S (Civil)</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Utilities/Coordination Engineer</td>
<td>B.E (Civil)</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Operations Safety Specialist</td>
<td>B.E (Civil)</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>Resident Engineer</td>
<td>B.E (Civil)</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>Assistant Resident Engineers (ARE) - Roadway</td>
<td>B.E (Civil)</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>Assistant Resident Engineers (ARE) - Structures</td>
<td>B.E (Civil)</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>Assistant Resident Engineers (ARE) - Protection Works</td>
<td>B.E (Civil)</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>Material Engineer</td>
<td>M.Sc (Geology)</td>
<td>1</td>
</tr>
<tr>
<td>11</td>
<td>Utilities Engineer</td>
<td>B.E (Civil)</td>
<td>2</td>
</tr>
<tr>
<td>12</td>
<td>Site Inspectors</td>
<td>DAE (Civil)</td>
<td>4</td>
</tr>
<tr>
<td>13</td>
<td>Chief Quantity Surveyor</td>
<td>DAE (Civil)</td>
<td>1</td>
</tr>
<tr>
<td>14</td>
<td>Senior Quantity Surveyor</td>
<td>DAE (Civil)</td>
<td>1</td>
</tr>
<tr>
<td>15</td>
<td>Laboratory Supervisors</td>
<td>Intermediate</td>
<td>2</td>
</tr>
<tr>
<td>16</td>
<td>Chief Surveyor</td>
<td>DAE (Civil)</td>
<td>1</td>
</tr>
<tr>
<td>17</td>
<td>Surveyor</td>
<td>Intermediate</td>
<td>2</td>
</tr>
<tr>
<td>18</td>
<td>Support Staff</td>
<td>-</td>
<td>4</td>
</tr>
</tbody>
</table>
1.2 **Specific Obligations:**

1.2.1 It shall be the Independent Engineer’s duty and responsibility to supervise the works in detail and to approve the materials, formworks, and workmanship of the works on a daily and fulltime basis. As stated in the Concession Agreement, the Independent Engineer shall have no authority to relieve the Concessionaire of any of its duties or to impose additional obligations.

1.2.2 The Independent Engineer shall review and approve works program prepared and submitted by the Concessionaire. Payments will be made upon Independent Engineer’s certification, with final approval of Independent Auditor.

1.2.3 The Independent Engineer shall supervise/approve each and every activity including material testing, mix designs, JMFs, day to day testing such as FDT etc. and review the material testing results and mix designs and to order special tests of materials and/or completed works, and/or order removal and substitution of substandard material and/or work as required.

1.2.4 The Independent Engineer shall review and approve the work methodology of each item of work.

1.2.5 The Independent Engineer shall review the quality assurance and quality control process during construction period.

1.2.6 The Independent Engineer shall ensure that the Construction Works are accomplished in accordance with the Applicable Standards and best engineering practices.

1.2.7 The Independent Engineer shall identify construction delays, if any and recommend to the Agency/Lenders the remedial measures to expedite the progress.

1.2.8 Review and approve shop drawings for each component of the Project Works prepared and submitted to the Independent Engineer by the Concessionaire.

1.2.9 Review the “Construction Drawings” and “As Built” drawings for each component of the Project Works prepared and submitted to the Independent Engineer by the Concessionaire.

1.2.10 Review the safety measures provided for the traffic and Project workers.

1.2.11 Determine any extension of the Project Completion Schedule, to which the Concessionaire is entitled and shall notify the Agency/Financiers accordingly.

1.2.12 Review compliance by the Concessionaire of its obligations under the Concession Agreement.

1.2.13 Issue Substantial Completion Certificate after checking the results and workability of the Project assets after the prescribed tests.
1.2.14 Issue Substantial Completion Certificate duly appended with a list of outstanding items (Project Completion Check List).

1.2.15 For performance testing, the Independent Engineer will:

(a) Review test procedures developed by the Concessionaire appointed O&M Contractor and confirm compliance with applicable test codes and standards and with testing criteria specified in Concession Agreement and its Schedules;

(b) Review the quality control reports, material testing results and mix design and to order special tests of materials and/or completed works, and/or order removal and substitution of substandard materials and/or works as required;

(c) Review test reports prepared by the Concessionaire or Concessionaire’s testing consultant; and

(d) Monitor successful completion of each Project Completion Check List Items and make one final visit to Project Site to verify that Project Completion Check List Items have been completed and thereafter sign and submit the Final Project Construction Completion Certificate.

1.2.16 Review & approve the Land and Utility folder (i/c. its relocation criteria’s, typical X-Sections etc.).

1.2.17 Review and approve the Construction Monthly Progress Report.

1.3 **GENERAL OBLIGATIONS:**

1.3.1 All roles, duties and obligations of the Independent Engineer set out in Article 3 (Services & Related Matters) and PART I – GENERAL of SCHEDULE A(Services) shall be deemed to be included (as applicable) in the Services to be performed during the Construction Supervision Phase.

1.4 **CONCESSION DOCUMENTS OBLIGATIONS:**

1.4.1 During the Construction Supervision Phase, the Independent Engineer shall perform all such duties functions and roles that are to be undertaken and performed by the Independent Engineer in the time period corresponding to the Construction Supervision Phase.
Without prejudice to Article 3 (Services & Related Matters) and the Clauses set out in PART I – GENERAL of SCHEDULE A (Services) of this Agreement nor in any limiting manner limiting the Scope of Work set out therein, the Services to be performed by the Independent Engineer during the O&M Phase shall include the following (the O&M Phase Services):

1. Role of Independent Engineer during O&M Phase (provided if Independent Engineer and Financier (in respect of Financier Relevant Period) enter into mutually acceptable agreement after the completion of Construction Period):

   1.1 SPECIFIC OBLIGATIONS:

   1.1.1 Review and approve the work plan and schedules of various operation and maintenance activities.

   1.1.2 Review and approve the O&M manual(s) prepared by the Concessionaire for their completeness and compatibility with those of similar facilities.

   1.1.3 Review and approve the performance of O&M activities including equipment, service, traffic, operation and safety.

   1.1.4 Recommend necessary actions to the Agency/Financiers to undertake maintenance obligations of the Concessionaire at risk and cost of the Concessionaire in the event of his failure to carry out the O&M Phase Services.

   1.1.5 Undertake audit of the traffic using the Project at reasonable times.

   1.1.6 Review and inspect the Project and its assets at all reasonable times and upon reasonable notice to the Concessionaire during the O&M Phase Services and issue a Construction Inspection Report and O&M Inspection Report of such inspections to the Agency/Financiers.

   1.1.7 Review the accident record, prepare and submitted by the Concessionaire, on the project and suggest remedial measures at reasonable intervals.

   1.1.8 Monitor the KPIs included in this agreement and the same will be added in the O&M Manual as provided by the Agency and also inform the Independent Auditor about the instances in the corresponding penalties / liquidated damages payable by the Concessionaire to the Agency. Provided further, Agency shall have the right to off-set such amounts from any payments due from the Agency to the Concessionaire. Failure by the Concessionaire to make payments of such penalties / liquidated damages shall be treated as an Event of Default subject to applicable Cure Period as set-out in the Annuity Amount Payment Agreement.
1.2 **GENERAL OBLIGATIONS:**

1.2.1 All roles, duties and obligations of the Independent Engineer set out in Article 3 (Services & Related Matters) and **PART I – GENERAL** of **SCHEDULE A (Services)** shall be deemed to be included (as applicable) in the Services to be performed during the O&M Phase.

1.3 **CONCESSION DOCUMENTS OBLIGATIONS:**

1.3.1 During the O&M Phase, the Independent Engineer shall perform all such duties functions and roles that are to be undertaken and performed by the Independent Engineer in the time period corresponding to the O&M Phase.
SCHEDULE B - NOTICES

TO AGENCY:
ATTENTION: PROJECT DIRECTOR,
ADDRESS: GROUND FLOOR, TUGHLAQ HOUSE, SHAHRA-E-ATTATURK ROAD, KARACHI, PAKISTAN
TELEPHONE:

TO CONCESSIONAIRE:
ATTENTION: [*]
ADDRESS: [*]
TELEPHONE: [*]

TO INDEPENDENT ENGINEER:
ATTENTION: [*]
ADDRESS: [*]
TELEPHONE: [*]
# Schedule C - Fees

1. The projected Fees in respect of the Services is as follows:

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Description</th>
<th>Independent Engineer’s Remuneration/Fee</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Unit</td>
</tr>
<tr>
<td>1.</td>
<td>Design Review Fee (Final Alignment Stage)</td>
<td>LUMP SUM</td>
</tr>
<tr>
<td>2.</td>
<td>Design Review Fee (Approved Preliminary Engineering Design)</td>
<td>LUMP SUM</td>
</tr>
<tr>
<td>3.</td>
<td>Design Review Fee (Detailed Engineering Design Stage)</td>
<td>LUMP SUM</td>
</tr>
<tr>
<td>4.</td>
<td>Design Review Fee (Approved Detailed Engineering Design Issuance)</td>
<td>LUMP SUM</td>
</tr>
<tr>
<td>5.</td>
<td>Construction Supervision Fee</td>
<td>MONTH</td>
</tr>
<tr>
<td>6.</td>
<td>O&amp;M Supervision Fee During 1st Year of O&amp;M Phase Services</td>
<td>LUMP SUM</td>
</tr>
<tr>
<td>7.</td>
<td>O&amp;M Supervision Fee During 2nd Year of O&amp;M Phase Services</td>
<td>LUMP SUM</td>
</tr>
<tr>
<td>8.</td>
<td>Total Remuneration (1+2+3+4+5+6+7)</td>
<td></td>
</tr>
</tbody>
</table>

**Note 2: Construction Supervision Fee**

The Construction Supervision Fee shall be calculated on basis of following:

<table>
<thead>
<tr>
<th>SN</th>
<th>Description</th>
<th>Unit</th>
<th>Rate</th>
<th>Nos</th>
<th>Input</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Project Manager</td>
<td>Month</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Contracts Specialist</td>
<td>Month</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Senior Planning Engineer</td>
<td>Month</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Utilities/Coordination Engineer</td>
<td>Month</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Operations Safety Specialist</td>
<td>Month</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Resident Engineer</td>
<td>Month</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Assistant Resident Engineers (ARE) - Roadway</td>
<td>Month</td>
<td></td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Assistant Resident Engineers (ARE) - Structures</td>
<td>Month</td>
<td></td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Position</td>
<td>Month</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>9 Assistant Resident Engineers (ARE) - Protection Works</td>
<td>Month</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Material Engineer</td>
<td>Month</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Utilities Engineer</td>
<td>Month</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Site Inspectors</td>
<td>Month</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Chief Quantity Surveyor</td>
<td>Month</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Senior Quantity Surveyor</td>
<td>Month</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Laboratory Supervisors</td>
<td>Month</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Chief Surveyor</td>
<td>Month</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Surveyor</td>
<td>Month</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Support Staff</td>
<td>Month</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

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_________________________  ___________________________  ___________________________
AGENCY INITIALS  CONCESSIONAIRE INITIALS  INDEPENDENT ENGINEER’S INITIALS
**Schedule D - Independent Engineer’s Facilities**

In terms of Section 3.7 (*Independent Engineer’s Facility*) of this Agreement, the Concessionaire during the Construction Supervision Phase shall provide for the Independent Engineer/Authorized Representative and its staff the following facilities in accordance with needs and requirements as per mutual agreement prior to providing the same, which will be in consistency with level of resource mobilized on the project by the Independent Engineer:

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Provide fully furnished and maintained bachelor accommodation for Independent Engineer’s staff.</td>
</tr>
<tr>
<td>2</td>
<td>Fully furnished, equipped, and maintained Site office.</td>
</tr>
</tbody>
</table>
| 3       | Provide and maintain Survey Equipment (SOKIA or equivalent), including helpers.  
  a) Total Station (Power Set), with complete accessories ----- 1 set  
  b) Level Machine with complete accessories ---- 4 sets |
| 4       | Communication facilities, including installation, maintenance, and monthly billing for:  
  a) Two STD Lines (1 Telephone and 1 Fax line)  
  b) Mobile Phones (6 Nos)  
  c) Broad band internet facility (at two locations) with required number of personal computers as mutually decided together with the Independent Engineer |
| 5       | Providing, running and maintenance of following vehicles with driver, fuel, insurance, lubricant, repairs etc.  
  a) Double Cabin (4WD – 3000 cc)-------------3 no  
  b) Jeeps (4WD – 1500 cc) ----------------------3nos  
  c) Cars 1300 cc ---------------2 nos  
  d) Cars 1000 cc --------------------------2nos |
| 6       | Establishing fully furnished, equipped, and maintained material testing laboratory with required testing equipment, technicians, and support staff. |
| 7       | Security at the Site for the Independent Engineer’s team shall be provided by the Concessionaire at no cost. |
Dear Sir/Madam,

1. **ISSUANCE OF STANDING INSTRUCTIONS NOTICE**

We, [*], (through ______________) (the CONCESSIONAIRE) refer you, [INSERT BANK NAME] (a banking company established under the laws of Pakistan having its registered office located at [•]) (the Account Bank) to the following bank account established and maintained in the name of the Concessionaire at the Account Bank’s branch located at [•]:

(a) Account Number [●], Account Title [●] (the Concessionaire Independent Engineer Payment Account);

And, We, the Concessionaire, hereby issue this notice (the Standing Instructions Notice) containing the Standing Instructions (as defined below) for the maintenance and operation of the Concessionaire Independent Engineer Payment Account and for matters relating to the same.

2. **DEFINITIONS**

In this Standing Instructions Notice, the following capitalized words shall bear the meaning ascribed to the same as below:

(a) **Account Bank** shall bear the meaning ascribed thereto in Paragraph 1;

(b) **Concessionaire** means, a company incorporated under the laws of Pakistan, having its registered office located at [•];

(c) **Concession Agreement** means the agreement entitled ‘Concession Agreement’ dated [●] 2021,] and entered into between Governor of Sindh (through Secretary, Local Government Department) (as the Agency) and (as the Concessionaire);

(d) **Concessionaire Independent Engineer Payment Account** shall bear the meaning ascribed thereto in Paragraph 1;
(e) **Financiers** means the financial institutions, banks, Islamic financiers, funds, trusts or trustees of the holders of debentures or other securities their successors and assigns, that extend financing for the Project to the Concessionaire pursuant to the financing documents;

(f) **Financing Termination Date** means the date, as notified by the Concessionaire, on which all amounts due and payable by the Concessionaire to the Financiers are paid in accordance with the financing documents;

(g) **Independent Engineer** means [●], a firm validly existing under the laws of Pakistan having its place of business located at [●], Pakistan;

(h) **Independent Engineer Payment Account Bank** means [●], corporate centre branch located at [●], Pakistan;

(i) **Independent Engineer Payment Account** means the account established by bearing the Account [●], bearing the Account Title [●];

(j) **Independent Engineer Payment Account** means the account established by bearing the Account [●], bearing the Account Title [●];

(k) **Independent Engineer Payment Account** means the account established by bearing the Account [●], bearing the Account Title [●];

(l) **Independent Engineer Payment Account** means:

(i) in respect of the Fees (or any part thereof) payable to in terms of and as set out in the Independent Engineer Payment Amount Certificate, the Independent Engineer Payment Account;

(ii) in respect of the Fees (or any part thereof) payable to in terms of and as set out in the Independent Engineer Payment Amount Certificate, the Independent Engineer Payment Account; and

(iii) in respect of the Fees (or any part thereof) payable to in terms of and as set out in the Independent Engineer Payment Amount Certificate, the Independent Engineer Payment Account.

(m) **Independent Engineer Payment Amount Certificate** means the certificate to be procured by the Concessionaire from the Independent Auditor and issued by the Independent Auditor on its letterhead setting out the Independent Engineer Payment Date and the Independent Engineer Payment Amount along with the Independent Engineer’s invoice annexed thereto for such Independent Engineer Payment Amount;

(n) **Independent Engineer Payment Amount** means the amount due and payable to the Independent Engineer as set out in the Independent Engineer Payment Amount Certificate;
Independent Engineer Payment Date means the due date for payment of the Independent Engineer Payment Amount as set out in the Independent Engineer Payment Amount Certificate;

Project includes but not limited to the following having total length of approximately 12.0 km road and other structures:

- 3 + 3 Lane Bridge approximately 1.0 km length over Malir River (between Korangi Causeway and Jam Sadiq Bridge) with all guide (upstream and downstream) bunds, spurs, river training works, culvert, spurs etc. will be constructed (considering the recommendations of Hydraulic/Physical Model study report of Malir River provided by the Agency).
- To conduct Hydraulic/Physical model study for shifting of Malir Left Bund and proposed bridge considering above mentioned report, river topography, rainfall pattern, catchment area, invert levels of outfall drain(s) of adjacent areas and subsoil conditions and take approval from the relevant department (Sindh Irrigation Department) with the due support from the Agency.
- 2 lane Flyover over Korangi Bridge
- Construction of road over Left Bank of Korangi river to connect Korangi road of approximately 1.5 km length
- Construction of 2 + 2 lane interchange / loop ramps at Korangi Bridge / Link road to Korangi Creek
- 2+2 Lane coastal/river road (Link Road to Korangi Creek) with shoulders on either side including revetement and earthwork for embankment / bund of approximately 5.9 km length
- Construction of Culverts
- New Construction of PRL road to connect Link Road to Korangi Creek of approximately 1.0 km length
- Rehabilitation / Widening of Existing PRL road of approximately 1.6 km length
- Construction of stormwater drain approximately 1.0 km length
- Realignment of existing Creek Avenue
- Construction of Roundabout at creek avenue to link with Malir Expressway
- Rehabilitation of existing bunds.
- Earthwork for embankment of recreational/commercial area (around 450m x 40m) with entrance and exit lanes and pavement works for car parking areas of 600 to 650 vehicles
- Street Lights
- Procure, operate and maintain 1 crane for stranded vehicle
- Stormwater drainage chamber/pit with its disposal line for pumping stormwater near Attock Petrol Pump
- Plantation using Miyawaki technique at all available land pockets (but not limited to the areas mentioned below) with in the project area with the approval of the Horticulture Department.
  - landside embankment slopes of right and left bund of the Malir River
  - South west side of creek avenue / Korangi causeway road (green belt area near start point),
  - Rotary area of right turn flyover,
  - Landside embankment slope of new bund
  - U turn rotary near Airman Gold course
(q) **Standing Instructions** means the legally binding, enforceable and irrevocable (subject to Paragraph 5.1 and Paragraph 5.3 below) standing instructions contained in this Standing Instructions Notice for the operation and maintenance of the Concessionaire Independent Engineer Payment Account; and

(r) **Standing Instructions Notice** shall bear the meaning ascribed thereto in Paragraph 1.

3. **INTERPRETATION**

3.1 In this Standing Instructions Notice:

(a) Words in this Standing Instructions Notice importing the singular shall include the plural or vice versa.

(b) Save where the contrary is indicated, any reference in this Standing Instructions Notice to:

(i) a Paragraph or an Annexure shall be construed as a reference to a paragraph or an annexure of this Standing Instructions Notice;

(ii) any instrument, memorandum, agreement, contract or document shall be construed as a reference to that instrument, memorandum, agreement, contract or document (together with any recitals or sections thereto) all as amended, varied, restated, novated or supplemented from time to time;

(iii) any person shall be construed so as to include their respective administrators, successors in interest and permitted assigns from time to time;

(iv) a statute, enactment or order shall be construed as a reference to such statute, enactment or order as the same may have been, or may from time to time be, amended or re-enacted and all subsidiary legislation and other instrument made under or deriving validity therefrom;

(v) the singular shall include the plural and vice versa, where appropriate;

(vi) the words 'including' and 'includes' and any grammatical variants of those words, will be read as if followed by the words 'without limitation';

(vii) a reference to a person shall be construed to include a juridical person;

(viii) a time of day shall be construed as a reference to Pakistan Standard Time; and
(ix) headings in this Standing Instructions Notice are for ease of reference only and shall be ignored in construing this Standing Instructions Notice.

(c) The Annexures (if any) appended to this Standing Instructions Notice shall form an integral part of this Standing Instructions Notice.

4. **THE INSTRUCTIONS IN RESPECT OF MATTERS RELATING TO THE CONCESSIONAIRE INDEPENDENT ENGINEER PAYMENT ACCOUNT**

4.1 The Concessionaire hereby instructs the Account Bank to debit the Concessionaire Independent Engineer Payment Account on each Independent Engineer Payment Date (upon receipt of an Independent Engineer Payment Amount Certificate relating to such Independent Engineer Payment Date) in an amount equal to the relevant Independent Engineer Payment Amount and credit the same to the Independent Engineer Payment Account.

5. **REVOCATION AND AMENDMENT OF STANDING INSTRUCTIONS**

5.1 The Concessionaire Independent Engineer Payment Account Standing Instructions (or any part thereof) issued by the Concessionaire may be revoked pursuant to a written revocation Notice duly executed, countersigned and confirmed by:

(a) in case of the period falling between the signing date of these Standing Instructions and the Financing Termination Date, the authorized representatives of the Agency, the Independent Engineer and the Financiers (in respect of the Financier Relevant Period) (including any agent of the same);

(b) in case of the period falling after the Financing Termination Date, the authorized representatives of the Agency and the Independent Engineer, in each case acknowledged by the Account Bank.

5.2 The Concessionaire Independent Engineer Payment Account shall be strictly operated and maintained in accordance with the Standing Instructions.

5.3 These Standing Instructions may be amended from time to time with the written mutual consent of the Account Bank and the Agency provided that any such amendment shall be only effective if the same is accepted, confirmed and countersigned by:

(a) in case of the period falling between the signing date of these Standing Instructions and the Financing Termination Date, the authorized representatives of the Agency, the Independent Engineer and the Financiers (in respect of the Financier Relevant Period) (including any agent of the same); and
(b) in case of the period falling after the Financing Termination Date, the authorized representatives of the Agency and the Independent Engineer, in each case, acknowledged by the Account Bank.

6. **SEVERABILITY**

6.1 If for any reason whatsoever any provision of this Standing Instruction Notice is or becomes invalid, illegal or unenforceable or is declared by any court of competent jurisdiction or any other instrumentality to be invalid, illegal or unenforceable, the validity, legality or enforceability of the remaining provisions shall not be affected in any manner, and the Account Bank, the Concessionaire, the Agency, and till the Financing Termination Date, the Financiers (in respect of the Financier Relevant Period) (including any agent of the same), will negotiate in good faith with a view to agreeing upon one or more provisions which may be substituted for such invalid, unenforceable or illegal provisions, as nearly as is practicable.

7. **GOVERNING LAW & DISPUTE RESOLUTION**

7.1 This Standing Instructions Notice shall be governed by and construed in accordance with the laws of Pakistan and the courts of law at Karachi, Pakistan with competent jurisdiction shall entertain all disputes arising hereunder.

FOR AND ON BEHALF OF
THE CONCESSIONAIRE

..............................

NAME:
DESIGNATION:

72

..............................

AGENCY INITIALS

..............................

CONCESSIONAIRE INITIALS

..............................

INDEPENDENT ENGINEER’S INITIALS
ACKNOWLEDGMENT AND CONSENT NOTICE:

We, the Account Bank, hereby undertake the following:

1. We have received the Standing Instructions Notice issued by the Concessionaire and we hereby acknowledge the receipt of the same;

2. We have reviewed and understand all the provisions, terms and conditions as stipulated in the Standing Instructions Notice;

3. By signing this acknowledgement and consent notice, we hereby confirm our acceptance to all the instructions as stipulated in the Standing Instructions Notice and all the terms and conditions stated therein; and

4. We shall act in accordance with the instructions of the Concessionaire, as stipulated in the Standing Instructions Notice, subject to the same being in conformity with applicable laws (including the State Bank of Pakistan circulars, notifications and directions issued, from time to time).

By confirming, signing and delivery of this acknowledgment and consent notice to the Concessionaire, certified true copies of the same are also being sent to the Agency, the Independent Engineer and the Financiers (in respect of the Financier Relevant Period) (including any agent of the same).

This acknowledgement and consent notice is being signed by a duly authorised representative of the Account Bank.

FOR AND ON BEHALF OF
THE ACCOUNT BANK

......................................
NAME:
DESIGNATION:
Key Performance Indicators and Penalties/Liquidated Damages

**Annuity Amount Payment Damages Events** means the following events (as certified in writing by the Independent Engineer); provided, that the same shall not constitute an Annuity Amount Payment Damages Event in case the same results from the Permitted Events (excluding the Non Political Events):

(a) non compliance of any one or more of the key performance indicators as mentioned in the table above; and/or

(b) the Project (or any part thereof) is closed to traffic; or

(c) the Independent Engineer determines that:

(i) the riding quality of the Project (or any part thereof) has deteriorated to a level which is below the acceptable levels prescribed by the Applicable Standards; and

(ii) the Project (or any part thereof) is not safe for operation, irrespective of whether the Project (or any part thereof) has been closed to traffic or not.

provided, that in order to constitute as the Annuity Amount Payment Damages Event, the aforesaid events must occur in relation to a stretch of a lane of the Project of at least five (5) meters.

<table>
<thead>
<tr>
<th>Sr.</th>
<th>Key</th>
<th>SLAB A</th>
<th>SLAB B</th>
<th>SLAB C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<td></td>
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</tbody>
</table>

74
<table>
<thead>
<tr>
<th>No</th>
<th>Performance Indicators</th>
<th>Damages in Pak. Rupees</th>
<th>Response Time (days)</th>
<th>Damages in Pak. Rupees</th>
<th>Response Time (days)</th>
<th>Damages in Pak. Rupees</th>
<th>Response Time (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Pothole on paved roads</td>
<td>25,000/day/pothole</td>
<td>1&lt;=t&lt;4</td>
<td>50,000/day/pothole</td>
<td>4&lt;=t&lt;=8</td>
<td>100,000/day/pothole</td>
<td>t&gt;8</td>
</tr>
<tr>
<td>2</td>
<td>Edge failure on paved roads</td>
<td>18,000/day/failure</td>
<td>1&lt;=t&lt;4</td>
<td>36,000/day/failure</td>
<td>4&lt;=t&lt;=8</td>
<td>72,000/day/failure</td>
<td>t&gt;8</td>
</tr>
<tr>
<td>3</td>
<td>Rutting more than 20m long and 10mm deep on paved road</td>
<td>9,000/day/rut</td>
<td>1&lt;=t&lt;7</td>
<td>18,000/day/rut</td>
<td>7&lt;=t&lt;=14</td>
<td>36,000/day/rut</td>
<td>t&gt;14</td>
</tr>
<tr>
<td>4</td>
<td>Drains, ditches, and other drainage structures to be cleaned</td>
<td>3,000/day/ culvert or drain</td>
<td>1&lt;=t&lt;12</td>
<td>6,000/day/ culvert or drain</td>
<td>12&lt;=t&lt;24</td>
<td>12,000/day/ culvert or drain</td>
<td>t&gt;24</td>
</tr>
<tr>
<td>5</td>
<td>Bridge parapets/ barriers , expansion joints to be maintained</td>
<td>18,000/day/joint</td>
<td>1&lt;=t&lt;5</td>
<td>36,000/day/joint</td>
<td>5&lt;=t&lt;=10</td>
<td>72,000/day/joint</td>
<td>t&gt;10</td>
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<td></td>
<td>Vertical signs to be well-placed, cleaned and visible day and night</td>
<td>6,000/day/Sign</td>
<td>1&lt;=t&lt;7</td>
<td>12,000/day/Sign</td>
<td>7&lt;=t&lt;=14</td>
<td>24,000/day/Sign</td>
<td>t&gt;14</td>
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<tr>
<td>7</td>
<td>Horizontal lane markings to be well maintained</td>
<td>3,000/m/day</td>
<td>1&lt;=t&lt;7</td>
<td>6,000/m/day</td>
<td>7&lt;=t&lt;=14</td>
<td>12,000/m/day</td>
<td>t&gt;14</td>
</tr>
<tr>
<td>8</td>
<td>Safety Barrier/Project Corridor to be cleaned, well maintained and visible during day and night</td>
<td>1,500/day/km or part</td>
<td>1&lt;=t&lt;3</td>
<td>3,000/day/km or part</td>
<td>3&lt;=t&lt;6</td>
<td>6,000/day/km or part</td>
<td>t&gt;6</td>
</tr>
<tr>
<td>9</td>
<td>Litter or residues on or around pavement</td>
<td>1,500/day of delay</td>
<td>1&lt;=t&lt;3</td>
<td>3,000/day of delay</td>
<td>3&lt;=t&lt;6</td>
<td>6,000/day of delay</td>
<td>t&gt;6</td>
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<tr>
<td></td>
<td>Failure to maintain trees/plants</td>
<td>1,000/ month/tree or plant</td>
<td>1&lt;=t&lt;=30</td>
<td>2,000/ month/tree or plant</td>
<td>30&lt;t&lt;=60</td>
<td>3,000/ month/tree or plant</td>
<td>t&gt;60</td>
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<tr>
<td>10</td>
<td>Failure to achieve the Project completion by the Scheduled Project completion Date (max upto 10% of Bid Price)</td>
<td>1,000,000/d ay/delay</td>
<td>1&lt;=t&lt;=7</td>
<td>1,500,000/ d ay/delay</td>
<td>7&lt;t&lt;=14</td>
<td>2,000,000/d ay/delay</td>
<td>t&gt;14</td>
</tr>
<tr>
<td>11</td>
<td>Non availability events</td>
<td>5,000 per lane meter/day</td>
<td>1&lt;=t&lt;=3</td>
<td>7,500 per lane meter/day</td>
<td>3&lt;t&lt;=7</td>
<td>10,000 per lane meter/day</td>
<td>t&gt;7</td>
</tr>
<tr>
<td>12</td>
<td>Malfunctioning of Stormwater Drainage complete Pumping arrangement No Grace</td>
<td>500,000/day</td>
<td>0&lt;=t&lt;=2 (No Grace Period)</td>
<td>800,000/d ay/ culvert or drain</td>
<td>2&lt;t&lt;=3 (No Grace Period)</td>
<td>1,000,000/d ay/ culvert or drain</td>
<td>t&gt;3 (No Grace Period)</td>
</tr>
</tbody>
</table>
Where  \( t \)  denotes the non-rectification period in days.

**Illustration of Annuity Amount Payment Damages**

If the Annuity Amount Payment Damages Event occurs on a single day in relation to a stretch of a lane of the Project of fifty (50) meters, the damages shall be calculated as follows:

\[
\text{Damages: } A \times B \\
\text{WHERE:} \\
A: \text{the length of the stretch of a lane of the Project;} \\
B: \text{per lane meter rate of damages}
\]

\[
\text{Damages: } 50 \times 5,000: \text{PKR 250,000}\
\]

**Note:**

The aforesaid damages shall become payable after expiry of the relevant cure period set out in the Concession Agreement and/or the O&M Manual in respect of the underlying performance failure set out in the table above, the Concessionaire having failed to cure the same during the said cure period.
The aforementioned rate of damages (other than rates applicable in relation to Annuity Amount Payment Damages Event) would be applicable on slab basis and on the entirety of the non-rectification period, based on each performance indicator. Furthermore, these rates are applicable for:

(a) the first (1st) Operational Year and will be indexed each subsequent Operational Year; and

Provided that (a) above shall be based on the prevailing Wholesale Price Index (WPI) rate.

The KPIs stated above are non-exhaustive. Additional KPIs may be added in the O&M Manual.
PROJECT SITE LICENSE AGREEMENT

BETWEEN

GOVERNOR OF SINDH
(THROUGH THE SECRETARY, LOCAL GOVERNMENT DEPARTMENT)
(AS THE AGENCY)

AND

[●] (AS THE CONCESSIONAIRE)

DATED: AS OF ______________________

AT: KARACHI, PAKISTAN
PROJECT SITE LICENSE AGREEMENT

This PROJECT SITE LICENSE AGREEMENT (this Agreement) is entered into on this ______ day of ______, 2021 (the Signing Date) at Karachi, Pakistan:

BY AND BETWEEN

THE GOVERNOR OF SINDH (acting through Secretary, Local Government Department) having his offices at Local Government Department, Ground Floor, Tughlaq House, Sindh Secretariat, Karachi, Pakistan for and on behalf of the Government of Sindh (the Agency);

AND

[●], a company incorporated under the laws of [●], having its registered office located at [●] (the Concessionaire, which expression shall, where the context so permits, be deemed to mean and include its, successors in interest, administrators and permitted assigns);

(the Agency and the Concessionaire are hereinafter collectively referred to as the Parties and each individually as a Party, as the context may require).

.........................................................
AGENCY INITIALS

.........................................................
CONCESSIONAIRE INITIALS
**Recitals**

A. **WHEREAS**, the Parties have entered into a concession agreement dated [●] (the Concession Agreement);

B. **WHEREAS**, the Parties have agreed in terms of the Concession Agreement that the Agency shall, License to the Concessionaire, pursuant to this Agreement, the vacant possession of all the land and rights comprising the Concession Assets Project Site;

C. **AND WHEREAS**, the Parties are now entering into this Agreement to set out the terms and conditions applicable to, *inter alia*, the License and the relationship of the Agency and the Concessionaire and their rights and obligations.

**NOW, THEREFORE**, in view of the foregoing and in consideration of the mutual benefits to be derived and the representations and warranties, covenants and agreements contained herein and other good and valuable consideration, the sufficiency of which is hereby acknowledged and intending to be legally bound, the Parties hereby agree as follows:

---

**Agency Initials**

**Concessionaire Initials**

3
1. **DEFINITIONS AND INTERPRETATION**

1.1 **DEFINITIONS**

Unless specified otherwise herein, in this Agreement (including the Recitals), all capitalized terms shall have the meanings assigned to them under the Concession Agreement (as defined below).

In addition, the following terms shall have the following meanings, unless the context otherwise requires:

- **Additional Project Site** means any additional land required for the Project (as per the Approved Detailed Engineering Design) other than the Required Project Site, as determined by the Independent Engineer in accordance with Section 2.2.1;

- **Additional Project Site Handing Over Date** shall have the meaning ascribed thereto in Section 2.2.1;

- **Additional Project Site License** shall have the meaning ascribed thereto in Section 2.2.1;

- **Agreement** shall have the meaning ascribed thereto in the Preamble;

- **Concessionaire** shall have the meaning ascribed thereto in the Preamble;

- **Concession Agreement** shall have the meaning ascribed thereto in the Recital A;

- **Concession Assets Project Site** means, collectively, the Required Project Site and the Additional Project Site;

- **Concession Assets Project Site Parcel** shall have the meaning ascribed thereto in Section 2.4.1;

- **Agency** shall have the meaning ascribed thereto in the Preamble;

- **License** means collectively, the Required Project Site License and the Additional Project Site License and **License** shall mean (as the context requires):
  
  (a) in respect of the Required Project Site, the Required Project Site License; and

  (b) in respect of the Additional Project Site, the Additional Project Site License;

- **Parties** shall have the meaning ascribed thereto in the Preamble;

- **Required Project Site** means such part of the Concession Assets Project Site as is provided in PART II - SCHEDULE F (Project Site) of the Concession Agreement;

- **Required Project Site Handing Over Date** shall have the meaning ascribed thereto in Section 2.1.2;

- **Required Project Site License** shall have the meaning ascribed thereto in Section 2.1.1;

- **Signing Date** shall have the meaning ascribed thereto in the Preamble; and

- **Status Report** shall have the meaning ascribed thereto in Section 2.4.2(b).
1.2 **INTERPRETATION**

1.2.1 Words used in this Agreement importing the singular shall include the plural or vice versa.

1.2.2 Save where the contrary is indicated, any reference in this Agreement to:

   (a) an Article, Section, Schedule or Clause shall be construed as a reference to an article, section, schedule or clause of this Agreement;

   (b) any instrument, memorandum, agreement, contract or document shall be construed as a reference to that instrument, memorandum, agreement, contract or document (together with any recitals, schedules or sections thereto) all as amended, varied, restated, novated or supplemented from time to time;

   (c) any Person shall be construed so as to include their respective administrators, successors in interest and permitted assigns from time to time;

   (d) a statute, enactment or order shall be construed as a reference to such statute, enactment or order as the same may have been, or may from time to time be, amended or re-enacted and all subsidiary legislation and other instrument made under or deriving validity therefrom;

   (e) the singular shall include the plural and vice versa, where appropriate;

   (f) the words ‘including’ and ‘includes’, and any grammatical variants of those words, will be read as if followed by the words ‘without limitation’;

   (g) a reference to a person shall be construed to include a juridical person;

   (h) a time of day shall be construed as a reference to Pakistan Standard Time; and

   (i) headings in and the list of contents to this Agreement are for ease of reference only and shall be ignored in construing this Agreement.

1.2.3 The Recitals, Preamble and Schedules to this Agreement shall form an integral part of this Agreement.
2. **LICENSE AND RELATED MATTERS**

2.1 **LICENSE OF REQUIRED PROJECT SITE**

2.1.1 The Agency hereby, subject to the Concession Agreement and commencing from the Required Project Site Handing Over Date, licenses to the Concessionaire the Vacant Possession of all the land and rights comprising the Required Project Site (the **Required Project Site License**) for the purposes set out in the Concession Agreement. This Agreement shall be duly executed by the Parties and, to the extent required by Applicable Laws, registered by the Concessionaire with the relevant Government Authority and all costs, fees, expenses, duties, charges and taxes (including charges relating to the registration of this Agreement) relating to the same shall be borne by the Concessionaire.

2.1.2 The Required Project Site License shall commence on the physical handing over of the Vacant Possession of the Required Project Site to the Concessionaire by the Agency (which physical possession shall be handed over to the Concessionaire prior to the Commencement Date), as an Agency Conditions Precedent duly satisfied in accordance with section 3.4.2(b) of the Concession Agreement (the **Required Project Site Handing Over Date**). Upon commencement of the Required Project Site License, the same shall be co-terminus on the Transfer Date without the need for any action to be taken by the Parties to terminate the Required Project Site License. Any extension of the Concession Period shall also extend the Required Project Site License and the Concessionaire, and the Agency shall enter into such addendums, extensions or modifications of this Agreement as are necessary to give effect to such extension.

2.1.3 The Agency shall grant such permission or exemptions as may be required under the Applicable Laws relating to and regulating land, as applicable in the Province of Sindh, Pakistan, so as to ensure that the Concessionaire can enjoy Vacant Possession and hold the area of land comprising the Required Project Site, except where failure to enjoy Vacant Possession results from a breach by the Concessionaire of the Applicable Standards and the Applicable Laws.

2.2 **LICENSE OF ADDITIONAL PROJECT SITE**

2.2.1 As part of the Approved Detailed Engineering Design, the Independent Engineer shall determine the parameters of the Additional Project Site in light of the Scope of the Project, the Construction Requirements, the Construction Drawings and the requirements of the Concession Agreement. Upon determination of the Additional Project Site by the Independent Engineer, the Agency shall license and handover to the Concessionaire, the Vacant Possession of all the land and rights comprising Additional Project Site (the **Additional Project Site License**) within one hundred and eighty (180) days upon determination by the Independent Engineer of such Additional Project Site (the **Additional Project Site Handing Over Date**).

2.2.2 The Agency hereby undertakes that it shall handover and deliver to the Concessionaire the Vacant Possession of the Additional Project Site on or prior to the Additional Project Site Handing Over Date. In the event the Concessionaire is adversely affected and/or delayed in the performance of its obligations and / or there is any adverse financial impact on the Concessionaire, in each case, resulting from any delay and/or failure of the Agency to deliver Vacant Possession of the Additional Project Site to the Concessionaire on or prior to the Additional Project Site Handing Over Date, such delay and/or failure of the Agency shall entitle the Concessionaire to issuance of a Relief Order Request and in such case, the provisions of article 15 (**Relief Extensions & Relief Compensations**) of the Concession Agreement shall apply.

2.2.3 The Agency hereby, subject to the Concession Agreement and this Agreement, agrees to license to the Concessionaire the Vacant Possession of all the land and
rights comprising the Additional Project Site for the purposes set out in the Concession Agreement.

2.2.4 The Additional Project Site License for the Additional Project Site shall commence on the physical handing over of the Vacant Possession of the Additional Project Site to the Concessionaire by the Agency (which physical possession shall, in case of an Additional Project Site, be handed over to the Concessionaire on or prior to the Additional Project Site Handing Over Date), as confirmed in writing by the Independent Engineer. Upon commencement of the Additional Project Site License, the same shall be co-terminus on the Transfer Date without the need for any action to be taken by the Parties to terminate the Additional Project Site License. Any extension of the Concession Period shall also extend the Additional Project Site License and the Concessionaire and the Agency shall enter into such addendums, extensions or modifications of this Agreement as are necessary to give effect to such extension.

2.2.5 The Agency shall grant such permissions or exemptions as may be required under the Applicable Laws relating to and regulating land, as applicable in the Province of Sindh, Pakistan, so as to ensure that the Concessionaire can enjoy Vacant Possession and hold the area of land comprising the Additional Project Site, except where failure to enjoy Vacant Possession results from a breach by the Concessionaire of the Applicable Standards and the Applicable Laws.

2.3 NO SALE OR CREATION OF ENCUMBRANCE

2.3.1 The Concessionaire shall not part with, dispose of, sell, sublease or create any Encumbrance of any nature whatsoever on the whole or any part of the Concession Assets Project Site and shall not place or create nor permit any Contractor or other person claiming through or under the Concessionaire to place or create any Encumbrance over all or any part of the Concession Assets Project Site or the Concession Assets, or on any rights of the Concessionaire therein or under this Agreement, save and except as otherwise expressly set forth in the Agency Agreements.

2.4 PROTECTION OF SITE FROM ENCROACHMENTS

2.4.1 Upon Following the delivery and handing over to the Concessionaire of the Vacant Possession of a part and parcel of land and immovable property constituting of the Concession Assets Project Site (each such parcel is hereinafter referred to as the Concession Assets Project Site Parcel) by the Agency and until the Transfer Date, the Concessionaire shall be fully responsible for and protect each such Concession Assets Project Site Parcel from, in each case, any and all occupations, thefts, encroachments and Encumbrances provided that, in furtherance of provisions of section 8.2.1(b) of the Concession Agreement, the Agency shall provide reasonable assistance to the Concessionaire in procuring police assistance for removal of trespassers, removal of encroachments and security on and/or in respect of each Concession Assets Project Site Parcel. The Concessionaire further undertakes and covenants to indemnify the Agency from any costs, claims, expenses or charges incurred resulting from any breach of its obligations under this Section 2.4.1). For avoidance of doubt, obligations of the Parties in respect of each Concession Assets Project Site Parcel shall commence upon delivery and handing over of Vacant Possession of such Concession Assets Project Site Parcel.

2.4.2 Commencing from the physical handing over of the Vacant Possession of each Concession Assets Project Site Parcel, the Concessionaire shall:

(a) immediately upon becoming aware notify the Agency and the Independent Engineer of any and all occupations, thefts, encroachments and
Encumbrances on any of the Concession Assets Project Site Parcel and the Agency shall, upon receipt of such notification and in furtherance of its obligations stipulated by section 8.2.1(b) of the Concession Agreement, provide reasonable assistance to the Concessionaire in procuring police assistance for removal of trespassers, removal of encroachments and security on and/or in respect of each Concession Assets Project Site Parcel; and

(b) submit an annual report intimating to the Agency and the Independent Engineer either: (i) occurrence and status of occupations, thefts, encroachments and Encumbrances on each Concession Assets Project Site in the relevant year (if any); or (ii) confirming that each Concession Assets Project Site Parcel is free from any occupations, thefts, encroachments and Encumbrances in the relevant year (the Status Report). Each Status Report shall be updated by the Concessionaire based on any observations and comments made by the Independent Engineer and/or the Agency and shall be submitted again to the Agency and the Independent Engineer until such time that it is approved by the Independent Engineer.

2.5 AGENCY INDEMNITIES IN RESPECT OF CONCESSION ASSETS PROJECT SITE

2.5.1 The Agency shall indemnify and hold the Concessionaire harmless from any costs, claims, expenses or charges incurred (in respect of the time period falling prior to delivery of Vacant Possession of the Concession Assets Project Site to the Concessionaire) in relocating, rehabilitating or resettling persons in connection with making available the Concession Assets Project Site to the Concessionaire for implementation of the Project and for delivery of Vacant Possession of the Concession Assets Project Site to the Concessionaire.

2.5.2 The Agency hereby indemnifies and holds harmless the Concessionaire against all Losses arising in connection with or relating to any defect in title in the Concessionaire’s Licenced interest in the Concession Assets Project Site, which prevents, impedes or delays the Concessionaire from constructing or, operating and maintaining the Concession Assets in accordance with the Concession Agreement and this Agreement; provided, that such Losses are not the consequence of any breach or non-compliance by the Concessionaire of the Concession Agreement, this Agreement and the Applicable Standards; provided, further that such action is not a consequence of the Concessionaire’s failure to maintain the Concession Assets Project Site in its possession free from encroachments and encumbrances by third parties and/or is not as a consequence or failure by the Concessionaire to meet its obligations under the Concession Agreement and this Agreement.
3. **Representations And Warranties**

3.1 **Agency Representations & Warranties**

3.1.1 The Agency hereby represents and warrants the following to the Concessionaire:

(a) it shall hand over the Vacant Possession of the Concession Assets Project Site to the Concessionaire;

(b) it has the power and authority to grant the License;

(c) it has the power and authority to enter into and deliver this Agreement and that this Agreement forms the valid, binding and enforceable obligations of the Agency; and

(d) the execution and performance of this Agreement by the Agency does not violate the laws of Pakistan or any other obligations to which the Agency is subject.

3.1.2 Notwithstanding anything to the contrary, the provisions of this Section 3.1.2 including i.e. the representation and warranty provided herein, shall be effective on the Required Project Site Handing Over Date.

3.2 **Concessionaire Representations & Warranties**

3.2.1 The Concessionaire hereby represents and warrants the following to the Agency:

(a) it has the power and authority to enter into and deliver this Agreement and that this Agreement forms the valid and binding enforceable obligations of the Concessionaire; and

(b) the execution and performance of this Agreement by the Concessionaire does not violate the laws of Pakistan or any other obligations to which the Concessionaire is subject.

3.3 **Repetition**

3.3.1 The representation and warranties of the Agency provided in Section 3.1 (Agency Representations & Warranties) and of the Concessionaire provided in Section 3.2 (Concessionaire Representations & Warranties) shall be deemed to be repeated on the Required Project Site Handing Over Date and each Additional Project Site Handing Over Date.
4. Notices

4.1 Notices

4.1.1 The provisions of section 31.5 (Notices) and SCHEDULE S (Notices) of the Concession Agreement shall be incorporated by reference into this Agreement and apply, mutatis mutandis, hereto.
5. **GOVERNING LAW & DISPUTE RESOLUTION**

5.1 **GOVERNING LAW**

5.1.1 The provisions of section 31.1 (Governing Law and Jurisdiction) of the Concession Agreement shall be incorporated by reference into this Agreement and apply, *mutatis mutandis*, hereto.

5.2 **DISPUTE RESOLUTION**

5.2.1 The provisions of article 30 (Dispute Resolution) of the Concession Agreement shall be incorporated by reference into this Agreement and apply, *mutatis mutandis*, hereto.
6. MISCELLANEOUS

6.1 PARTIAL INVALIDITY & SEVERABILITY

6.1.1 If for any reason whatsoever, any provision of this Agreement is or becomes invalid, illegal or unenforceable or is declared by any court of competent jurisdiction or any other instrumentality to be invalid, illegal or unenforceable, the validity, legality or enforceability of the remaining provisions shall not be affected in any manner, and the Parties shall negotiate in good faith with a view to agreeing upon one or more provisions which may be substituted for such invalid, unenforceable or illegal provisions, as nearly as is practicable.

6.2 AMENDMENT

6.2.1 No amendment or modification of this Agreement shall be valid and effective unless agreed to by all the Parties hereto and evidenced in writing.
7. **ORIGINALS**

7.1 **NUMBER OF ORIGINALS**

7.1.1 This Agreement shall be executed in two (2) originals.
SIGNATURE PAGE

For and on behalf of LOCAL GOVERNMENT & HOUSING TOWN PLANNING DEPARTMENT, GOVERNMENT OF SINDH through its authorised signatory

Name: ................................................
Designation: ........................................

Name: ................................................
Designation: ........................................

in the presence of WITNESSES:

1. Name: ........................................
   Address: ........................................
   CNIC No.: ........................................

2. Name: ........................................
   Address: ........................................
   CNIC No.: ........................................

For and on behalf of [●] through its authorised signatory

Name: ................................................
Designation: ........................................

in the presence of WITNESSES:

1. Name: ........................................
   Address: ........................................
   CNIC No.: ........................................

2. Name: ........................................
   Address: ........................................
   CNIC No.: ........................................
Feasibility Study and Transaction Advisory Services, 'Urban Road Initiatives in Karachi'
Sub Project 1: Link Road for Korangi

Preliminary Design Drawings

December 2020

National Engineering Services Pakistan (Pvt.) Ltd.
13th Floor, N.I.C. Building, Abbasi Shaheed Road, Off. Shahrah-e-Faisal, Karachi
Phone: (0092 21) 99207277-84
Fax: (0092 21) 35651994
E-mail: nespakkh@khi.wol.net.pk
Web: http://www.nespak.com.pk
LOCAL GOVERNMENT & HTP DEPARTMENT
GOVERNMENT OF SINDH

URBAN ROAD INITIATIVES IN KARACHI

SUB-PROJECT 1 : LINK ROAD FOR KORANGI

PRELIMINARY DESIGN DRAWINGS

DECEMBER, 2020

NATIONAL ENGINEERING SERVICES
PAKISTAN (PVT.) LIMITED

ROAD DRAWINGS
GENERAL NOTES:

1. ALL DIMENSIONS AND UNITS ARE IN SI UNIT SYSTEM OF MEASUREMENT EXCEPT WHERE OTHERWISE INDICATED.

2. ALL LEVELS ARE WITH RESPECT TO THE BENCHMARK MARKS (BM) ESTABLISHED ON SITE, THE COORDINATES & ELEVATION OF BMs ARE AS FOLLOWS:

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<tbody>
<tr>
<td>BENCHMARK MARK</td>
</tr>
<tr>
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<tr>
<td>BM(CP12)</td>
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<td>BM(CP15)</td>
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<tr>
<td>BM(CP16)</td>
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*ASSUMED FOR PROJECT SITE*

3. GRID COORDINATES ARE IN METERS AND WITH REFERENCE TO UTM 42.


5. BEFORE COMMENCEMENT OF WORK, CONTRACTOR SHALL VERIFY THE EXISTING FEATURES AND ELEVATIONS SHOWN IN DRAWINGS JOINTLY WITH THE INDEPENDENT ENGINEER / GGS.

6. ALL DRAWINGS SHALL BE READ IN CONJUNCTION WITH RELEVANT PLAN AND CROSS-SECTIONAL DRAWINGS.

7. ANY CONFLICT FOUND BETWEEN DRAWINGS SHALL BE BROUGHT TO THE KNOWLEDGE OF THE THE INDEPENDENT ENGINEER / GGS FOR HIS CLARIFICATION AND INSTRUCTIONS BEFORE PROCEEDING WITH THE WORK.

8. DARK LINES SHOWN ON DRAWINGS INDICATE THE PROPOSED DEVELOPMENT, WHEREAS LIGHT LINES INDICATE THE EXISTING FEATURES AS SHOWN IN THE LEGEND.

9. ALL EXISTING STRUCTURES, UTILITY POLES, WHICH ARE IN THE PROPOSED CROSS SECTION, ARE REQUIRED TO BE DEMOURED/RELOCATED BY THE CONTRACTOR/CONCERNED AGENCIES IN CONSULTATION WITH THE CONCERNED UTILITY DEPARTMENT SUBJECT TO PRIOR APPROVAL OF THE INDEPENDENT ENGINEER / GGS.

10. THE REMOVAL/SHITING OF EXISTING UNDERGROUND AND OVERHEAD SERVICES/UTILITIES SHALL BE CARRIED OUT BY THE CONCERNED DEPARTMENTS/AGENCIES SUBJECT TO PRIOR APPROVAL OF THE CLIENT.

11. CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS AND EXPEDITIONS TO PREVENT DAMAGES TO THE ADJACENT STRUCTURES, OVER AND UNDERGROUND PIPES, CABLES AND CONDUITS, ANY DAMAGE CAUSED TO THE STRUCTURE AND INSTALLATIONS DUE TO NEGLIGENCE OF THE CONTRACTOR SHALL BE REPAIRED/REPLACED BY THE CONTRACTOR TO THE SATISFACTION OF THE ENGINEER WITHOUT ADDITIONAL COST TO THE EMPLOYER.

12. DURING RECONSTRUCTION, THE LEVEL OF EXISTING MANHOLE IS REQUIRED TO BE ADJUSTED AS PER FINAL ROAD PROFILE.

13. PAVEMENT WIDENING SHALL BE REQUIRED WHERE EXISTING PAVEMENT WIDTH IS LESS THAN THE WIDTH SHOWN ON THE TYPICAL CROSS-SECTION.

14. ARROWS SHOWN ON PLANS INDICATE DIRECTION OF TRAFFIC ONLY, THEY DO NOT REPRESENT PAVEMENT MARKINGS UNLESS SPECIFICALLY NOTED.

15. ACCESS TO ANY EXISTING COMMERCIAL AND RESIDENTIAL AREAS WITHIN THE CONSTRUCTION ZONE SHALL NOT BE BLOCKED BY THE CONTRACTOR AT ANY TIME.

16. THE CONTRACTOR SHALL SUBMIT A COMPREHENSIVE TRAFFIC MANAGEMENT PLAN BEFORE STARTING THE WORK FOR DIFFERENT PHASES OF CONSTRUCTION AND COORDINATE WITH ENGINEER / TRAFFIC POLICE TO ENSURE UNINTERRUPTED TRAFFIC FLOW.

17. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL TEMPORARY TRAFFIC DIVERSIONS ON THE ROAD, CONSTRUCTION OF DETOUR, MAINTENANCE, SPRINKLING OF WATER, GRADING AND COMPACTION, TRAFFIC SAFETY DEVICES; BEACON LIGHTS WHEN AND WHERE REQUIRED, OR AS DIRECTED BY THE ENGINEER, WITHOUT ADDITIONAL COST TO THE EMPLOYER.

18. THE GROUND ELEVATION, STRUCTURE LOCATIONS, SKEW ANGLE AND GRADES SHALL BE CHECKED DURING SURVEY BEFORE EXECUTION OF THE WORKS SUFFICIENTLY IN ADVANCE. ADJUSTMENTS TO THE DRAWINGS, IF ANY, SHALL BE APPROVED BY THE ENGINEER BEFORE EXECUTION.

19. THE CONTRACTOR SHALL ENSURE THAT ALL THE SUITABLE MATERIAL OBTAINED DURING EXCAVATION SHALL BE USED IN NEW CONSTRUCTION.

20. THE CONTRACTOR MAY VARY FEATURES OF DESIGN AS DEEMED NECESSARY TO CONFORM TO THE VARYING SITE CONDITIONS DURING THE EXECUTION OF WORK OR AS MAY BE DISCOVERED FROM THE SURVEY OUTCOME, ALL SUCH CHANGES SHALL BE GOVERNED BY THE RELEVANT CONTRACT CONDITIONS.

21. THE CONTRACTOR SHALL TAKE CARE NOT TO DAMAGE ANY EXISTING UTILITIES (ELECTRIC, GAS, NTC, PTOC, SEWERAGE, WATER, ETC.);

22. THE CONTRACTOR SHALL AVOID UNNECESSARY CUTTING/REMOVAL OF TREES.

23. THE CONTRACTOR SHALL AVOID UNNECESSARY CUTTING/DISMANTLING OF EXISTING ROAD/MEANAGE/FOOTPATH ETC. IF SUCH WORK IS DAMAGED BY THE CONTRACTOR DURING CONSTRUCTION, IT SHALL BE REPAIRED BY THE CONTRACTOR TO THE SATISFACTION OF THE ENGINEER WITHOUT ANY FINANCIAL IMPACT TO THE EMPLOYER.

24. EXTENT OF PROPOSED FOOTPATH ALONG DRIVEWAYS/MINOR STREETS SHALL BE CONSTRUCTED 5M FROM EDGE OF ROADWAY.

25. FOR ALL OTHER REINFORCED CONCRETE CROSS-SECTION REFER TO THE RELEVANT STRUCTURE DRAWINGS FOR CLASS OF CONCRETE AND TYPE OF CEMENT.

26. DRAINAGE SCHEME OF ROAD REHABILITATION WORKS SHALL BE UNDERTAKEN BY CONTRACTOR AS PER EXISTING SITE CONDITIONS AND NEAR BY DISPOSAL SUBJECT TO PRIOR APPROVAL OF THE INDEPENDENT ENGINEER / GGS.
NOTE:
1. FOR DETAILS SEE RELEVANT STRUCTURAL DRAWINGS.
2. THE DIMENSIONS SHALL BE ADJUSTED AS PER SITE CONDITIONS.
STRUCTURAL DRAWINGS
A. GENERAL

1. NOTES GIVEN ON THIS DRAWING ARE APPARENT TO ALL STRUCTURAL ENGINEERS, IF NOT ADHERED TO, WILL RESULT IN NON COMPLIANCE WITH THE CODE STANDARDS AND SPECIFICATIONS.

2. ALIEN PROJECT ORGANISATION (APOLLO) IS THE APPROVED CONTRACTOR AND IS RESPONSIBLE FOR THE COMPLETION OF THE PROJECT.

3. FOR THE PURPOSE OF THIS DRAWING, ALL MATERIALS AND SERVICES ARE TO BE APPROVED BY THE PROFESSIONAL ENGINEER AND ARE SUBJECT TO THE ACCEPTANCE OF THE LOCAL GOVERNMENT AND UTILITY DEPARTMENTS.

4. ALL.drawings are to be kept in a secure location and are not to be reproduced or distributed without the written consent of the organisation.

5. Drawings may not be used for any purpose other than the construction of the project.

6. Unless otherwise specified, all structural members shall be of reinforced concrete.

B. FOUNDATION / PILING

1. The contractor shall ensure that the foundation is compatible with the superstructure.

2. Engineering data and other detailed parameters shall be provided by the local government and utility departments.

3. All foundations shall be designed to withstand the loads and stresses imposed by the superstructure.

4. All foundations shall be constructed with reinforced concrete of the specified grade and type.

5. All foundations shall be placed on sound and stable soil or rock.

6. All foundations shall be designed to accommodate any variations in the soil conditions.

7. Engineering data and other detailed parameters shall be provided by the local government and utility departments.

C. REINFORCED & PRESTRESSED PRECAST CONCRETE WORKS

1. All precast concrete elements shall be designed and fabricated in accordance with the code standards and specifications.

2. The contractor shall ensure that all precast concrete elements are fabricated to the specified grade and type.

3. All precast concrete elements shall be designed to withstand the loads and stresses imposed by the superstructure.

4. All precast concrete elements shall be placed on sound and stable soil or rock.

5. All precast concrete elements shall be designed to accommodate any variations in the soil conditions.

D. DESIGN VEHICULAR LOADING

1. Class of design vehicles shall be determined in accordance with the code standards and specifications.

2. The contractor shall submit a complete loading schedule for vehicular traffic for review and approval.

E. CONSTRUCTION & ERECTION

1. The contractor shall construct the project in accordance with the approved plans and specifications.

2. The contractor shall ensure that all construction works are carried out in a safe and efficient manner.

3. The contractor shall ensure that all structural elements are durable and will withstand the expected loads and stresses.

F. POST TENSIONING

1. All post-tensioning elements shall be designed and fabricated in accordance with the code standards and specifications.

2. The contractor shall ensure that all post-tensioning elements are fabricated to the specified grade and type.

3. All post-tensioning elements shall be designed to withstand the loads and stresses imposed by the superstructure.

4. All post-tensioning elements shall be placed on sound and stable soil or rock.

5. All post-tensioning elements shall be designed to accommodate any variations in the soil conditions.

G. ELECTRICAL CONDUITS

1. All conduits shall be installed in accordance with the code standards and specifications.

2. The contractor shall ensure that all conduits are installed to the specified grade and type.

3. All conduits shall be designed to withstand the loads and stresses imposed by the superstructure.

4. All conduits shall be placed on sound and stable soil or rock.

5. All conduits shall be designed to accommodate any variations in the soil conditions.

H. PROPS, FORMWORK & CURING

1. All props, formwork and curing shall be implemented in accordance with the code standards and specifications.

2. The contractor shall ensure that all props, formwork and curing are implemented to the specified grade and type.

3. All props, formwork and curing shall be designed to withstand the loads and stresses imposed by the superstructure.

4. All props, formwork and curing shall be placed on sound and stable soil or rock.

5. All props, formwork and curing shall be designed to accommodate any variations in the soil conditions.
**GENERAL NOTES**

**J. STRUCTURAL STEEL**

1. All structural steel, truss, and other structural steel to be done in accordance with the latest code Specifications.
2. All structural steel shall comply with the requirements of ASHRAE/ACI.
3. All structural steel shall comply with the requirements of NFPA/UL 2001 and NFPA/UL 2012.
4. All steel shall comply with the requirements of ASHRAE/ACI.
5. All steel shall comply with the requirements of NFPA/UL 2001 and NFPA/UL 2012.
6. The fire protection of all structural steel for painting shall be done in accordance with the latest code of steel structures painting code.
7. All steel that is exposed to the elements and concrete shall be covered by the steel fabrication shop, prior to the steel being erected.
8. All steel shall be marked with the manufacturer's name, code, and batch number.
9. Structural steel members, as per requirements of ASHRAE/ACI, shall be corrosion-protected by the contractor prior to its application to the structure.
10. Steel connections shall be designed and fabricated in accordance with the latest code of steel structures connection code.

**K. ABBREVIATIONS & SYMBOLS**

- **ABC**
- **DEF**
- **GHI**
- **JKL**
- **MNO**
- **PQR**
- **STU**
- **VWX**
- **YZT**

**L. SPLICE LENGTH & DEVELOPMENT LENGTH**

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**PRELIMINARY DRAWINGS**

**LOCAL GOVERNMENT & ITP DEPARTMENT**

**NATIONAL ENGINEERING SERVICES PAKISTAN (NESP), LIMITED**

**URBAN ROAD INITIATIVES IN KARACHI**

**SUB-PROJECT: I-11 ROAD FOR KAROLINA**

**DATE:** DEC 2020

**DRAWN:** PREPARED

**CHECKED:** REVISED

**APPROVED:**

**REVISION:**

**SCALE:**

**DIAGRAM:**

**NOTE:**
PILE LAYOUT PLAN

SCALE 1:700

NOTES:
1. FOR GENERAL NOTES REFER ORG. NO. P-20030/01/200/03/001-01 & 002-02
2. ALLOTTED LOAD CARRYING CAPACITY OF PILE 1 & 2 IS 400 TONS FOR 30M EFFECTIVE LENGTH (BELOW 3.0M BELOW SEA LEVEL)
3. ALLOTTED LOAD CARRYING CAPACITY OF PILE 3 IS 350 TONS FOR 30M EFFECTIVE LENGTH (BELOW 3.0M BELOW SEA LEVEL)
4. FOR BRIDGE LOCATION REFER VARIOUS ROAD DRAWINGS
5. FOR DETAILS OF PILE DESIGN ORG. NO. P-20030/01/200/03/001-01 & 002-02
6. THE PROJECT HAS BEEN DESIGNED TO MEET REQUIREMENTS CONCERNING GPS OF THE BRIDGE WILL THEREFORE OPERATE UNDER THE SUPERVISION OF A TECHNICAL INVESTIGATION UNIT AND BE CARRIED OUT P棗 TO THE SATISFACTION OF ENGINEERING DESIGN AT REDEVELOPMENT STAGE.
PILE LAYOUT PLAN

Scale 1:750

NOTES:
1. For General Notes Refer Eng. No. P-34802/1/2019/L/2020001 & C000002.
2. Alternate load carrying capacity of pile 92 kN is 450 tons for 30m effective length (below hill base level).
3. Alternate load carrying capacity of pile 92 kN is 300 tons for 30m effective length (below hill base level).
4. For bridge location refer preliminary road drawings.
6. The project report has been reviewed by high competent authorities up to depth of 30m below hill base. Geotechnical investigations should be carried out prior to the fabrication of foundation design at detailed design stage.

THICK PERMANENT STEEL LAYER SHALL BE PROVIDED IN ALL PLIES ON EACH RECL. THE LENGTH OF LAYER SHALL BE TRAILLED AFT THE DEDELINE GEO-TECHNICAL INVESTIGATIONS TO BE CARRIED OUT BY A SOVEREIGN ENGINEER. HOWEVER, FOR BDD PURPOSE LENGTH OF LAYER CAN BE TAKEN AS 17m FOR EACH PILE.
PILE LAYOUT PLAN
SCALE: 1:700

NOTES:
1. THE LENGTH OF LAYER SHALL BE TRIANGLED AFTER DETAIL DETAILED GEOTECHNICAL INVESTIGATIONS TO BE CARRIED OUT BY SOIL ENGINEERING ENGINEERS. HOWEVER, FOR DESIGN PURPOSE LENGTH OF LAYER CAN BE TAKEN AS 1/7TH FOR EACH PILE.

2. THE NUMBER OF PILES PER METER IS AS PER REQUIREMENT.

3. THE PROPOSED DEPTH OF FOOTING IF NOT SHOWN IS 1 METER DEEP.

4. THE PROPOSED MORTAR COVER OR PILE REINFORCEMENT IS AS PER REQUIREMENT.

5. THE PROPOSED PILE SPIKE SECTIONS ARE AS PER REQUIREMENT.

6. THE PROPOSED PILE SPANS ARE 1 Meter DEEP.

7. THE PROPOSED PILE SPANS ARE 1 Meter DEEP.

8. THE PROPOSED PILE SPANS ARE 1 Meter DEEP.

9. THE PROPOSED PILE SPANS ARE 1 Meter DEEP.

10. THE PROPOSED PILE SPANS ARE 1 Meter DEEP.

11. THE PROPOSED PILE SPANS ARE 1 Meter DEEP.

12. THE PROPOSED PILE SPANS ARE 1 Meter DEEP.
PILE LAYOUT PLAN
SCALE 1: 700

NOTES:
1. FOR GENERAL NOTES REFER ORG. NO. P-3950/05/P/287/2005/000001 & 000002.
2. ALLOWABLE LOAD CARRYING CAPACITY OF "PILE P1" IS 450 TONS FOR 30M EFFECTIVE LENGTH (BELOW AND 80 ft BELOW SEA LEVEL).
3. ALLOWABLE LOAD CARRYING CAPACITY OF "PILE P2" IS 350 TONS FOR 30M EFFECTIVE LENGTH (BELOW AND 80 ft BELOW SEA LEVEL).
4. FOR BRIDGE LOCATION REFER PRELIMINARY ROAD DRAWINGS.
5. For details of piles refer ORG. NO. P-3950/05/P/287/2005/000003.
6. THE PROJECT HAS BEEN DESIGNED TO MEET COMPREHENSIVE CONSIDERATIONS UNTIL DEPTH OF THE SOIL FOR SOLID ROCKY GROUND CONDITIONS. INVESTIGATION WORKS WILL BE CARRIED OUT PRIOR TO THE PRODUCTION OF FOUNDATION DESIGN AT CEMENTED DESIGN STAGE.

LOCAL GOVERNMENT & NIP DEPARTMENT GOVERNMENT OF SINDH
NATIONAL ENGINEERING SERVICES PAKISTAN (PVT) LIMITED

SUB-PROJECT I: LINK ROAD FOR KORANGI TERRACE BRIDGE AT MAJAR RIVER

PRELIMINARY DRAWINGS

DEC. 2020
PRELIMINARY DRAWINGS

REVISION 0
DC-02
P-3950/05/P/287/2005/000004

DATE

SCALE 1: 700
TYP. ELEVATION OF TRANSOM TR-1 TO TR-6

NOTE:
1. FOR GENERAL NOTES REFER DRAW. No. P-20035/P/07/07/200701 & 000002.
2. FOR BRIDGE PIER AND AT BRIDGE PIER REFER RELEVANT ROAD DRAW.
3. FOR TRANSOM LENGTH REFER DRAW. No. P-20035/P/07/07/200701 & 000002.
4. FOR CIVIL A & B REFER DRAW. No. P-20235/P/07/07/200701 & 000002.
5. ALL APPROVED CORNER SHALL BE CONTINUED BY 250mm.
PLAN AT DECK LEVEL
SCALE: 1:200
(CONTRACTIONS ARE 300TH INC.)
NOTES:
1. FOR GENERAL NOTES REFER DRAWING NO. P-2003/PI/PLO/0010001
2. FOR FLEXIBLE SHEET METAL CIRCLES REFER DRAWING NO. P-2003/PI/PLO/0010001
3. FOR TOP OF ENHANCEMENT ELEV. & PROFILE REFER RELIANT ROADS DRAWINGS
4. ALLOWABLE LOAD CARRYING CAPACITY OF PILE P1 IS 130 TONS FOR 25% EFFECTIVE LENGTH BELOW PILE TIP
5. ALLOWABLE LOAD CARRYING CAPACITY OF PILE P2 IS 410 TONS FOR 25% EFFECTIVE LENGTH BELOW PILE TIP

LOCAL GOVERNMENT & HOUSING DEPARTMENT
GOVERNMENT OF SINDH
NATIONAL ENGINEERING SERVICES
PAKISTAN (PVT) LIMITED

PILE LINK ROAD TO KALOHERI CREEK
FLY-OVER AT ROAD-02
SUB-PROJECT 1; LINK ROAD FOR KARACHI

DRAWN
C
DESIGNED
S.F.H

CHECKED
M.F

APPROVED
M.T.V

REV.
8
DRAWING DATE
DEC,2020

PRELIMINARY DRAWINGS

P-2003/PI/FD/PRO/000001

SCALE
TYP. ELEVATION OF TRANSMAN TR-1

TYP. ELEVATION OF TRANSMAN TR-2
ELEVATION OF RETAINING WALL RW1

PLAN OF RETAINING WALL RW1

SCHEDULE OF RETAINING WALL

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*Note: To be adjusted as per road dwgs.*

SECTION 1-1

SCHEDULE NO. 1

DIMENSIONS (mm)

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<td>300</td>
<td>450</td>
<td>600</td>
<td>1300</td>
<td>2200</td>
</tr>
</tbody>
</table>

DETAIL 'A'

DETAIL 'B'

NOTES:

1. FOR GENERAL NOTES REFER Dwg. No. P-30035/PJ/12/15/000001.
2. FOR TOP OF EMBANKMENT & FALL UPON RETAINING WALL DRAWS.
3. PUNJAB ROAD ENGINEERING CORPORATION (Sindh) using topographic road drawings.

REV. DATE DESCRIPTION

LOCAL GOVERNMENT & ITD DEPARTMENT GOVERNMENT OF SINDH

NATIONAL ENGINEERING SERVICES PAKISTAN (PVT), LIMITED

SUB-PROJECT: LINK ROAD FOR KORANGA FLYOVER AT ROAD - 32

RWW RETAINING WALL DETAILS

FILE: LINK ROAD TO KORANGA FLYOVER AT ROAD - 32

DRAWN: S.F.H.
CHECKED: M.F.
APPROVED: N.W.W.

URBAN ROAD INITIATIVES IN KARACHI

DRAWING NO. 5-30035/PJ/12/15/000001

SCALE 1:400

PRELIMINARY DRAWING

REV. 0

DECLARATION OF 
REV. 0

DECLARATION OF
PILE LAYOUT PLAN

1. THICK PERMANENT STEEL LATERAL SHELL SHALL BE PROVIDED IN ALL PLUT ON EACH SIDE. THE LENGTH OF LATERAL SHELL SHALL BE RATED AS DETAILED GEO-TECHNICAL INVESTIGATIONS TO BE CARRIED OUT BY GEO-ENGINEERING ENGINEER. HOWEVER, FOR BOG PURPOSE LENGTH OF SHELL CAN BE TAKEN AS 1/7TH FOR EACH PLUT.

NOTES:
1. REFER GENERAL NOTES PAPER NO. P-39030/P1/REV/P1/REV/390301 & 390302.
2. ALLOWABLE LOAD CARRYING CAPACITY OF "PLUT" IS 4.2 TONNE PER 3.5M EFFECTIVE LENGTH (SHEAR WALL).
3. REFER LOCATION PLAN RELEVANT ROAD DRAWINGS.
4. REFER DETAIL OF PLUT SHELL NO. P-39030/P1/REV/P1/REV/390307.
5. THE PROJECT SHELL IS NOT MICA G SARKAR CONDITION TO THE DEPTH OF 7.2M BELOW GND. CONSTRUCTION OF SHELL MICA G SARKAR CONDITION TO THE DEPTHS OF FOUNDATION DESIGN OF DETAILED DESIGN STAGE.

LOCAL GOVERNMENT & MP bleiben DEPARTMENT
GOVERNMENT OF SINDH
NATIONAL ENGINEERING SERVICES PAKISTAN (PVT) LIMITED

ECC
B
A
D
REV. DATE DESCRIPTION

0
DEC.22 00 PRELIMINARY DRAWINGS

0
DEC.22 00 APPROVED

PRELIMINARY DESIGN DRAWINGS

EBERO ROAD TO KORANGI CREEK BRIDGE T1
SUB-SITE: 1- LINK ROAD
FOR KORANGI

SCALE 1:500
OS.
DATE
ORG.
REV.
PRINCIPAL ENGINEERS

0
DEC.22 00 DRAFT

P-39030/P1/REV/P1/REV/3903014
NOTES:
1. FOR GENERAL NOTES REFER DRAWN NO. /DESIGN NO./REV./REVISION NO. & DRAWING SCALE.
2. D.E. STRANDS ARE USED AS POST TENSIONING TENDONS AS PER SPECIFICATION.
3. THE TENDONS SHALL BE TENDED FROM THE END ONLY. ALSO CONCRETE TENDONS SHALL BE TENDED FROM ANOTHER END.
4. MINIMUM COMPRESSIVE STRENGTH OF CONCRETE SHALL BE 25 MPA (STRANDS EMBEDDING 25 MPA).
5. BLOCK EDGES SHOWN IN VIEW 1-1 TO BE CLEARED FROM FINISHED ELEVATION AT TOP.
6. PULL-OUT STRENGTH AS PER DESIGN.
ELECTRICAL DRAWINGS
GENERAL NOTES:

LOCAL GOVERNMENT & URBAN DEPARTMENT

URBAN ROAD INITIATIVES IN KARACHI

SUB-PROJECT 1: LINK ROAD FOR KORANGI

GENERAL NOTES:
EXISTING KACHA TRACK

CONTRACT LIMIT

(TYPICAL)

LOCAL GOVERNMENT & HTP DEPARTMENT
GOVERNMENT OF SINDH

URBAN ROAD INITIATIVES IN KARACHI
SUB-PROJECT 1: LINK ROAD FOR KORANG

STREET LIGHTING/SLEEVE LAYOUT
(SHEET 2 OF 9)
STREET LIGHTING/SLEEVE LAYOUT
SUB PROJECT 1: LINK ROAD FOR KORANG

LOCAL GOVERNMENT & HTP DEPARTMENT
GOVERNMENT OF SINDH

URBAN ROAD INITIATIVES IN KARACHI

(TYPICAL)
FEASIBILITY STUDY AND TRANSACTION ADVISORY SERVICES, ‘URBAN ROAD INITIATIVES IN KARACHI’ PROJECT

ENVIRONMENTAL IMPACT ASSESSMENT DRAFT REPORT

LINK ROAD FOR KORANGI

APRIL, 2021
Feasibility Study and Transaction Advisory Services for ‘Urban Road Initiatives in Karachi’ Project

ENVIRONMENTAL IMPACT ASSESSMENT (EIA) REPORT LINK ROAD FOR KORANGI

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LIST OF ABBREVIATIONS

Akem  Avenue Kilometer
APs    Affected Persons
ASRs   Air Sensitive Receivers
ASTM   American Society of Testing Material
BDL    Below Detection Limit
BHU    Basic Health Unit
BOD    Bio-chemical Oxygen Demand
CC     Construction Contractor
CITES  Convention on International Trade of Endangered Species
CO     Carbon Monoxide
COD    Chemical Oxygen Demand
dB (A) Decibel
DC     Design Consultant
DCR    District Census Report
DD     Deputy Director
DO     Dissolved Oxygen
EA     Environmental Assessment
EE     Environmental Engineer
EIA    Environmental Impact Assessment
EMP    Environmental Management Plan
EPD    Environment Protection Department
EPO    Environmental Protection Ordinance
ESR    Environmental Sensitive Receiver
FCC    Forest Conservation Committee
GHG    Green House Gases
GOP    Government of Pakistan
GRC    Grievance Redress Committee
GRM    Grievance Redress Mechanism
IEE    Initial Environmental Examination
Km     Kilometer
LAC    Land Acquisition Collector
MVES   Motor Vehicle Examiners
NESPAK National Engineering Services Pakistan (Pvt.) Ltd.
NGO    Non-Governmental Organization
NOC    No-Objection Certificate
NOx    Nitrogen Oxides
NSL    Natural Surface Level
NSR    Noise Sensitive Receiver
NTC    National Trade Corridor
OC     Degree Centigrade
OSHA   Occupational Safety and Health Administration
PAPs   Project Affected Persons
PEPA   Pakistan Environmental Protection Act
PEPC  Pakistan Environmental Protection Council
PM    Particulate Matter
PNCS  Pakistan National Conservation Strategy
PPAF  Pakistan Poverty Alleviation Fund
PPC   Pakistan Penal Code
PPP   Public Private Partnership
RE    Resident Engineer
REA   Rapid Environmental Assessment
ROW   Right of Way
SC    Supervision Consultant
SEPA  Sindh Environmental Protection Agency
SEQS  Sindh Environmental Quality Standards
### GLOSSARY

<table>
<thead>
<tr>
<th><strong>Air Quality Sensitive Receptors</strong></th>
<th>People, property, species or designated sites for nature conservation that may be at risk from exposure to air pollutants potentially arising as a result of a proposed development.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Air Quality Standard</strong></td>
<td>Air quality limiting values and objectives.</td>
</tr>
<tr>
<td><strong>Anaerobic</strong></td>
<td>Absence of oxygen.</td>
</tr>
<tr>
<td><strong>Annual Average Rainfall</strong></td>
<td>Average amount of precipitation falling at a specified site recorded by the Meteorological Office. It gives a measure of the overall wetness of the local climate.</td>
</tr>
<tr>
<td><strong>Baseline</strong></td>
<td>Existing environmental conditions present on, or near a site, against which future changes can be measured or predicted.</td>
</tr>
<tr>
<td><strong>Bentonite</strong></td>
<td>A natural clay that, when mixed with water, swells and forms a thixotropic gel (a particular type of viscous behavior exhibited by some liquids). It can be used temporarily to support trenches or retaining walls, and helps to prevent collapse when they are being backfilled (i.e. refilled) or concreted.</td>
</tr>
<tr>
<td><strong>Biodiversity</strong></td>
<td>The variety of life in the world or in a particular habitat or ecosystem.</td>
</tr>
<tr>
<td><strong>Climate</strong></td>
<td>The climate can be described simply as the ‘average weather’, typically looked at over a period of 30 years. It can include temperature, rainfall, snow cover, or any other weather characteristic.</td>
</tr>
<tr>
<td><strong>Climate Change</strong></td>
<td>A change in the state of the climate, which can be identified by changes in average climate characteristics that persist for an extended period - typically decades or longer.</td>
</tr>
<tr>
<td><strong>Cutting</strong></td>
<td>A linear excavation of soil or rock to make way for a new railway or road. Cuttings help reduce the noise and/or visual impact of passing trains or road vehicles.</td>
</tr>
<tr>
<td><strong>Decibel(S)</strong></td>
<td>A unit used to express relative differences in sound power or intensity. There is a million to one ratio in sound pressure (measured in Pascal (Pa)) between the quietest audible sound and the loudest tolerable sound. The decibel (dB) scale, based on a logarithmic ratio, is used in sound measurement because of this wide range. Audibility of sound covers a range of approximately 0-140 dB.</td>
</tr>
<tr>
<td><strong>Dust</strong></td>
<td>All airborne particulate matter.</td>
</tr>
<tr>
<td><strong>Earthworks</strong></td>
<td>The removal or placement of soils and rocks such as in cuttings, embankments and environmental mitigation, including the in-situ improvement of soils/rocks to achieve desired properties.</td>
</tr>
<tr>
<td><strong>Ecosystem</strong></td>
<td>A biological community of interacting organisms (e.g. plants and animals) and their environment.</td>
</tr>
<tr>
<td><strong>Effect</strong></td>
<td>Used throughout this environmental impact assessment report to refer to the consequence of an impact to the receiving environment (see also: ‘impact’).</td>
</tr>
<tr>
<td><strong>Effluent</strong></td>
<td>Liquid waste or sewage.</td>
</tr>
<tr>
<td><strong>Embankment</strong></td>
<td>Artificially raised ground, commonly made of rock or compacted soil, on which a new railway or road is constructed.</td>
</tr>
<tr>
<td><strong>Environment Agency</strong></td>
<td>Government agency established to protect and improve the environment and contribute to sustainable development. Responsibilities include: Water quality and resources, flooding and coastal risk management and contaminated land.</td>
</tr>
<tr>
<td><strong>Environmental Impact Assessment</strong></td>
<td>A process of systematically assessing the likely environmental effects of proposed development projects. EIA is a legal requirement for certain public and private projects under PEPA Act 1997.</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
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<tr>
<td>Environmental Impact Report</td>
<td>A suite of documents, previously referred to as an environmental statement, produced as part of an environmental impact assessment. It must include all information that is reasonably required to assess the likely significant environmental effects of a proposed development.</td>
</tr>
<tr>
<td>Excavated Material</td>
<td>Soil, rock and other material that has been removed from the ground during construction.</td>
</tr>
<tr>
<td>Greenhouse Gas</td>
<td>A gas such as carbon dioxide, methane, chlorofluorocarbons, nitrous oxide, ozone, and water vapor that contributes to the greenhouse effect by absorbing infrared radiation.</td>
</tr>
<tr>
<td>Groundwater</td>
<td>All water that is below the surface of the ground and within the permanently saturated zone.</td>
</tr>
<tr>
<td>Groundwater Body</td>
<td>A distinct volume of groundwater within an aquifer.</td>
</tr>
<tr>
<td>Heavy Metals</td>
<td>A loosely defined term which refers to a group of metal and metalloids, many of which are toxic to some degree.</td>
</tr>
<tr>
<td>Impact</td>
<td>Used throughout this EIA Report to refer to changes to the environment that has the potential to occur as a result of the construction and/or operation of the Proposed Scheme. (See also: ‘effect’.)</td>
</tr>
<tr>
<td>Mitigation</td>
<td>The measures put forward to prevent, reduce and where possible, offset any adverse effects on the environment.</td>
</tr>
<tr>
<td>Risk Assessment</td>
<td>An assessment of the probability of a hazard occurring that could result in an impact.</td>
</tr>
<tr>
<td>Sand</td>
<td>Soil particles from 0.06mm-2.0mm in equivalent diameter. Fine sand particles are from 0.06mm-0.2mm; medium sand from 0.2mm-0.6mm; and coarse sand from 0.6mm-2.0mm.</td>
</tr>
<tr>
<td>Scoping</td>
<td>An initial stage in the environmental impact assessment process to determine the nature and potential scale of environmental effects arising as a result of a proposed development, and an assessment of what further studies are required to establish their potential environmental impacts and effects.</td>
</tr>
<tr>
<td>Screening</td>
<td>The first stage in an environmental impact assessment. It is used to determine if further assessment is necessary and to categorize the project.</td>
</tr>
<tr>
<td>Soil Erosion</td>
<td>The detachment and movement of soil by the action of water and/or wind.</td>
</tr>
<tr>
<td>Soil Profile</td>
<td>A vertical cross-section through a soil.</td>
</tr>
<tr>
<td>Surface Water</td>
<td>Waters including rivers, lakes, reservoirs, canals, streams, ditches, coastal waters and estuaries.</td>
</tr>
<tr>
<td>Threshold</td>
<td>A level of effect above which an assessment will be taken of whether any changes to procedures need to be made.</td>
</tr>
<tr>
<td>Topography</td>
<td>The natural or artificial features, level and surface form of the ground surface.</td>
</tr>
<tr>
<td>Topsoil</td>
<td>Upper layer of a soil profile, usually darker in color (because of its higher content of organic matter) and more fertile than subsoil, and which is a product of natural biological and environmental processes.</td>
</tr>
</tbody>
</table>
EXECUTIVE SUMMARY

ES-1 Introduction

1. The Local Government & HTP Department, Government of Sindh intends to implement the ‘Urban Road Initiatives in Karachi’ under Public Private Partnership (PPP) modality to reduce traffic congestion and to provide quick and safe access to the commuters. The Sub-Projects in this initiative include;

   - Link Road for Korangi,
   - Expressway from Mauripur Road to Y-Junction and
   - Interchange at ICI Bridge

2. This report presents the findings of EIA of “Link Road for Korangi”.

3. Korangi Crossing Road is the main entrance to Korangi Creek Road and the adjoining residential and industrial areas for the traffic from Qayyumabad, DHA and beyond. Currently, a causeway across Malir River serves the traffic to / from this densely populated area. During rainy season, the existing causeway gets under water and the traffic across the river gets disrupted and rerouted to other longer routes causing inconvenience and traffic congestion on the other exits from Main Korangi Industrial Area Road. Unnecessary delays and travel cost is incurred by the road users and industrial supply and products are affected. Additionally, an increase in traffic volumes is expected due to construction of Malir Expressway project which will have its starting point near the existing causeway (KPT Interchange) and will thus link these areas directly with the Karachi Hyderabad Motorway i.e. M9. Thus, proposed Link Road to Korangi and the new bridge on Malir River will be an alternate direct access route serving the industrial and commercial traffic to / from these areas.

4. Keeping in view the above facts, an alternate/emergency route is proposed which is a dire need to resolve the heavy traffic jams/diversion issues. This route will facilitate the movement of traffic in the project area.

5. Under the scheme, a new bridge is proposed to be constructed over Malir River as an alternate to the existing causeway and an expressway is proposed along the left bank of Malir River up to the PAF Airmen Golf Club with connection to Korangi Creek Road.

6. The proposed project requires an EIA in accordance with the Sindh Environmental Protection Act, 2014, Review of IEE/EIA Regulation, 2014 and also to fulfil requirements of international financial institutions.

7. According to Sindh Environmental Protection Agency and Review of IEE and EIA regulations 2014, the proposed project falls under category ‘E’ (Transport) of Schedule II, which requires EIA before commencement of construction.
ES-2 Legal and Administrative Frameworks for EIA


9. The implementing agency of the proposed project is Local Government & HTP Department, Government of Sindh. They will ensure that all the proposed measures are effectively implemented at the design, construction and operational stages of the project.

ES-3 Project Description

10. The project area is located in Karachi. The road starts approximately from a distance of 1 km from KPT Interchange, a bridge is proposed which connects Creek Avenue and Malir Expressway to Korangi Creek Road. The link road extends from the bridge and ends at Airmen Golf Course. Another segment of road extends from Korangi Link Road passing adjacent to Korangi Creek Industrial Park and joins Korangi Creek Road. Layout Map of the Project area is shown in Figure 1.

Components of the proposed project

11. The salient features of the project are as follows:

- Start point – Creek Avenue / Korangi Causeway Intersection
- End point – PAF Airmen Golf Club
- Total Length – Approx. 12 km (with elevated portions)
- Alignment – Parallel to Jam Sadiq Bridge along Left Bank of Malir River.
- Number of lanes –
  - 6 lanes (3 in each direction) for Ramp 1 from KPT Interchange and NewBridge at Malir River
  - 4 lanes (2 in each directions with shoulders) for Road 1 (Creek Avenue to Malir Expressway)
  - 4 lanes (2 in each directions) for Ramp 2, 3 and Road 3
  - 6 lanes (3 in each direction) for Road 2, 4 and Ramp 4 (New Malir Bridge to Attock Petrol Pump)
  - 4 lanes (2 in each direction) for Road 6 (New bridge to NRL Link) and Road 8 (NRL Link to Airmen Golf course)
  - 4 lanes (2 in each direction) for Road 7 (NRL Link Road)

- Design Speed (Link road to Korangi Creek) – 90 Km/h
- Design Speed (Korangi Bridge) – 80 Km/h
- Design Speed (interchanges) – 30 - 40 Km/h
- Right of Way (ROW) of Bridge – 26.1 m
- Right of Way (ROW) of Road depending on number of lanes – 17- 25 m

ROW mentioned above are without berm/slope protection width, which may vary as per site condition.
Figure 1: Layout Plan of Proposed Project
ES-4 Analysis of Alternatives

12. Three options have been considered during the desk study for proposed project;

Alternative 1: No Project Alternative
Alternative 2: Alignment along the Existing Coastline
Alternative 3: Alignment Including Reclamation of Land

13. After analysis of different options, Alternative 5 is considered as selected option due to its long term benefits of reducing traffic load and consequently reducing emissions, dust and noise from these vehicles. It will also save time and fuel and reduce any conflicts due to traffic jam/car accidents. There will be ease in commuting to important destinations like hospitals, industries and educational institutes. It will also help in improving trade and development. Furthermore, due to availability of land, future development is expected.

ES-5 Description of the Environment

14. The existing environment in and around the project area has been studied with respect to the physical, biological and socio-economic conditions. The baseline surveys were carried out during November 08, 2020 to November 19, 2020.

Physical Environment

15. The proposed project area is located in Karachi. The city represents quite a variety of habitats such as the sea coast, islands, sand dunes, swamps, semi-arid regions, cultivated fields, dry stream beds, sandy plains, hillocks. A large portion of the Karachi area consists of vacant land including the area dedicated to the Kirther National Park. The vacant land accounts for only 7% of all land and housing is the biggest use of land (with about 37% of the total), while roads and open spaces are also significant in number and area.

16. The proposed project area falls under Miocene Rock Gaj formation which comprises mainly marine shells and limestone, fossiliferous, topmost sandstone and shales estuarine with abundant molluscan and few vertebrate fauna, early Miocene.

17. The soil is alluvium with plenty of clay derived from land drainage and river discharge. It is rich in salts like sodium chloride, sodium carbonate and nitrates with some calcium, which comes from shell fragments. The muddy and clay-based soil is poor in other mineral substances. It is very badly drained and is not permeable. The pH of the soils ranges from 8.2 to 8.4.

18. According to Building code of Pakistan, 2007, the project area falls in Seismic Zone 2B of Pakistan (moderate damage), and peak ground acceleration (PGA) from 0.16 to 0.24 g.
19. Ground water resources in Karachi are limited. Small amount of groundwater is extracted for private use in the Karachi area. The aquifers close to the coastal belt are mostly saline and unusable for domestic purposes. Aquifers near the Hub River are well developed and serve as sources of water for agriculture and domestic use. The aquifers are estimated to lie at depths of 50-100 m.

20. The climate of the Karachi can be characterized by dry, hot and humid conditions and in general terms it is moderate, sunny and humid. The maximum temperature range is 24 – 37 °C. The average temperature range is 21 – 34 °C. The minimum monthly temperature range is 17– 30 °C. April to November are the hot months whereas cold months are December to March.

21. The maximum rainfall occurs during the months of July and August. Winter rains generally occur during the months of December to March, whereas, May, October, November is normally the months with least precipitation. The minimum average monthly rainfall of the project area varies from 0 to 0.8 mm whereas maximum average monthly rainfall varies from 14.31 mm to 118.90 mm.

22. Relative humidity levels are mostly high during the month of July and August, whereas, these are lower during December.

23. The data reveals that the wind speeds are generally lower during winter (December to March) while higher wind speeds are recorded during summer (May, June, July).

24. The Landuse of the area is commercial and industrial area, it also includes water body and mangroves.

25. In order to determine the ambient air, noise levels, water and surface water quality of the study area, environmental monitoring were carried in the month of November 2020. The concentrations of CO, NO2 and SO2 in the ambient air are well within limits specified by the SEQS. However, Suspended Particulate Matter including both PM2.5 and PM10 are higher in the project area as the location is adjacent to the Korangi Industrial Area. Noise monitoring results show that the noise levels at day and night time exceed from the permissible limits of SEQS (commercial) near Attock Petrol Pump Korangi Crossing. Whereas, near Jam Sadiq Bridge, Korangi and Barrett Hodgson University, noise levels exceed only during nigh time from SEQS limits. COD and Chloride of wastewater (adjacent to Attock Petrol Pump Korangi Crossing) is higher than the prescribed limits of SEQS. The sample of drinking water showed presence of Coliforms whereas fecal Coliform was not found in the sample. The chemical parameters were within the range of SEQS.

Ecological Environment

26. Phyto-geographically the natural vegetation of the tract falls in Saharo-Sindian region. Floristically this region is considered very poor. However, the project is located close to the coast therefore, marine phytoplankton and mangrove forests are in relative
abundance in the coastal areas. The mangrove forests are among the most important component of the area. The area has significant ecological and biodiversity value. Mangrove forest provides good feeding, sheltering and breeding ground for many species of bird mangroves ecosystem provides roosting place to a variety of migratory birds. Local fishing communities also use these forests for fodder and fuel.

27. Mangroves present in the project area are classified as tidal swamp forests and are comparable to tropical rain forests on a small scale. Avicennia marina, locally called as timer is the dominant species of the area and occurs almost as monotypic stand throughout the area. It is a tree species and attains about 10 m in height in regularly in undated areas, fringing the creek or growing in the adjoining small Islands, with the increase in elevation and decreasing tidal waves, the tree height is gradually reduced and takes a bushy appearance.

28. As per the Sindh Forest Department all the mangroves forests are declared/designated as Protected Forests, under Forest Act 1927.

29. Along the barren lands in study area, towards the north, various xerophytic species exist and the prominent amongst them is Musket (Prosopis Glandulosa), a bushy growth, which is a very hardy species, covered with strong thorns. No significant Agriculture or Horticulture practices were noticed in the area.

30. The avian species, which are quite abundant and common in the proposed project area, include Indian Roller, Green Bee Eater and Indian Myna. The site is very poor in reptiles. Only few lizards were reported. There is no fish species of special importance/endangered in the project area. Mangrove easing predators to hunt the aquatic organisms in the area.

31. IBAT was conducted in the project area at three (03) Locations. Based on the findings of IBAT Proximity report 1, initially 111 nos. of IUCN red list species were identified at point 1 i.e. Ramp 1 – Ramp 4 (Location: [24.8, 67.1] Date of analysis: 15 April 202, Buffers applied: 1 km | 3 km | 5 km). No (0) Protected Area and Key Biodiversity Area were identified within this buffer. However, the initial screening species identified by IBAT are potentially found within 5km of the area of interest.

32. Based on the findings of IBAT Proximity report 2, initially 111 nos. of IUCN red list species were identified at point 2 i.e. Road 7 – Road 7 (Location: [24.8, 67.1] Date of analysis: 15 April 202, Buffers applied: 1 km | 3 km | 5 km). No (0) Protected Area and Key Biodiversity Area were identified within this buffer. However, the initial screening species identified by IBAT are potentially found within 5km of the area of interest.

33. Based on the findings of IBAT Proximity report 1, initially 112 nos. of IUCN red list species were identified at point 3 i.e. Ramp 2 – Road 8 (Location: [24.8, 67.1] Date of analysis: 15 April 202, Buffers applied: 1 km | 3 km | 5 km). No (0) Protected Area and Key Biodiversity Area were identified within this buffer. However, the initial screening species identified by IBAT are potentially found within 5km of the area of interest.
34. IBAT species were verified/authenticated through various tools including literature review, stakeholders/departmental consultations and random ground trotting.  
Socioeconomic Environment

35. The study area for the socio-economic survey includes the project area as well as the residential houses in surrounding, road users, commuters, educational and health centers and the commercial shops.

36. During the baseline survey, 63 respondents were interviewed for socioeconomic study of the project area. To conduct the baseline survey, 102 respondents were consulted including 63 respondents of socioeconomic baseline survey, 31 respondents of community consultations and 08 respondents of the gender consultation. About 63 respondents, comprising 83% male and 17% female population in the project was contacted to carry out socio-economic and impact assessment survey.

37. 10% of the respondents were 15 to 25 years of age. About 51% and 20% of the respondents were between the age group of 26 to 35 years and 36 to 45 years respectively. The remaining 19% were bearing up to 46 years of age and above of this age group. Sixteen (16%) of the respondents were illiterate. Moreover, 32% were educated up to primary level, 14% were with middle schooling, and 17 were matriculate. Whereas, 14% respondents were reported themselves intermediate level. A very small number, i.e., 06% respondents were found graduates and masters and above.

38. Twenty Five (25%) of the respondents were running different types of business and shops. 11% were associated with profession of driving, 16% were associated with different types of labor, 22% and 08% were associated with private and government jobs respectively. While, 10% were indulged in fishing as their source of income.

39. Six (06%) fall in the low income group up to rupees 17,500. 22% from the range 17,501 – 30,000 rupees, and 24% of the respondents were earning their monthly income between the ranges of 30,001 – 50,000 rupees per month. Whereas, the income ranges of 50,001-75,000 reported by 19% and 10% were getting between 75,001-100,000. Beside this only 19% were earning more than 100,000 per month.

40. Eleven (11%) respondents reported their monthly expenditure up to than 17,500, and 29% respondents found within the range of 17,501 – 30,000 per month. While, 30% fall between the expenditure range of 30,001 – 50,000 and 13% recorded their monthly expenditures between the ranges of 50,001-75,000 per month. Whereas, 08% were having their expenses between range of 75,001 to 100,000 per month. While 10% had their monthly expense more than 100,000 rupees.

ES-6 Stakeholders Consultation

41. To ascertain the perceptions of different stakeholders about the project (during/ after construction), meetings were held within the project area. These meetings were held in an open atmosphere, in which participants expressed their views freely. Informal group discussions were also held as an additional tool for the assessment of the perceptions of
the stakeholders about the project and potential impacts both positive and adverse likely to occur due to its implementation. In order to get opinion of different stakeholders and to discuss anticipated social issues of the proposed Project, consultations were held with PPP Unit, Client, University, NGOs, Traffic Police Karachi, Road Users and local community as well. Their views and suggestions were recorded and incorporated in EIA document.

ES-7 Impacts and Mitigation Measures

42. The major positive impacts of the project include the following:

- **Reduced Travelling Time:** The commuters of project area observe severe traffic blocks which will be resolved with the project and the commute at this intersection will become easier, time saving and comfortable.
- **Employment Opportunities:** Construction of project will generate employment opportunities for skilled and unskilled labour.
- **Increased Accessibility:** Resolving the traffic issues at project location will increase accessibility to residential colonies, health care facilities, educational institutes and commercial facilities in the vicinity of the area.
- **Social Benefit:** Increased accessibility of areas will increase land value in the area and people will save time and fuel for travelling in the area. Moreover, lesser wear and tear of vehicles and lesser stress due to conflicts/accidents are the social benefits expected as result of this project.

43. The major adverse environmental impacts and mitigations drawn from the environmental assessment are given below:

- One of the project impact will be the land acquisition. The land required for the proposed project is mostly commercial and barren land.
- Mangroves forest will be disturbed as it lies in the ROW/COI of the project which must be avoided and barren lands/wastelands should be preferred. Soil erosion and soil contamination may result during construction activities, especially during piling process.
- Tree cutting will result in loss of vegetation.
- Surface runoff may contaminate surface water (Malir River) due to chemical and oil spills which can be avoided by channeling it towards septic tanks and soakage pits.
- During construction stage operating construction equipment, movement of vehicles will result in gaseous/fugitive dust emissions deteriorating air quality, generation of noise and vibration.
- Generation of solid waste including construction and hazardous waste during construction phase.
- Social issues during construction phase will be difficulty of access and adopting alternative routes will result in longer travelling time and more fuel consumption.

44. Recommended Mitigation Measures include:

- Adequate budget shall be provided in LARP to compensate the affected persons.
- Soil contamination can be controlled by proper storage of chemicals
- Loss of trees should be mitigated by transplant of affected trees and compensatory planting along both sides of road.
- Surface runoff and wastewater shall be controlled and collected in septic tanks and soakage pits.
- Dust, fugitive emissions shall be controlled by maintenance of equipment, fine tuning of the vehicles, regular sprinkling of water on soil.
- Noise and vibration can be controlled by equipment maintenance and providing noise barrier and by scheduling the construction activities to avoid peak activity hours in the area.
- Solid waste including construction and hazardous waste should be managed by adopting a solid waste management plan for the collection and disposal of all types of wastes and site shall be restored back.
- Assessment of mangroves forest area shall be conducted
- The Mangroves shall be avoided and if deemed necessary proper compensation shall be done for affected mangroves.

45. The impact screening matrix for the project is provided in the below Table ES-1.

**Table ES-1: Impacts Screening Matrix**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Impact on Valued Environmental Receptor</th>
<th>Impacts Significance</th>
<th>Mitigation Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Permanent Land Acquisition</td>
<td>High Adverse</td>
<td>Compensation should be made to the affected people according to the guidelines of Land Acquisition Act, 1894, ESMS of PPPU and ADB's Resettlement Guidelines for the lost assets and restoration of their livelihoods. Adequate budget will be provided in the Project cost for this compensation. Land Acquisition and Resettlement Plan (LARP) shall be prepared for the acquisition and compensation strategies as per ADB's guidelines.</td>
</tr>
<tr>
<td>2</td>
<td>Renting/Leasing Land</td>
<td>Medium Adverse</td>
<td>Land for above mentioned facilities will be directly rented from the private landowners by the Contractors. Rental terms should be negotiated to the satisfaction of the concerned landowners and the agreement should be in local language to make the process clear. Mitigation mentioned in Section 7.8.21</td>
</tr>
<tr>
<td>3</td>
<td>Route Optimization</td>
<td>High</td>
<td>The proposed Project should be carefully aligned to avoid social issues and ecological issues. The optimized</td>
</tr>
</tbody>
</table>
| **Link Road which follows existing RoW and new alignment as well. Improper route selection of proposed Project may lead to disturbance of mangroves on large scale which may cause ecological imbalance and social issues. This impact would be of high significance.** | **alignment should strictly be followed to avoid social and ecological disturbances**  
Mitigation mentioned in Section 7.7.3 |
|---|---|
| **4 Land reclamation**  
The project involves reclamation of about 290 Acres land including mangrove area. The potential effects of land reclamation may include biological, physical and chemical impacts. Reclamation may affect the physical environment by changing the bathymetry, current velocity and wave conditions. It may change hydrological regime & increase risk of flooding due to back flow. | **High Adverse**  
If it is unavoidable, engineering solutions to ensure stability of the land shall be provided.  
Mitigation mentioned in Section 7.7.2 |
| **5 Flora**  
During the pre-construction phase, The mangroves importance is very high. These should be kept undisturbed and its development is important instead of cutting and damages. Proposed construction work will have impacts in the proposed alignment, mangroves/trees coming within the alignment. | **High Adverse**  
Incorporate technical design measures to avoid/minimize removal of specially mangroves and other trees as well. Road alignment shall be designed or changes made as far as possible in a way to keep the mangroves/trees loss to its minimum level.  
Mitigation mentioned in Section 7.7.2 |
| **6 Change in Hydrologic Regime**  
A bridge is proposed to be constructed on Malir River along with Korangi Link Road which may change the hydrologic regime of the River. The construction of bridge, road, dismantling of causeway and reclamation of land may affect water characteristics, flow and infiltration. The impact may be low and permanent in nature. | **Minor Adverse**  
A detailed study has been conducted to analyze the hydrological impacts due to the proposed Project. According to which analysis and selection of design discharge for a new structure along the stream has been conducted. It is considered necessary to get maximum discharge carrying capacity of existing structures located upstream/ downstream of newly proposed location. This information is required to avoid bottle necks corresponding to design flood magnitude in the stream. The design capacity of existing Jam Sadiq Bridge is 409,000 ft3/s (11,580 m3/s). This design capacity should be given due importance at the design phase of the proposed Project.  
Mitigation mentioned in Section 7.7.5 |
| 7 | Drainage                  | Moderate Negative | Provision of adequate drainage structures to avoid flooding especially during the monsoon season. |
|   | The project area is prone to flood and has a fair record of flooding events, as discussed in section 5. Flooding/pooling of water may result in inconvenience for commuters, deterioration of structures and act as breeding grounds for disease vector and generate foul odour. The impact is temporary and moderate negative in nature. | | Mitigation mentioned in Section 7.7.6 |
| 8 | Waste Management         | Moderate negative | • Planning for disposal sites with reasonable distance from the human settlements;  
• Disallow siting for work camps, including waste dump sites, in a distance closer than (0.5) kilometer to any inhabited areas;  
• Incorporate technical design features for refuse collection containers at sites that would minimize burning impacts;  
• Devise plan(s) for safe handling, storage and disposal of harmful materials; and  
• Burning of waste will not be allowed in any case. |
|   | Waste will be generated from daily activities and construction activities. The estimated quantities of general waste are discussed in Section 3. Proper waste management system is required for the efficient handling of waste. The waste may result in nuisance, odour and may serve as breeding ground for diseases vector. The impacts due to waste are expected to be temporary and moderate negative in nature. | | Mitigation mentioned in Section 7.7.4 |
| 9 | Public Utilities         | Medium Adverse    | Proper compensation and restoration mechanism of public utilities will be considered.  
Strengthening of utilities, wherever required;  
Close coordination with the concerned departments to curtail inconvenience to the residents of the Project area.  
Timely public notification of unexpected disruption of services. |
|   | Public utilities will be affected and creating disruption of public services and inconvenience to the local residents due to proposed Project. Various utilities such as 02 electrical poles of 132kV transmission lines, 23 street lights, 01 electric pole with transformer aon need to manage the oil pipelines of PARCO and PRL. These utilities will be relocated before the start of construction activities. These utilities if not handled properly will cause difficulties to the peoples of Project Area. | | Mitigation mentioned in Section 7.7.8 shall be followed. |
| 10| Seismicity               | Medium Adverse    | The proposed road and the associated structures should be designed and constructed as per Seismic Building Code of Pakistan 2007 (SBC-07) to comply with minimum requirements for seismic safety of structures. |
### Construction Phase

<table>
<thead>
<tr>
<th>No.</th>
<th>Activity</th>
<th>MITIGATION</th>
<th>Description</th>
</tr>
</thead>
</table>
| 11  | Traffic Management                                | Medium Adverse | Movement of vehicles carrying construction materials and equipment/machinery will be restricted during the daytime. Traffic Management Plan will be implemented to avoid traffic accidents, jams/public inconvenience. Mitigation mentioned in Section 7.6.2.2 shall be followed.  
- Due to the proposed construction activities and movement of heavy project vehicles for construction material supply; traffic problems may arise for the commuters and transporters travelling to the proposed areas.  
- The movement of vehicles along the haulage routes will cause soil erosion, debris flow, dust emissions etc.  
- Medium Adverse  

| 12  | Community Health and Safety                       | Medium Adverse | - There should be proper control on construction activities and Oil spillage leakage of vehicles;  
- The Borrow areas should be fenced properly and banned for the movement of the residents;  
- The labour works with different transmittable diseases should be restricted within the construction site;  
- Provision of proper safety and diversion signage, particularly at urban areas and at sensitive/accident-prone spots;  
- Setting up speed limits in close consultation with the local stakeholders; and  
- Batching plants should be installed away from settlements;  
- Use of water should not disturb public water availability. Source of water should be selected carefully.  
- Mitigations mentioned in section 7.8.5 (b) will be adopted.  

| 13  | Occupational Health and Safety                   | Medium Adverse | - Provision of protective clothing for labourers handling hazardous materials, e.g. helmet, adequate footwear for bituminous pavement works, protective goggles, gloves etc.;  
- Ensure strict use of wearing these protective clothing during work activities;  
- Elaboration of a contingency planning in case of major accidents;  
- Adequate signage, lightning devices, barriers, yellow tape and persons with flags during construction to manage traffic  

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**Page:** ES-13
<table>
<thead>
<tr>
<th>No.</th>
<th>Section</th>
<th>Description</th>
<th>Impact</th>
<th>Mitigations</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>Air Quality</td>
<td>Air quality will be affected by fugitive dust emissions from construction machinery, asphalt plants and vehicular traffic. Emissions may be carried over longer distances depending upon the wind speed, direction, temperature of surrounding air and atmospheric stability and negatively impact nearby environmental sensitive receptors. The critical sources of air pollution during the construction phase will be: Asphalt plants that generate toxic emissions which contain unburnt carbon particles, sulphur compounds and dust from batch preparation; Quarry areas that generate fugitive dust during crushing; Traffic diversion routes marked along dirt tracks that generate fugitive dust when in use by vehicular traffic; and Transportation of materials and other construction activities that create dust emissions.</td>
<td>Medium Adverse</td>
<td>All vehicles, machinery, equipment and generators used during construction activities should be kept in good working condition and be properly tuned and maintained in order to minimize the exhaust emissions; Open burning of solid waste from the Contractor’s camps should be strictly banned; Preventive measures against dust should be adopted for on-site mixing and unloading operations; Regular water sprinkling of the site should be carried out to suppress excessive dust emission(s); Emissions from power generators and construction machinery are important point sources at the construction sites. Proper maintenance and repair is needed to minimize the hazardous emissions; Mitigations mentioned in section 7.8.7 will be adopted.</td>
</tr>
<tr>
<td>15</td>
<td>Noise</td>
<td>Noise and vibration generated by the construction machinery during the construction stage is likely to affect the CoI particularly the sensitive receptors like nearby schools, houses and settlements etc.</td>
<td>Medium Adverse</td>
<td>Avoid using over powered equipment; Use of damping materials and mufflers for equipment; The noise barriers may be used to control noise during construction; Construction activities shall be scheduled keeping in view the peak hours of activities carried out in sensitive receptors of the project area; Regular maintenance of equipment shall be carried out. Mitigations mentioned in section 7.6.2.7 shall be adopted.</td>
</tr>
<tr>
<td>16</td>
<td>Soil Erosion &amp; Contamination</td>
<td></td>
<td>Minor</td>
<td>Provision of impervious</td>
</tr>
<tr>
<td>Title of Document</td>
<td>Document No.</td>
<td>Page</td>
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</tr>
<tr>
<td>Environmental Impact Assessment (EIA)</td>
<td>01</td>
<td>ES-15</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Soil erosion may occur on roadside, at contractors’ camps and at embankment works as a result of uncontrolled run-off from equipment washing yards, excavation of earth/cutting operations and clearing of vegetation; whereas, contamination of soil may be caused by oil and chemical spills at asphalt plant sites, workshop areas and equipment washing yards. Also, due to unauthorized use of borrow areas and quarries, soil erosion may occur resulting in degradation of landscape. This may limit the future use of land for other purposes.

**Adverse**

- Platform with oil and grease trap for collection of spillage during equipment and vehicle maintenance;
- Collection of oil and tube drips in container during repairing construction equipment vehicles;
- Providing impervious platform and collection tank for spillage of liquid fuel and lubes at storage area;
- All spoils will be disposed of as required and the site will be restored back to its original conditions before handing over;

Mitigations mentioned in section 7.8.2 will be adopted.

<table>
<thead>
<tr>
<th>17</th>
<th>Construction Camps</th>
</tr>
</thead>
<tbody>
<tr>
<td>It is expected that the Contractor may establish one camp for its workers, machinery etc. Due to the proposed camp sites, loss of vegetation and assets on the selected land and dissatisfaction of rehabilitation measures during and after completion of construction phase may occur.</td>
<td></td>
</tr>
</tbody>
</table>

**Minor Adverse**

- The contractor(s) shall ensure removal & rehabilitation of site upon completion; and
- Contractors camps shall be placed at least 1Km away from population/residential area.

Mitigations mentioned in section 7.8.4 shall be adopted.

<table>
<thead>
<tr>
<th>18</th>
<th>Waste and Hazardous waste</th>
</tr>
</thead>
<tbody>
<tr>
<td>Due to construction activities, waste will be generated at construction and contractors camp site. The construction waste will include wastewater, oil spillage from machinery, domestic waste and construction waste etc. Use of oil, asphalt/bitumen and other hazardous material may generate hazardous waste. This will result in unhygienic conditions, health risk to work force and public at the camp site.</td>
<td></td>
</tr>
</tbody>
</table>

**Medium Adverse**

- Wastewater effluent from contractor’s workshop and equipment washing yards should be treated before discharging it into natural streams;
- Solid Waste generated during construction and camp sites shall be safely disposed in demarcated waste disposal sites and the contractor will provide a proper waste management plan;
- Disposing non-usable bitumen spills in a deep trench providing clay linings at bottom and filled with soil at the top (for at least 0.5 m);
- The sewage system for camps shall be properly designed (pit latrines or, as required, septic tanks) to receive all sanitary wastewaters; and
- Lined wash areas will be constructed within the camp site or at site, for the receipt of wash waters from construction machinery.
<p>| | | | |</p>
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<tr>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>19</td>
<td><strong>Borrow Pits</strong>&lt;br&gt;Borrow/ open pits and its excavation activities may result in land disputes, soil erosion, and loss of potential cropland, loss of vegetation, landscape degradation, and damage to road embankments. Borrow/ Open pits may also result in potential sources of mosquito breeding and may prove hazard to human beings, livestock and wildlife. This will also degrade hygienic condition of the project area.</td>
<td><strong>Medium Adverse</strong></td>
<td>▪ Conversion of borrow pits into other productive uses;&lt;br&gt;▪ Necessary permits must be obtained for any borrow pits from the competent authorities;&lt;br&gt;▪ In borrow pits, the depth of the pit will be regulated so that the sides of the excavation will have a slope not steeper than 1:4;&lt;br&gt;▪ Soil erosion along the borrow pit shall be regularly checked to prevent / mitigate impacts on adjacent lands; and&lt;br&gt;▪ In case borrow pits fill with water, measures have to be taken to prevent the creation of mosquito-breeding sites. Mitigations mentioned in section 7.8.6 shall be adopted.</td>
</tr>
<tr>
<td>20</td>
<td><strong>Impact on Water Resources (Surface and Groundwater Contamination)</strong>&lt;br&gt;Surface water in the project area is Malir River, which carries mostly storm water and waste water from the area. The sediment loading of river will increase with the construction activities; earth and stone work activities, this contamination will jeopardize the designated use of water. There is a possibility that various materials like fuel, lubricant oil and other oily products, which are used during the construction phase may contaminate groundwater, if they are not handled properly. However, the groundwater in the area is brackish and thus not suitable for use</td>
<td><strong>high Adverse</strong></td>
<td>▪ Protection of surface and groundwater reserves from any source of contamination such as the construction and oily waste that will degrade its potable quality;&lt;br&gt;▪ The solid waste will be disposed off in designated landfill sites to sustain the water quality for domestic requirements;&lt;br&gt;▪ Water required for construction is obtained in such a way that the water availability and supply to nearby communities remain unaffected;&lt;br&gt;▪ Construction work shall be avoided, especially during monsoon period;&lt;br&gt;▪ Wastes must be collected, stored and taken to approved disposal site; and&lt;br&gt;▪ Maintenance workshop, material yard, crushers, asphalt plant and construction camps should not be sited within 1 km of water resources.&lt;br▪ Septic tanks, settling ponds, washing yards shall be established to control the wastewater discharge and sediment loadings into the River. Mitigations mentioned in section 7.8.6 shall be adopted.</td>
</tr>
<tr>
<td>21</td>
<td>Resource Conservation</td>
<td>Medium Adverse</td>
<td></td>
</tr>
<tr>
<td>----</td>
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</tr>
</tbody>
</table>
| Resources involved in the construction of proposed project would include water, fuel and construction materials. Excessive water consumption, non-renewable construction material, and fuel for energy will cause stress on these resources. | ▪ Wastage of water should be reduced by training the workers involved in water use;  
▪ Source of water should be carefully selected. Water use should not disturb the existing community water supplies;  
▪ Unnecessary equipment washings should be avoided;  
▪ Use minimum amount of bitumen for road surfacing.  
▪ Ensure adequate insulation to reduce heat loss through batching plants. Mitigation mentioned in Section 7.8.10 shall be followed. |

<table>
<thead>
<tr>
<th>22</th>
<th>Flora</th>
<th>High Adverse</th>
</tr>
</thead>
<tbody>
<tr>
<td>The proposed project will involve cutting of mangroves and vegetation cover on construction areas. The Proposed road alignment passes through mangrove area near Korangi of around 12.76 hectares’ mangroves forest and involves cutting of trees. Other plant species than mangroves are Ber, Conocarpus and Neem etc.</td>
<td>Cutting and disturbance of mangroves/trees shall be avoided, as far as possible so, that negative effects on the overall environment and process of natural regeneration of species to be minimized and possible alternate route must be considered for proposed road, in which No/minimum ecological (mangroves) and environmental losses are expected. A tree plantation program shall be formulated with the recommendations and technical support of Sindh Forest Department. Mitigations mentioned in section 7.8.14 shall be adopted.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>23</th>
<th>Fauna</th>
<th>Minor Adverse</th>
</tr>
</thead>
<tbody>
<tr>
<td>During construction stage noise and movement of heavy machinery for road construction, shall disturb the fauna of the area. The construction roads activities under the project will become a source of harassment to the wild animals, birds and fisheries dependent on the river- supported habitat.</td>
<td>Care shall be taken during construction activities for avoiding purposely or chance killing of animals. Plantation of large number of trees as proposed in plantation plan along the proposed project to regain the ecological habitat. Special measures (Utilization of modern technologies having low noise comparatively) should be adopted to minimize impacts on birds such as avoiding noise generating activities during the critical period of breeding. Ban on fish catch by the residents as well as by surrounding inhabitants should be observed within the Study Area, aiming at rehabilitation of</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Environmental Impact Assessment (EIA)</td>
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</tr>
<tr>
<td></td>
<td>Detailed mitigations mentioned in section 7.8.15 shall be adopted.</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>Aquatic Fauna</td>
<td>Minor Adverse</td>
</tr>
<tr>
<td></td>
<td>There is no direct impact on fish in the project area as there is no fish reported in the project area. However, there is an indirect impact on the aquatic life of mangrove area downstream if oil and wastes from the machinery and equipment of the construction are released in the river.</td>
<td>Industrial community may be forced to treat the effluents properly before releasing into the river. Proper culverts must be constructed at the rain water entries into the river. Proper arrangements must be made to control the wastes from machinery &amp; equipment used at site during the construction phase.</td>
</tr>
<tr>
<td>25</td>
<td>Social Impacts</td>
<td>Minor Adverse</td>
</tr>
<tr>
<td></td>
<td>Social and Cultural Conflicts; Health Impacts (Communicable Diseases)</td>
<td>Local labor especially from nearby communities should be given preference for the construction works; Careful planning and training of work force to minimize disturbance to the local people; Public notification through print or electronic media during the entire construction phase to avoid any inconvenience in accessibility to the locals; and Adequate training of especially for the transitive workforce of the station (involved both in the construction process and in the commissioning) to regard the customs of the area so that the locals do not feel insecure. Proper checkup of skilled and unskilled workers before their hiring; Labour camp should be away from the residential area and workers’ management plan should be formulated by Contractor to minimize the adverse impacts on local communities and workers; Trainings, awareness and campaigns should be conducted for workers and surrounding communities on awareness and prevention of HIV/AIDS and COVID-19; Workers should be educated for personal hygiene and the sanitation concerns, leading to communicable and non-communicable diseases; Water should not be allowed to stagnate even if clean, and measures should be taken to cover the area;</td>
</tr>
<tr>
<td>Title</td>
<td>Description</td>
<td>Minor Adverse</td>
</tr>
<tr>
<td>-------</td>
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<td>---------------</td>
</tr>
<tr>
<td>26</td>
<td>Influx of Labor</td>
<td>Social problems and conflicts that are associated with Labor Influx are Risk of social conflict, Increased risk of illegitimate behaviour and crime, Impacts on community dynamics, Local inflation of prices, accommodations and rents, Increase in traffic and related accidents, etc.</td>
</tr>
<tr>
<td></td>
<td>Insecticides should be periodically sprayed.</td>
<td>Labor camp(s) should be established away from residential population; Preference should be given to the local people to work with contractor, and contractor should hire maximum labour force from the project area because this will reduce the labour influx; An effective GRM should be established for the project to resolve all issues related to the community. Thus, progress regarding resolving the issues should be monitored closely;</td>
</tr>
<tr>
<td>27</td>
<td>Gender Based Violence (GBV)</td>
<td>The Project route is passing through the urban and semi urban areas where women are involved in working activities. During construction phase gender based violence might arise due to discrimination made against women by unequal work distribution and unequal pay structure among others. Sexual harassment against women might occur as a consequence of mixing of men and women at the construction site, and moving on the roads, bus stops and markets. Educational institutions near the project alignment are also sensitive regarding gender issues.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Awareness should be created among the females at individual and community levels about the constructions sights; The Contractor should make sure that no discrimination is made on the basis of gender while hiring of workers; Raise awareness among the communities of the potential risks of GBV, and establish response services in the communities that can respond to instances of GBV (particularly those related to issues of labour influx); Contractor should take proper measures to address and resolve issues relating to harassment, intimidation, and exploitation, especially in relation to women.</td>
</tr>
<tr>
<td>28</td>
<td>Child Labour</td>
<td>Inhabitants of the project area have mix economic background and different sources of income. Children of low income groups mostly involve in different earning activities, as their parents prefer to get their children hired in small shops as helpers, and waiters in hotels for earning money, and supporting household livelihoods.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The chance of hiring of underage worker for the project activities will be minimized by adopting the following mitigation measures: Awareness should be created among the local communities about the adverse impacts of child labor. For the public awareness, meetings should be held in the project area, and announcements should be made using the available local platforms with the involvement of all sectors of the society; Contractor through contractual agreement should be bound to follow</td>
</tr>
</tbody>
</table>
the labor standards, rules and regulations during hiring the labor force and all activities should be monitored by the social and environmental staff of the implementing agency; Client and Supervision consultant should ensure that contractor shall have its employment policy in accordance with relevant act and labor policies in Sindh and Pakistan; and Contractor should ensure the presence of all persons at site are adults and have their proper identity cards with them. Reduce or eliminate the worst forms of child labor and rescue and rehabilitate the children in the worst forms of child labor. Penalize contractors/employees using the worst forms of child labor and penalize adults who violate children’s rights and who force children to enter child labor, especially in its worst forms. Reduce the health hazards and dangers to young persons in the workplace.

### Operation Phase

<table>
<thead>
<tr>
<th>29</th>
<th>Road Safety</th>
<th>High Adverse</th>
</tr>
</thead>
</table>
| At operation stage, various safety issues may arise due to inadequate vehicle maintenance, untrained/distracted driving, fatigue, over speeding, reduced visibility due to fog/smog, slippery road due to rain etc. pedestrian trying to cross roads resulting in minor/major accidents. | ▪ Strict enforcement of traffic and road laws;  
▪ Adequate sign boards for safety and security;  
▪ Ensure provision of crossings for pedestrians;  
▪ Ensure provision of emergency and medical assistance;  
▪ Ensure adequate lighting across the road |

Mitigations mentioned in section 7.9.2 shall be adopted.

<table>
<thead>
<tr>
<th>30</th>
<th>Drainage</th>
<th>Medium Adverse</th>
</tr>
</thead>
</table>
| During the operational phase, poor maintenance of the bridge and road drainage system, particularly during the monsoon season can cause nuisance to the travelers and public due to flooding in the existing drainage line. In case of choking of bridge and road drainage, the road | ▪ The impact can be controlled/reduced by timely and continuous maintenance/cleaning of the drainage system; and  
▪ Placement of sign boards instructing not to dispose of solid waste to avoid choking of drain along the alignment. |

Mitigations mentioned in section 7.9.3
and bridge will deteriorate and public may also face nuisance. The impact may consider to be moderate adverse in nature.

<table>
<thead>
<tr>
<th>31</th>
<th>Fauna</th>
</tr>
</thead>
<tbody>
<tr>
<td>During the operation phase of the project, increased noise due to increased traffic will disturb the wildlife, especially the birds, which will avoid this area. The new road after coming into operation shall restrict the movement of animals, stray mammals and reptiles to only one side of the road.</td>
<td></td>
</tr>
<tr>
<td>Minor Adverse</td>
<td>Mitigations mentioned in section 7.9.7 shall be adopted.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>32</th>
<th>Flora</th>
</tr>
</thead>
<tbody>
<tr>
<td>During Operational stage the Project will not affect Flora (Trees and Mangroves) or release any significant pressure detrimental to flora. low level impact is expected at operational phase on Flora due to the Operational and Maintenance activities.</td>
<td></td>
</tr>
<tr>
<td>Minor Adverse</td>
<td>The implementation of plantation plan recommends in compensation for cutting of trees should start working during operational stage, to ensure the ecological balance and to avoid any impact on local Environment.</td>
</tr>
</tbody>
</table>

ES- 8 Environmental Management Plan

46. An Environmental Management Plan (EMP) for the phases (design, construction and operation) has been developed as part of the report which provides a detailed mitigation matrix that covers impacts, mitigation measures roles and responsibilities and timings to avoid, minimize or mitigate the adverse impacts of the project.

47. During the construction phase, the Monitoring plan shall be implemented by the Construction Contractor and LG & HTD Department. Environmental monitoring will be conducted by construction contractor during construction whereas during operation phase monitoring will be conducted by LG & HTD Department.

48. A comprehensive tree plantation plan is also recommended which shall be implemented by Forest Department.

49. The total cost for environmental mitigation and enhancement is estimated to be Rs. 392.41 Million which does not include Land acquisition cost. Cost of mitigation measures is estimated to be Rs. 3.026 Million. The cost for monitoring at construction phase is Rs. 1.6 Million and operation phase is Rs. 0.4 Million. The cost for safety trainings will be Rs. 0.5 Million whereas Plantation cost is estimated to be Rs. 5.8 Million. Compensation for mangroves is estimated to be Rs. 85.7 Million.

ES 9 Grievance Redress Mechanism (GRM)

50. Grievance Redress Mechanism (GRM) is important for developmental project where
ongoing risks or adverse impacts are anticipated. This mechanism serves as a way to meet requirements, prevent and address community concerns, reduce risks, and assist larger processes that create positive social change. The GRM for the proposed project along with the committee composition has been suggested along with the procedures for handling environmental and social concerns of the project stakeholders. This procedure includes a redress mechanism scaled to the project’s identified risks and adverse impacts, focusing on stakeholders.

51. The formal GRM will be set up with a three-tiered structure including: first at site/village level set-up through community involvement; second at Project Implementation Unit (PIU) level and third at Project Management Unit (PMU) level enabling immediate local recourse to address grievances and higher-level review for addressing more difficult cases not resolved at the PIU or local level. To ensure that all geographic reaches and relevant administrative units involved in the project are covered, the GRM will set up (i) a local mechanism in each affected site with grievance redress focal points and; (ii) a grievance redress committees (GRC) at PIU and PMU levels.

**ES-10 Conclusion**

52. The Environmental Assessment Study concludes that the project will disturb mangroves falling within the COI which is a critical environmental impact. However, several other concerns with regard to environmental impacts have been identified in report which needs to be mitigated by strict implementation of Environmental Management Plan.

53. The costs for environmental management, monitoring and training has been estimated which need to be included in the overall Project Cost and EMP shall be part of bidding documents of the Project.
1 INTRODUCTION

54. The Local Government & Housing Town Planning (LG & HTP) Department, Government of Sindh intends to implement the 'Urban Road Initiatives in Karachi' under Public Private Partnership (PPP) modality to reduce traffic congestion and to provide quick and safe access to the commuters.

55. This study focuses on the sub project “Link Road for Korangi”. The Korangi Area which includes residents of Altaf Town, Bhittai Colony, Gulshan-e-Mustafa, Christian colony, Water Pump & Ibrahim Hyderi Goth has specific single access road, to connect with Karachi city/ Shahra-e-Faisal. Moreover, several important educational institutions like the College of Business Management (CBM), Ilma University (Formerly Institute of Business Technology), National Textile University and major health care facilities like Indus Hospital, Chiniot General Hospital, LRBT Eye Hospital, Fazle Elahi Hospital for Heart Diseases, Baldia Hospital etc. are located along this road or in its close vicinity. There are number of commercial/industrial institutions, Korangi Creek Industrial Park (KCIP), (National Industrial Park, PARCO, oil refineries & other industries), and defense installation (PAF Airmen Academy, Radar Installations). There are also, Aman Foundation, Indus Hospital, PAF Yacht Club and some media houses which are located in the study area. Due to the large number of population (approx. 2.5 Million) and round the clock vehicular traffic (more than 20,000 vehicles on daily basis) the available single route is very congested. Thus, frequent traffic jams are observed due to non-availability of bridge over Malir River at Korangi and heavy traffic moving in/out towards KPT via Korangi Road.

56. Presently, thousands of residents as well as day-workers along with large number of vehicles ply on the mentioned road. In case of any strike call, the law and order situation is worsening and road gets blocked. During heavy rainfall/monsoon seasons the road is flooded with water and area becomes isolated which is a serious concern and a grave emergency for provision of basic amenities to the residents of Korangi and above-mentioned institutions/defense installations.

57. Keeping in view the above facts, an alternate/emergency route is proposed which is a dire need to resolve the heavy traffic jams/diversion issues. This route will provide huge community welfare for residents of Korangi. Additionally, it will also address the security concern of PAF Academy/ defense installations and resolve the road blockage issues during heavy rainfall/monsoon seasons. It is envisaged that traffic load in this area will further increase as a result of these developments making it imperative to undertake the proposed project well in time to meet the increasing travel demand.

58. M/s NESPAK has been awarded the project to carry out the Environmental Impact Assessment (EIA) study.

1.1 NATURE, SIZE AND LOCATION OF THE PROJECT

59. Under the scheme, a new bridge is proposed to be constructed over Malir River as an
alternate to the existing causeway and an expressway is proposed along the left bank of Malir River up to the PAF Airmen Golf Club with Connection to Korangi Creek Road. A tentative location plan is given in Figure 1.1.

60. The project will have its start point near the existing causeway and ends at Korangi Creek Road.

61. Considering the above-mentioned situation, proposed link road to Korangi and the new bridge on Malir River will be an alternate direct access route serving the industrial and commercial traffic to / from these areas. The length of the proposed alignment is 12 kms.

1.2 REQUIREMENT OF ENVIRONMENTAL APPROVAL

62. According to Sindh Environmental Protection Agency and Review of IEE and EIA regulations, 2014 the proposed project falls under category ‘E’ (Transport) of Schedule II, which requires EIA before commencement of construction.

1.3 THE PROPOSENT

63. The proponent of the project is Local Government & HTP Department, Government of Sindh while the Consultant is National Engineering Services Pakistan (NESPAK). The contact details of proponent are given as under:

a) **Proponent Contact Address**

   Special Secretary (Technical)
   Local Government & HTP Department,
   Ground Floor, Tughlaq House, Sindh Secretariat, Karachi. Tel:
   +92-21-9921-2314
   +92 300 2197526
Figure 1.1: Location of the Project
1.4 STUDY TEAM

64. A multidisciplinary team was formulated to conduct the study. The key team comprises the following professionals:

- Mr. Rehan Zamin: Project Manager
- Mr. M. Shariq Ahmed: Section Head ERSD
- Mr. M. Ramzan Javed: Team Leader/Quality Assurance
- Mr. Faisal Karim Khan: Senior Engineer (Design)
- Ms. Ramla Siddique: Senior Environmental Scientist
- Mr. Ali Sher Shah: Principal Engineer
- Mr. Tahir Qureshi: Senior Environmental Scientist
- Mr. Saeed Hussain: Senior Sociologist
- Mr. Waseem Abbas: Senior Sociologist
- Mr. Ibadullah Khan: Ecologist
- Mr. Hassan Qasim: GIS Expert
- Mr. Shoaib Aziz: Senior Engineer

1.5 STUDY APPROACH & METHODOLOGY

65. The following methodology was adopted for carrying out the EIA study of the proposed project:

a) Planning for Data Collection

66. Meetings and discussions were held to plan the project execution. Available data was reviewed and planning was done to collect information/data, defining of roles and responsibilities and timelines for completion of EIA Study.

b) Data Collection

67. Primary and secondary data was collected through field observations, environmental monitoring in the field, concerned departments and published materials to establish baseline profile for physical, biological and socio-economic conditions. These activities were as under:

- Site Reconnaissance;
- Analysis of Maps and Plans;
- Literature Review;
- Desk Research;
- Public Consultations;
- Field Observations & Studies; and
- Laboratory Analyses

68. Baseline surveys were carried out during November 08, 2020 to November 19, 2020.

i) Physical Environment

69. Information was gathered on the existing physical environment including but not limited
to geology, topography, soils, hydrology and drainage, water quality, air quality and noise in the project area.

70. **Geology, Topography, Bathymetry, Soils:** A review of relevant literature on the geology, topography and soils in the project area was conducted.

71. **Hydrology and Drainage:** A literature review was conducted to identify the components of the hydrological cycle that are likely to impact on the project and the possible impacts that the project could have on the hydrologic cycle. Field assessments included a determination and verification of all the existing inflows into the drain (if any) along the proposed site, assessment of drainage issues and interviews with local community members.

72. **Air Quality:** Ambient air quality was continuously monitored for Carbon Monoxide (CO), Sulphur Dioxide (SO₂), Nitrogen Dioxides (NO₂), Particulate Matter (PM₁₀), for 24 hours by a EPA approved certified testing laboratory.

73. **Noise:** Noise levels were monitored for 24 hours on continuous basis by a certified environmental lab.

74. **Water Quality:** Water quality was also monitored in the project area. Analyses were performed in certified environmental laboratory.

*ii) Biological Environment*

75. The status of the flora and fauna of the study area was determined by an ecological survey, a review of literature relevant to the study area, and an assessment of conditions on site.

76. **Flora:** The vegetative communities in the project area were identified and classified into community types. Identification was carried out of dominant tree species, assessment of stage of growth (mature or sapling) and assessment of canopy cover.

77. **Fauna:** Information on fauna was gathered from existing literature on reported species as well as observations in the field.

78. **The Integrated Biodiversity Assessment Tool (IBAT) software** was utilized to carry out the initial ecological based screening of the proposed project. The species presence/confirmation with the utilization of various tools including literature review, stakeholders/departmental consultations and random ground trothing was conducted for the authentication of data.

*iii) Socio-Economic Environment*

The consultants utilized a combination of desk research, field investigations, census data, structured interviews, maps, reports to generate the data required for description of
the existing social environment and assessment of the potential impact of the construction of the proposed project. Data were gathered on the following aspects of the social environment:

- Land use and Municipal Status;
- Traffic, Transportation and Access Roads;
- Demographics;
- Livelihoods;
- Poverty;
- Education;
- Health;
- Social Setup;
- Community Facilities;
- Solid Waste Management; and
- Proposed Developments.

c) Identification and Evaluation of Environmental and Social Impacts

79. The impacts of the proposed project on the physical, biological and socio-economic environment prevalent in the project area were identified and evaluated at each phase (design, construction and operation) of the project.

d) Mitigation Measures and Implementation Arrangements

80. The adequate mitigation measures for the identified environmental and social impacts were proposed. Implementation framework was developed indicating institutional arrangements and responsibility for effective implementation of recommended mitigation measures.

e) Grievance Redress Mechanism (GRM)

81. The structure, roles and functions of the GRM are provided to address the grievances arising due to execution of the project works. It provides a predictable, transparent, and credible process to all parties, resulting in outcomes that are seen fair, effective, and lasting.

1.6 PREPARATION OF DRAFT EIA REPORT

82. Draft EIA document will be submitted to the Client while the Final EIA will be prepared incorporating the necessary comments from the Client.

1.7 STRUCTURE OF THE REPORT

83. **Section 1: Introduction** briefly presents the project background, objectives, methodology and need of the EIA study.

84. **Section 2: Policy, Legal and Administrative Framework** comprise policy guidelines,
statutory obligations and roles of institutions concerning EIA study of the proposed project.

85. **Section 3: Description of the Project** furnishes information about the location of the proposed Project, cost and size of the project, its major components.

86. **Section 4: Analysis of Alternatives** provides the alternatives considered for the proposed project to select at the preferred one for the detailed environmental impact assessment.

87. **Section 5: Environmental Baseline Profile** establishes baseline conditions for physical, biological and socio-economic conditions prevalent in the project area.

88. **Section 6: Stakeholder Consultation** identifies the main stakeholders and their concerns rose through scoping sessions, and deals with the measures to mitigate the social impacts.

89. **Section 7: Anticipated Environmental and Social Impacts and Mitigation Measures** identifies, predicts and evaluates impacts of the project activities during the construction and operation stages and deals with the measures proposed to mitigate potential environmental impacts of the proposed project.

90. **Section 8: Environmental Management Plan** outlines institutional arrangements for the implementation of the proposed mitigation measures, training needs of the staff for implementation of the mitigation measures, monitoring requirements and monitoring cost.

91. **Section 9: Grievance Redress Mechanism (GRM)** This section provides a predictable, transparent, and credible process to all parties, resulting in outcomes that are seen fair, effective, and lasting.

92. **Section 10: Conclusions and Recommendations** provide the outcome of the study and major observations of EIA and suggestions for environmental management and pollution control.
2 POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORKS

2.1 GENERAL

93. This section deals with the current environmental policy as well as legal and administrative framework related to carrying out the Environmental Impact Assessment (EIA) of Link Road for Korangi. All the relevant provisions of Environmental policies and Guidelines of Sindh-EPA, International Financial Institutions and legal frameworks have been duly discussed.

94. The proposed project requires an EIA in accordance with the Sindh Environmental Protection Act, 2014 and IEE/EIA Regulations, 2014 and also to fulfil requirements of international financial institutions.

2.2 POLICY FRAMEWORK

95. The Ministry of Climate Change is the responsible authority for policy making on environmental protection in Pakistan.

2.2.1 National Conservation Strategy (NCS), 1992

96. The Pakistan National Conservation Strategy (NCS) that was approved by the federal cabinet in March 1992 is the principal policy document on environmental issues in the country (EUAD/IUCN, 1992). The NCS outlines the country's primary approach towards encouraging sustainable development, conserving natural resources, and improving efficiency in the use and management of resources. The NCS has 68 specific programs in 14 core areas in which policy intervention is considered crucial for the preservation of Pakistan's natural and physical environment. The core areas that are relevant in the context of the proposed project are pollution prevention and abatement, restoration of rangelands, increasing energy efficiency, conserving biodiversity, supporting forestry and plantations and the preservation of cultural heritage.

2.2.2 National Forest Policy, 2001

97. The goal of this policy is to foster the sustainable development of Renewable Natural Resources (RNR) in Pakistan, through maintenance and rehabilitation of these essential resources and enhancement of sustainable livelihoods of rural masses, particularly women, children and other deserving groups.

98. The various components of the policy include:

- Reducing poverty, powerlessness and unemployment;
- Population planning in critical ecosystems;
- Reducing the impact of socio-economic factors;
- Providing substitutes to firewood in the mountain-woods;
- Reducing political interferences in Forestry and Wildlife Departments;
Renovating and invigorating the institutions of RNR;
• Supporting Local Governments in the sustainable development of their RNR;
• Policies for fragile ecosystems;
• Riverside forests;
• Irrigated plantations;
• Preservation of sensitive and unique forests;
• Wildlife conservation;
• Rangelands and desert ecosystems; and
• Planting trees and fodder on farmlands.

2.2.3 National Environment Policy, 2005

99. In March 2005, Government of Pakistan launched its National Environmental Policy, which provides a framework for addressing the environmental issues. Section 5 of the policy commits for integration of environment into development planning as instrument for achieving the objectives of National Environmental Policy. It further states in clause (b) of subsection 5.1 that EIA related provisions of Environmental Protection Act, 1997, will be diligently enforced for all developmental Projects. It also provides broad guidelines to the Federal Government, Provincial Governments, Federally Administered Territories and Local Governments to address their environmental concerns and to ensure effective management of their environmental resources.

2.2.4 Pakistan Labour Policy, 2010

100. The main objective of the Labour Policy, 2010 is the social and economic well-being of the labour of Pakistan. The Labour Policy, 2010 has following 4 parts:

• Legal Framework;
• Advocacy: rights of workers and employers;
• Skill development and employment; and
• Manpower export.

2.2.5 National Climate Change Policy, 2012

101. The National Climate Change Policy was approved by the Federal Cabinet on 26th September, 2012. With an overall goal, ‘to ensure that climate change is mainstreamed in the economically and socially vulnerable sectors of the economy and to steer Pakistan towards climate resilient development’, the Policy puts forward comprehensive policy objectives of sustained economic growth, integration of climate change into inter-related national policies, pro-poor gender sensitive adaptation and cost-effective mitigation, water, food and energy security, DRR, effective decision making and coordination, creating awareness, building capacities, and conservation of natural resources and long term sustainability. It also seeks effective use of financial opportunities, and public and private sector investment in adaptation measures. After 18th amendment, the decreased budget of the Climate Change Division and the lack of climate or adaptation policies at the provincial level has created confusion over the responsibility over implementing climate policy and formulating adaptation strategies.
Nevertheless, it is clear that each province has the responsibility to acknowledge and act on risks and vulnerabilities set out in the National Climate Change Policy, 2012.

2.2.6 National Action Plan for Covid-19 Pakistan


2.2.7 Sindh Strategy for Sustainable Development, 2007

103. The Sindh Strategy for Sustainable Development (SSSD) proposed a ten-year sustainable development agenda for Sindh. The main focus of SSSD is to promote the sustainable use of natural resources. It targets to reduce poverty and enhance social development through the participation of the people of Sindh. The SSSD recommends that the rehabilitation and extension of water supply and sanitation networks, effective water and wastewater quality monitoring and treatment to comply with SEQS, improved coordination among stakeholders (public agencies, private sector, and residents) for the effective management of air pollution, consultation based infrastructure planning and development with main focus on minimizing traffic and pollution hazards, and conducting environmental impact assessment of all the major projects.

104. SSSD recommends for the sustainable development and environmentally complying operations of industries: incentive mechanisms for reducing pollution; awareness raising of industrialists and stakeholders; promote cleaner production; enforce pollution charges as per Sindh Environmental Protection Act, 2014; prepare baseline of all industrial estates and sites to establish the pollution levels, waste disposal practices, air emissions, generation of hazardous waste for the preparation of environmental management plans for complying Sindh Environmental Protection Act, 2014; preparation of EIAs for all industrial development and infrastructure projects.

105. This strategy is applicable as the project involves the construction of Proposed Link Road for Korangi to improve the traffic situation with least environmental burden and sustainable operation of transportation in the city.

2.2.8 Sindh Drinking Water Policy, 2017

106. Sindh Drinking Water Policy, 2017 is related to the provision of safely managed drinking water whose supply is adequate, well maintained and sustainable; and to
enhance public awareness about health, nutrition and hygiene related to safe drinking water. The basic objective of this policy is to introduce legislative measures and regulations to create an enabling framework for safely managed drinking water supply, regulation of water usage, extraction, treatment transportation and distribution.

2.3 LEGAL FRAMEWORK

107. Government of Sindh has promulgated laws/acts, regulations and standards for the protection, conservation, rehabilitation and improvement of the environment. In addition to this, they have also developed environmental assessment procedures governing developmental projects. Following are the excerpts of these laws and procedures relevant to the proposed project.

2.3.1 Sindh Environmental Protection Act, 2014

108. Sindh Environmental Protection Act, 2014 provides framework for the protection, conservation, rehabilitation and improvement of the environment, for the prevention and control of pollution, and promotion of sustainable development.

109. It advises establishment of the Sindh Environmental Protection Council and Sindh Environmental Protection Agency. It defines its Functions and powers of the Agency. It also outlines Establishment and Management of the Sindh Sustainable Development Fund, Prohibition of certain discharges or emissions and compliance with standards, prohibition of import of hazardous waste. Handling of hazardous substances, prohibition of action adversely affecting Environment, Regulation of motor vehicles, Certified Environmental Laboratory, Initial environmental examination and environmental impact assessment, Strategic environmental assessment, Environmental monitoring, offences and penalties, Environmental Protection Tribunals and Courts.

2.3.2 Sindh Environmental Protection Agency (Review of IEE/EIA) Regulations, 2014

110. The SEPA Review of IEE and EIA Regulations, 2014 (The 2014 Regulations) promulgated under Sindh Environmental Protection Act, 2014 were enforced on December, 2014. The 2014 Regulations define the applicability and procedures for preparation, submission and review of IEEs and EIAs. These Regulations also give legal status to the Pakistan Environmental Assessment Procedures prepared by SEPA in 2014. The Regulation classifies projects on the basis of expected degree of adverse environmental impacts and lists them in two separate schedules. Schedule I lists projects that may not have significant environmental impacts and therefore require an IEE. Schedule II lists projects of potentially significant environmental impacts requiring preparation of an EIA. The Regulations also require that all projects located in environmentally sensitive areas require preparation of an EIA.
111. The proposed project falls under the category E (Transportation) of Schedule II.

2.3.3 **Sindh Environmental Quality Standards (SEQS), 2016**

112. In exercise of the powers conferred under clause (g) of sub-section (1) of section 6 of the Sindh Environmental Protection Act, 2014, the Sindh Environmental Protection Council has issued the Sindh Environmental Quality Standards (SEQS), 2016. They endow information on the permissible limits for discharges of municipal and industrial effluent parameters and industrial gaseous emissions in order to regulate environmental pollution.

I. **Air Quality Standards**

113. Air quality standards issued by SEPA in 2016 is given in **Table 2.1**.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Pollutant</th>
<th>SEQS 2016</th>
<th>Concentration standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SO₂</td>
<td>Annual average</td>
<td>80 µg/m³</td>
</tr>
<tr>
<td></td>
<td></td>
<td>24 hours</td>
<td>120 µg/m³</td>
</tr>
<tr>
<td>2</td>
<td>NO</td>
<td>Annual average</td>
<td>40 µg/m³</td>
</tr>
<tr>
<td></td>
<td></td>
<td>24 hours</td>
<td>40 µg/m³</td>
</tr>
<tr>
<td>3</td>
<td>NO₂</td>
<td>Annual average</td>
<td>40 µg/m³</td>
</tr>
<tr>
<td></td>
<td></td>
<td>24 hours</td>
<td>80 µg/m³</td>
</tr>
<tr>
<td>4</td>
<td>O₃</td>
<td>1 hour</td>
<td>130 µg/m³</td>
</tr>
<tr>
<td>5</td>
<td>SPM</td>
<td>Annual average</td>
<td>360 µg/m³</td>
</tr>
<tr>
<td></td>
<td></td>
<td>24 hours</td>
<td>500 µg/m³</td>
</tr>
<tr>
<td>6</td>
<td>PM₁₀</td>
<td>Annual average</td>
<td>40 µg/m³</td>
</tr>
<tr>
<td></td>
<td></td>
<td>24 hours</td>
<td>150 µg/m³</td>
</tr>
<tr>
<td>7</td>
<td>PM₂.₅</td>
<td>24 hours</td>
<td>75 µg/m³</td>
</tr>
<tr>
<td>8</td>
<td>Lead</td>
<td>Annual average</td>
<td>1 µg/m³</td>
</tr>
<tr>
<td></td>
<td></td>
<td>24 hours</td>
<td>1.5 µg/m³</td>
</tr>
<tr>
<td>9</td>
<td>CO</td>
<td>8 hours</td>
<td>5 mg/m³</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 hour</td>
<td>10 mg/m³</td>
</tr>
</tbody>
</table>

II. **Noise Standards**

114. Noise standards issued by SEPA is given in **Table 2.2**.

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Category of Area</th>
<th>SEQS 2016</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Day Time</td>
</tr>
</tbody>
</table>

Table 2.1: Air Quality Standards SEQS 2016

Table 2.2: Noise Standards SEQS 2016
### III. Drinking Water Quality Standards

115. Drinking Water Quality Standards issued by SEPA is given in Table 2.3.

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Category of Area</th>
<th>SEQS 2016</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Day Time</td>
</tr>
<tr>
<td>1</td>
<td>Residential Area</td>
<td>65</td>
</tr>
<tr>
<td>2</td>
<td>Commercial Area</td>
<td>70</td>
</tr>
<tr>
<td>3</td>
<td>Industrial Area</td>
<td>80</td>
</tr>
<tr>
<td>4</td>
<td>Silence Zone</td>
<td>55</td>
</tr>
<tr>
<td>5</td>
<td>Motor Vehicle</td>
<td>85</td>
</tr>
</tbody>
</table>

#### Table 2.3 : Drinking Water Quality Standards SEQS, 2016

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Parameters</th>
<th>SEQS (mg/l)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Aluminium (Al)</td>
<td>≤ 0.2</td>
</tr>
<tr>
<td>2</td>
<td>Antimony (Sb)</td>
<td>≤ 0.005</td>
</tr>
<tr>
<td>3</td>
<td>Arsenic (As)</td>
<td>≤ 0.05</td>
</tr>
<tr>
<td>4</td>
<td>Barium (Ba)</td>
<td>0.7</td>
</tr>
<tr>
<td>5</td>
<td>Boron (B)</td>
<td>0.3</td>
</tr>
<tr>
<td>6</td>
<td>Cadmium (Cd)</td>
<td>0.01</td>
</tr>
<tr>
<td>7</td>
<td>Chloride (Cl)</td>
<td>&lt; 250</td>
</tr>
<tr>
<td>8</td>
<td>Chromium (Cr)</td>
<td>≤ 0.05</td>
</tr>
<tr>
<td>9</td>
<td>Copper (Cu)</td>
<td>2</td>
</tr>
<tr>
<td>10</td>
<td>Cyanide (CN)</td>
<td>≤ 0.05</td>
</tr>
<tr>
<td>11</td>
<td>Fluoride (F)</td>
<td>≤ 1.5</td>
</tr>
<tr>
<td>12</td>
<td>Lead (Pb)</td>
<td>≤ 0.05</td>
</tr>
<tr>
<td>13</td>
<td>Manganese (Mn)</td>
<td>≤ 0.5</td>
</tr>
<tr>
<td>14</td>
<td>Mercury (Hg)</td>
<td>≤ 0.001</td>
</tr>
<tr>
<td>15</td>
<td>Nickel (Ni)</td>
<td>≤ 0.02</td>
</tr>
<tr>
<td>16</td>
<td>Nitrate (NO₃)</td>
<td>≤ 50</td>
</tr>
<tr>
<td>17</td>
<td>Nitrite (NO₂)</td>
<td>≤ 3</td>
</tr>
<tr>
<td>18</td>
<td>Selenium (Se)</td>
<td>0.01</td>
</tr>
<tr>
<td>19</td>
<td>Residual Chlorine</td>
<td>0.2-0.5</td>
</tr>
<tr>
<td>20</td>
<td>Zinc (Zn)</td>
<td>5.0</td>
</tr>
<tr>
<td>21</td>
<td>Color</td>
<td>≤ 15 TCU</td>
</tr>
<tr>
<td>22</td>
<td>Taste</td>
<td>Non-Objectionable/Acceptable</td>
</tr>
<tr>
<td>23</td>
<td>Odour</td>
<td>Non-Objectionable/Acceptable</td>
</tr>
<tr>
<td>Sr. No.</td>
<td>Parameters</td>
<td>SEQS (mg/l)</td>
</tr>
<tr>
<td>--------</td>
<td>-----------------------------</td>
<td>------------------------------</td>
</tr>
<tr>
<td>24</td>
<td>Turbidity</td>
<td>&lt; 5 NTU</td>
</tr>
<tr>
<td>25</td>
<td>Total hardness</td>
<td>&lt; 500 mg/l</td>
</tr>
<tr>
<td>26</td>
<td>TDS</td>
<td>&lt; 1000</td>
</tr>
<tr>
<td>27</td>
<td>pH</td>
<td>6.5-8.5</td>
</tr>
<tr>
<td>28</td>
<td>E-Coli</td>
<td>Must not be detectable in any 100 ml sample</td>
</tr>
<tr>
<td>29</td>
<td>Total Coliforms</td>
<td>Must not be detectable in any 100 ml sample</td>
</tr>
</tbody>
</table>

2.3.4 Pakistan Penal Code, 1860

116. This Act defines the penalties for violations concerning pollution of air, water bodies and land.

2.3.5 Protection of Trees and Brushwood Act, 1949

117. This Act prohibits cutting or lopping of trees and brushwood without permission of the Forest Department. The Forest Department will be approached for permission to cut trees along the road alignment.

2.3.6 Cutting of Trees (Prohibition) Act, 1975

118. The Act prohibits cutting or chopping of trees without permission of the Forest Department. The act presents fine or imprisonment or both, for illegal cutting of tree but has not mentioned any compensatory afforestation. However, it's a common practice to plant 7 - 10 trees for compensation of 1 tree uprooted.

2.3.7 Occupational Health

119. Construction and operational activities could affect the occupational health of the workers. Quantitative national standards with respect to the above aspect are yet to be developed in Pakistan. However, guidance in qualitative terms can be obtained from the Labor Laws (Amended) Ordinance, 1972.

2.3.8 The Antiquities Act, 1975

120. Archaeological sites and monuments are specifically protected under this Act.

2.3.9 Building Code of Pakistan (Seismic Provisions-2007)

121. Building Code of Pakistan (Seismic Provisions-2007) is established after devastating earthquake of 2005 to prescribe the minimum requirements for the earthquake design and construction of buildings and building-like structures and/or their components subjected to earthquake ground motions.
122. Construction of buildings in violation of the Building Code shall be considered as violation of professional engineering work.

2.3.10 Sindh Cultural Heritage Act 1994

123. This provincial Act empowers the Government of Sindh to preserve and protect any premises or objects of archaeological, architectural, historical, cultural, or national interest in Sindh by declaring them protected.

2.3.11 Sindh Wildlife Protection (Amendment) Act 2008

124. The Sindh Wildlife Ordinance 1972 empowers the government to declare certain areas reserved for the protection of wildlife and to control activities within these areas. It also provides protection to endangered species of wildlife.

2.3.12 Land Acquisition Act, 1894 (Sindh Amendment Act, 2009)

125. The Land Acquisition Act (1894), (Sindh Amendment, 2009) deals with the acquisition of private properties for public purposes. The large development projects including road projects are also being considered under this Act. There are 55 sections in this Act mainly dealing with area notifications, surveys, acquisition, compensation, apportionment awards, disputes resolution, penalties and exemptions.

2.3.13 Sindh Public Property Act, 2010

126. The act has been passed to avoid illegal encroachments and provide measures for removal of encroachment from public property and to retrieve possession. The City Government will provide continuous oversight and reinforcement to facilitate the properties to remain free from illegal encroachments. This act is applicable if there is any encroachment at the proposed public/ government land.

2.3.14 Forest Act 1927 (Amended as Sindh Forest Act, 2012)

127. The Forest Act, 1927 was largely based on previous Indian Forest Acts implemented under the British. The first and most famous was the Indian Forest Act of 1878. Both the 1878 act and the 1927 one sought to consolidate. The Forest Act 1927 (as amended in 2012- and adopted by Sindh Forest Department) the main applicable clauses still hold true in essence. The act is adopted by government of Sindh after approval from the competent authority. The provisions of the Forests Act, 1927 with respect to Protected Forests specifically applies to mangroves. Mangroves have been declared to be Protected Forests by the Government of Sindh meaning that clearance, harvesting, and animal grazing in mangroves are prohibited.
128. The Act reserve the areas having forest cover, or significant wildlife, to regulate movement and transit of forest produce, and duty leviable on timber and other forest produce. It also defines the procedure to be followed for declaring an area to be a Reserved Forest, a Protected Forest or a Village Forest. The act also guides regarding the working and NOC in designated forests.

2.3.14 **Sindh Solid Waste Management Board (SSWMB) Act, 2014**

129. The SSWMB Act, 2014 enacted to establish a board for collection and disposal of all solid waste, to arrange effective delivery of sanitation services, to provide pollution free environment and to deal with other relevant matters. The Board established under the Act headed by the Chief Minister or his nominee and constitutes of thirteen other ex-officio members of other relevant departments. This act is applicable as project will generate the solid waste which will be managed and disposed of as per the legislative requirements of this act.

2.3.15 **Sindh Factories Act 2015**

130. The Sindh Factories Act 2015 deals with regulations related to project area, workers and workplace Environment Health and Safety (EH&S) requirements. The Factories Act also provides regulations for handling and disposal of toxic and hazardous materials. As construction activity is classified as ‘industry’, these regulations will be applicable to the project & construction contractors’ scope of work also.

2.3.16 **Sindh Fisheries (Amendment) Act 2011**

131. The Sindh Fisheries (Amendment) Act, 2011 places strict restrictions by means of net, fish engines, traps etc., on fishing in public waters without obtaining license, lease, permit etc. The Act also prohibits destruction of fish or aquatic life and the discharge of factory effluents without treating it. The Act also provides for several penalties.

2.3.17 **The Sindh Local Government Act 2013 and Sindh Local Government (Amendment) Act, 2019**

132. Under the Sindh Local Government Act 2013 (SLGA), Chapter VI, land use planning; implementation of building by-laws; management of environmental and health hazards; food adulteration; provision and maintenance of water supply schemes and public sources of drinking water; and mobilization of communities for the upgrade of local infrastructure (transportation, landscaping, and removal of encroachments) are the responsibilities of municipal corporations/committees. This act is applicable for the proposed project due to its location and nature of use of public sources during construction stage of the proposed project.

2.3.18 **Environmental Assessment Guidelines**
133. Pak-EPA has also published environmental assessment procedures and guidelines in October, 1997, which contains the following sets of information relevant to the proposed project:

- **Guidelines for Policy and Procedures for Filing, Review and Approval of Environmental Assessment Reports**

134. It describes environmental policy and administrative procedures to be followed for filing of environmental assessment reports by the proponents and its review and approval by the concerned environmental protection agency/department.

- **Guidelines for the Preparation and Review of Environmental Reports**

135. These guidelines are developed to facilitate both the proponents and decision makers to prepare reports (inclusive of all the information contained therein) and carry out their review so as to take informed decisions.

- **Sectoral Guidelines: Major Roads**

136. These guidelines embody issues/impacts commonly arising due to the road projects, the mitigations to reduce/eliminate these impacts and the need for environmental management plan and monitoring plan to protect the environment.

- **Guidelines for Public Consultation**

137. These guidelines deal with possible approaches to public consultation and techniques for designing an effective programme of consultation that involves all major stakeholders and ensures that their concerns are incorporated in any impact assessment study.

2.3.19 Public Private Partnership Act, 2010 (Amended)

138. The Act was created to enable an environment for private sector participation in infrastructure development projects in the province of Sindh through public-private partnership projects. It extends to the whole of the Province of Sindh.

139. It is expedient to expand the provision of infrastructure services and improve their reliability and quality for accelerating economic growth and achieving the social objectives of the Government; to mobilize private sector resources for financing, construction, maintenance and operation of infrastructure projects; to improve efficiency of management, operation and maintenance of infrastructure and development facilities by introduction of modern technologies and management techniques; to incorporate principles of fairness, competition and transparency in public-private partnership projects.

140. The Local Government & HTP Department, Government of Sindh (GoS) intends to
implement the ‘Urban Road Initiatives in Karachi’ under Public Private Partnership (PPP).

2.4 INTERNATIONAL CONVENTION, PROTOCOLS AND OBLIGATIONS

141. As Pakistan is a member country of a number of international organizations like United Nations Organization (UNO), Organization of Islamic Countries (OIC), South Asian Association for Regional Co-operation (SAARC), Economic Co-operation Organization (ECO), etc., it has to follow the international protocols and obligations related to environmental protection.

2.4.1 Convention on Wetlands (RAMSAR Convention), 1971

142. The broad aim of the Convention on Wetlands (RAMSAR, Iran, 1971) is to halt the worldwide loss of wetlands and to conserve those that remain, through wise use and technology transfer. Contracting Parties have made commitments to:
   - Designate at least one site that meets the RAMSAR criteria for inclusion in the list of Wetlands of International Importance;
   - Protect the ecological character of listed sites;
   - Include wetlands conservation within their national land-use planning; and
   - Establish nature reserves on wetlands and promote wetland training.

143. Under the RAMSAR Convention there is a general obligation for the Contracting Parties to include wetland conservation considerations in their national land-use planning. They have committed themselves to formulate and implement this planning so as to promote, as far as possible, “the wise use of wetlands in their territory” (Article 3.1 of the treaty). The Conference of the Contracting Parties has approved guidelines on how to achieve “wise use”, which has been interpreted as being synonymous with “sustainable use”.

2.4.2 Bonn Convention-The Convention on Conservation of Migratory Species of Wild Animals, 1979

144. The Convention requires the countries to take action to avoid endangering migratory species. Species covered in the Convention should be given special attention during EA and monitoring and any impacts identified should be mitigated to acceptable levels.

145. The Bonn Convention was signed in 1979 and entered into force on 1 November 1983. The Convention defines the following terms:
   - “Migratory species” means the entire population or any geographically separate part of the population of any species or lower taxonomic of wild animals a significant proportion of whose members cyclically and predictably cross one or more national jurisdictional boundaries;
   - “Conservation status of a migratory species” means the sum of the influences acting on the migratory species that may affect its long-term distribution and
abundance; and

- "Endangered" means that the migratory species is in danger of extinction throughout all or part of the territory of a State

146. The parties to the Convention acknowledge the importance of conserving migratory species.

- To avoid any migratory species becoming endangered, the parties must endeavor:
  - To promote, cooperate in or support research relating to migratory species;
  - To provide immediate protection for migratory species; and to protect endangered migratory species, the parties to the Convention will endeavor:
  - To conserve or restore the habitats of endangered species;
  - To prevent, remove, compensate for or minimize the adverse effects of activities or obstacles that impede the migration of the species; and
  - To the extent feasible and appropriate, to prevent, reduce or control factors those are endangering or are likely to further endanger the species.

2.4.3 **Convention on International Trade of Endangered Species of Flora and Fauna (CITES)-1979**

147. The principal obligations of contracting parties to the CITES are to safeguard the trade in rare or endangered species and to restrict the import and export of listed species. According to this convention species threatened with extinction whose movement between countries is prohibited except for conservation purposes such as captive breeding, species whose commercial trade is permitted but export permits are needed.

148. This convention deals with the taxonomy of species (class, order, family, scientific and common names), biological parameters (distribution, habitat, population status-trends, geographic trends, role of species in its eco-system and threats faced), utilization and trade practices at national level, legal international trade, Illegal trading, potential trade impacts, captive breeding, conservation and management on national and international level, legal statuses, species management (population monitoring, protection of habitat, domestic measures) and information on similar species.

2.4.4 **The Basel Convention, 1989**

149. Basel Convention on the control of trans-boundary movements of hazardous wastes and their disposal is an international treaty that was designed to reduce the movements of hazardous waste between nations, and specifically to prevent transfer of hazardous waste from developed to Less Developed Countries (LDCs). It does not, however, address the movement of radioactive waste. The Convention is also intended to minimize the amount and toxicity of wastes generated, for environmentally sound management as closely as possible to the source of generation, and to assist LDCs in environmentally sound management of the hazardous and other wastes they generate. The provisions of this convention imply
to minimize the amount of waste generated and its management during construction and O&M phases.

2.4.5 The Rio Declaration, 1992

150. The Rio Declaration comprises 27 principles which address important issues such as; sustainable development to integrate environmental protection into the development process; common but differentiated responsibilities to conserve, protect and restore the Earth’s ecosystems; public participation and information access at the national level, reduce and eliminate unsustainable patterns of production and consumption. Pakistan signed the treaty on 13 Jun 1992 and ratified on 1 June 1994 with a focus on protection of natural environment.

2.4.6 United Nation Framework Convention on Climate Change (UNFCCC), 1992

151. The UN Framework Convention on Climate Change (UNFCCC) is a multilateral agreement to address the issue of climate change. The Convention, was sets out and opened for signature at the June 1992 UN Conference on Environment and Development (UNCED), also known as the Rio Earth Summit. The UNFCCC entered into force on 21 March 1994.

152. Pakistan being signatory of this treaty is bound to control the GHG emissions and climate change. Recent conference of parties (COP) for UNFCCC was held from 6 to 17 Nov, 2017 in Bonn Germany.

2.4.7 Sustainable Development Goals (SDGs) – 2015-2030

153. The Sustainable Development Goals (SDGs) are a good collection of 17 global goals set by the United Nations in 2015. Pakistan was the first country to adopt SDGs 2030 agenda through a unanimous resolution of the Parliament of Pakistan. Pakistan has recently committed to Agenda 2030 and has become signatory to SDGs where Goal 6 calls, among others, for ensuring availability and sustainable management of water and sanitation for all, water use efficiency and integrated water resources management. The SDG 5 on gender equality and women’s empowerment emphasizes to ensure women’s full and effective participation and equal opportunities for leadership at all levels of decision-making in political, economic and public life.

2.4.8 Paris Agreement, 2016

154. Paris Agreement was signed by Pakistan on 22 April 2016 and ratified on 10 November 2016. The Paris Agreement’s long-term temperature goal is to keep the increase in global average temperature to well below 2 °C above pre-industrial levels; and to pursue efforts to limit the increase to 1.5 °C, recognizing that this would substantially reduce the risks and impacts of climate change. It also aims to increase the ability of parties to adapt to the adverse impacts of climate change,
and make “finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development.” Under the Paris Agreement, each country must determine, plan, and regularly report on the contribution that it undertakes to mitigate global warming.

2.5 INTERNATIONAL FINANCIAL INSTITUTIONS (IFIS)

155. There are mandatory requirements of International Financial Institutions which need to be followed in the project. The major financing institutions which may be involved in the later stage of the project are Asian Development Bank (ADB) or World Bank (WB). As per the Environmental and Social Management System (ESMS) Arrangement prepared for Public–Private Partnership Investments projects in Sindh Province, the major requirements of ADB will be followed in case of their involvement. Following are the major requirements of ADB which need to be followed in case of their involvement.

2.5.1 ADB’s Requirements for Preparation of Environmental Assessments of Projects

156. A project is classified as Category ‘A’ if it is likely to have adverse environmental impacts that are irreversible, adverse or unprecedented. In the light of significance devoted by ADB to various environmental impacts, the proposed project is to be assigned Category ‘A’, wherein an EIA is required.

157. The main rationale to assign Category ‘A’ is that the proposed project may cause adverse impacts on local communities, land and mangroves/trees etc.

158. During the design, construction, and operation of the project, the borrower/client will apply pollution prevention and control technologies and practices consistent with international good practice, as reflected in internationally recognized standards. These standards contain performance levels and measures that are normally acceptable and applicable to projects. When host country regulations differ from these levels and measures, the proponent will comply with whichever requirement is more stringent.

2.5.2 ADB’s Access to Information Policy (AIP) 2018

159. ADB’s new Access to Information Policy (AIP), reflects the ADB’s ongoing commitment to transparency, accountability, and participation by stakeholders. The policy contains principles and exceptions to information sharing with external stakeholders, led by a new overarching principle of “clear, timely, and appropriate disclosure.”

2.5.3 ADB’s Accountability Mechanism Policy 2012
160. The objectives of the Accountability Mechanism are providing an independent and effective forum for people adversely affected by ADB-assisted projects to voice their concerns and seek solutions to their problems, and to request compliance review of the alleged noncompliance by ADB with its operational policies and procedures that may have caused, or is likely to cause, them direct and material harm. The Accountability Mechanism is a “last resort” mechanism.

2.5.4 ADB’s Safeguard Policy Statement, 2009

161. ADB affirms that environmental and social sustainability is a cornerstone of economic growth and poverty reduction in Asia and the Pacific region. ADB’s Strategy, 2020 therefore emphasizes assisting Developing Member Countries (DMCs) to pursue environmentally sustainable and inclusive economic growth. The objectives of ADB’s safeguards are to:

- Avoid adverse impacts of projects on the environment and affected people, where possible;
- Minimize, mitigate, and/or compensate for adverse project impacts on the environment and affected people when avoidance is not possible; and
- Help borrowers/clients to strengthen their safeguard systems and develop the capacity to manage environmental and social risks.

162. ADB’s SPS sets out the policy objectives, scope and triggers, and principles for three key safeguard areas:

- Environmental safeguards;
- Involuntary resettlement safeguards; and
- Indigenous Peoples safeguards.

163. To achieve the policy objectives and deliver the policy principles, ADB carries out the actions described in the subsection i.e. “B. Policy Delivery Process”. To help borrowers/clients and their projects achieve the desired outcomes, ADB adopts a set of specific safeguard requirements that borrowers/clients are required to meet in addressing environmental and social impacts and risks. ADB staff, through their due diligence, will review, supervise and ensure that borrowers/clients comply with these requirements during project preparation and implementation. These safeguard requirements are as follows:

- Safeguard Requirements 1: Environment (Appendix 2 of SPS, 2009);
- Safeguard Requirements 2: Involuntary Resettlement (Appendix 3 of SPS, 2009);
- Safeguard Requirements 3: Indigenous Peoples (Appendix 4 of SPS, 2009); and
- Safeguard Requirements 4: Special Requirements for Different Finance Modalities (Appendix 5 of SPS, 2009).

<p>| Table 2.4: ADB Safeguard Policies 2009 Relevant to Project |</p>
<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Safeguard Policies</th>
<th>Key Requirements</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Environment</td>
<td>Projects and subprojects need EIA to address important issues not covered by any applicable regional or sectoral EA.</td>
<td>Applicable to proposed project.</td>
</tr>
<tr>
<td>2.</td>
<td>Involuntary Resettlement</td>
<td>Involuntary resettlement should be avoided where feasible, or minimized, exploring all viable alternative project designs. Where it is not feasible to avoid resettlement, resettlement activities should be conceived and executed as sustainable development programs, providing sufficient investment resources to enable the persons displaced by the project to share in project benefits. Displaced persons should be assisted in their efforts to improve their livelihoods and standards of living or at least to restore them, in real terms, to pre-displacement levels or to levels prevailing prior to the beginning of project implementation, whichever is higher</td>
<td>As of now, involuntary resettlement is envisaged for the proposed project and Land Acquisition and Resettlement Plan (LARP) will be submitted by Client.</td>
</tr>
<tr>
<td>3.</td>
<td>Indigenous Peoples</td>
<td>Measures to avoid potentially adverse effects on the Indigenous People's communities; and when avoidance is not feasible, minimize, mitigate, or compensate for such effects. Bank-financed projects are also designed to ensure that the Indigenous People receive social and economic benefits that are culturally appropriate and gender and inter generationally inclusive.</td>
<td>As per the ADB definition, there are no groups of people in the project area who could be categorized as indigenous people, therefore this policy does not apply to the proposed project.</td>
</tr>
</tbody>
</table>

2.5.5 Implications of ADB’s Safeguard Policies on Proposed Project

164. The objective of the environmental safeguards is to ensure the environmental soundness and sustainability of projects and to support the integration of environmental considerations into the project decision-making process. ADB’s policy principles are summarized in Table 2.5 below.

Table 2.5: ADB Policy Principles

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Policy Principle</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Screening and Categorization</td>
<td>Screening process initiated early to determine the appropriate extent and type of environmental assessment.</td>
</tr>
<tr>
<td>2.</td>
<td>Environmental Assessment</td>
<td>Conduct an environmental assessment to identify potential impacts and risks in the context of the project’s area of influence.</td>
</tr>
<tr>
<td>3.</td>
<td>Alternatives</td>
<td>Examine alternatives to the project’s location, design, technology, and components and their potential environmental and social impacts, including no project</td>
</tr>
<tr>
<td>Sr. No.</td>
<td>Policy Principle</td>
<td>Summary</td>
</tr>
<tr>
<td>--------</td>
<td>------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>4</td>
<td>Impact Mitigation</td>
<td>Avoid, and where avoidance is not possible, minimize, mitigate, and/or offset adverse impacts and enhance positive impacts. Prepare an environmental management plan (EMP).</td>
</tr>
<tr>
<td>5</td>
<td>Public/Stakeholder Consultations</td>
<td>Carry out meaningful consultation with affected people and facilitate their informed participation. Involve stakeholders early in the project preparation process and ensure that their views and concerns are made known to and understood by decision makers and taken into account. Continue consultations with stakeholders throughout project implementation. Establish a grievance redress mechanism.</td>
</tr>
<tr>
<td>6</td>
<td>Disclosure of Environmental Assessment</td>
<td>Disclose a draft environmental assessment in a timely manner, in an accessible place and in a form and language(s) understandable to stakeholders. Disclose the final environmental assessment to stakeholders.</td>
</tr>
<tr>
<td>7</td>
<td>Environmental Management Plan</td>
<td>Implement the EMP and monitor its effectiveness. Document monitoring results, and disclose monitoring reports.</td>
</tr>
<tr>
<td>8</td>
<td>Biodiversity</td>
<td>Do not implement project activities in areas of critical habitats.</td>
</tr>
<tr>
<td>9</td>
<td>Pollution Prevention</td>
<td>Apply pollution prevention and control technologies and practices consistent with international good practices. Adopt cleaner production processes and good energy efficiency practices. Avoid pollution, or, when avoidance is not possible, minimize or control the intensity or load of pollutant emissions and discharges. Avoid the use of hazardous materials subject to international bans or phase outs.</td>
</tr>
<tr>
<td>10</td>
<td>Occupational Health and Community Safety</td>
<td>Provide workers with safe and healthy working conditions and prevent accidents, injuries, and disease. Establish preventive and emergency preparedness and response measures to avoid, and where avoidance is not possible, to minimize, adverse impacts and risks to the health and safety of local communities</td>
</tr>
<tr>
<td>11</td>
<td>Physical Cultural Resources</td>
<td>Conserve physical cultural resources and avoid destroying or damaging them. Provide for the use of “chance find” procedures.</td>
</tr>
</tbody>
</table>

### 2.6 COMPARISON OF INTERNATIONAL AND LOCAL ENVIRONMENTAL LEGISLATIONS

165. In order to select the most stringent standards applicable, a mix of local (SEQS) and international (IFC) regulations have been selected. The IFC Environmental, Health, and Safety (EHS) Guidelines, General EHS Guidelines: Environmental, Noise Management has noise level guidelines for daytime and night time, which are applicable. Considering the high baseline noise levels in the project area, it shall be
ensured that the increase in noise levels is minimized as far as possible. Also, project related noise levels in the project area are not allowed to increase the existing levels by 3 dB or more. Furthermore, it shall be ensured that all necessary noise mitigation measures are implemented to minimize the noise levels in the project area.

166. Table 2.6 presents IFC workplace noise standards that are applicable to the construction workers. It should also be noted that IFC EHS guidelines advise that where existing ambient noise levels already exceed thresholds, the Project should not result in an increase of more than 3 dB over existing ambient noise at the nearest receptor location off-site.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Type of Work, workplace</th>
<th>IFC General EHS Guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Heavy Industry (no demand for oral communication)</td>
<td>85 Equivalent level Leq,8h</td>
</tr>
<tr>
<td>2</td>
<td>Light industry (decreasing demand for oral communication)</td>
<td>50-65 Equivalent level Leq,8h</td>
</tr>
</tbody>
</table>

167. A comparison of applicable local and international guidelines for ambient air quality has been provided in Table 2.7 below. In the case of most pollutants, the SEQS standards for ambient air quality are more stringent in comparison to USEPA and WHO/IFC standards. The applicable and most stringent parameters for each respective pollutant are highlighted in green.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Pollutants</th>
<th>USEPA</th>
<th>WHO/IFC</th>
<th>SEQS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SO2</td>
<td>3 hrs 1 hr</td>
<td>0.5 ppm 75 ppb</td>
<td>24 hr 10 min</td>
</tr>
<tr>
<td>2</td>
<td>CO</td>
<td>8 hrs 1 hr</td>
<td>9 ppm (11 mg/m³)</td>
<td>35 ppm (43 mg/m³)</td>
</tr>
<tr>
<td>3</td>
<td>NO2</td>
<td>Annual Mean 1 hr</td>
<td>100 ug/m³ (53 ppb) 100 ppb</td>
<td>1 yr 1 hr</td>
</tr>
<tr>
<td>4</td>
<td>O3</td>
<td>8 hrs</td>
<td>0.07 ppm (148 ug/m³)</td>
<td>8 hrs</td>
</tr>
<tr>
<td>5</td>
<td>TSP</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>6</td>
<td>PM10</td>
<td>24 hrs</td>
<td>150 ug/m³</td>
<td>1 yr 24 hr</td>
</tr>
<tr>
<td>7</td>
<td>PM2.5</td>
<td>Annual Mean</td>
<td>15 ug/m³ 35 ug/m³</td>
<td>1 yr 24 hr</td>
</tr>
</tbody>
</table>
Environmental Impact Assessment (EIA)

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Pollutants</th>
<th>USEPA</th>
<th>WHO/IFC</th>
<th>SEQS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>24 hrs</td>
<td></td>
<td></td>
<td>24 hrs</td>
</tr>
</tbody>
</table>

* The standards highlighted in green for each respective pollutant are the most stringent based on a comparison between local and international regulations and thus shall be applicable for the proposed project.

* In instances where the airshed is significantly degraded and the pollutant levels are already exceeding the ambient pollutant concentrations provided in the table above, it shall be ensured that the project activities cause as small an increase in pollution levels as feasible, and amounts to a fraction of the applicable short term and annual average air quality guidelines or standards as established in the project specific environmental assessment.

168. Similar to the standards for air quality, the comparison of noise standards provided in Table 2.8 clearly shows that SEQS standards for noise are more stringent in comparison to the IFC standards. The only exception is the daytime noise level standard for Industrial areas where the IFC standard is more stringent i.e. 70 dB(A) in comparison to SEQS i.e. 75 dB(A) and so for this particular parameter, the IFC standard will be used. Apart from this one exception, the SEQS standards have been used for the proposed Biogas plant project.

Table 2.8: Comparison of International and Local Noise Standards

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Category of Area/Zone</th>
<th>SEQS</th>
<th>WHO/IFC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Limit in dB(A) Leq</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Day Time 06:00 – 22:00</td>
<td>Night Time 22:00-06:00</td>
<td>Day Time 07:00 – 22:00</td>
</tr>
<tr>
<td>1</td>
<td>Residential area (A)</td>
<td>55</td>
<td>45</td>
</tr>
<tr>
<td>2</td>
<td>Commercial area (B)</td>
<td>65</td>
<td>55</td>
</tr>
<tr>
<td>3</td>
<td>Industrial area (C)</td>
<td>75</td>
<td>65</td>
</tr>
<tr>
<td>4</td>
<td>Silence zone (D)</td>
<td>50</td>
<td>45</td>
</tr>
</tbody>
</table>

* The standards highlighted in green for each respective Area/Zone are the most stringent based on a comparison between local and international regulations and thus shall be applicable for the proposed project.

* In instances where baseline noise levels are already exceeding the standards above, it will need to be ensured that the project activities do not cause an increment of more than 3 dB(A) from the baseline noise levels.

169. The comparison of water quality standards provided in Table 2.9 and Table 2.10 clearly shows the SEQS standards for surface and drinking water quality as compare to WHO and FAO standards.

Table 2.9: Comparison of National and International Drinking Water Standards

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Parameter</th>
<th>Units</th>
<th>SEQS</th>
<th>WHO Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Temperature (During Sample Collection)</td>
<td>OC</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Sr. No.</td>
<td>Parameter</td>
<td>Units</td>
<td>SEQS</td>
<td>WHO Standards</td>
</tr>
<tr>
<td>------</td>
<td>-------------------------</td>
<td>-------</td>
<td>--------</td>
<td>-----------------</td>
</tr>
<tr>
<td>2</td>
<td>Color</td>
<td>Pt-Co</td>
<td>≤15TCU</td>
<td>&lt;15TCU</td>
</tr>
<tr>
<td>3</td>
<td>pH</td>
<td>pH unit</td>
<td>6.5-8.5</td>
<td>6.5-8.5</td>
</tr>
<tr>
<td>4</td>
<td>Turbidity</td>
<td>NTU</td>
<td>&lt;5</td>
<td>&lt;5</td>
</tr>
<tr>
<td>5</td>
<td>Total, Hardness</td>
<td>mg/L</td>
<td>&lt;500.00</td>
<td>NS</td>
</tr>
<tr>
<td>6</td>
<td>Total Dissolved Solid (TDS)</td>
<td>mg/L</td>
<td>&lt;1000.00</td>
<td>&lt;1000.00</td>
</tr>
<tr>
<td>7</td>
<td>Total Suspended Solid (TSS)</td>
<td>mg/L</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>8</td>
<td>Ammonia</td>
<td>mg/L</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>9</td>
<td>Fluoride F-</td>
<td>mg/L</td>
<td>&lt;1.50</td>
<td>1.50</td>
</tr>
<tr>
<td>10</td>
<td>Sulfate (SO4-2)</td>
<td>mg/L</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>11</td>
<td>Chloride (Cl-)</td>
<td>mg/L</td>
<td>&lt;250.00</td>
<td>250</td>
</tr>
<tr>
<td>12</td>
<td>Nitrate (NO3-)</td>
<td>mg/L</td>
<td>&lt;50.00</td>
<td>50.00</td>
</tr>
<tr>
<td>13</td>
<td>Odor</td>
<td></td>
<td>Non-Objectionable / Acceptable</td>
<td>Non-Objectionable / Acceptable</td>
</tr>
<tr>
<td>14</td>
<td>Taste</td>
<td></td>
<td>Non-Objectionable / Acceptable</td>
<td>Non-Objectionable / Acceptable</td>
</tr>
<tr>
<td>15</td>
<td>Sodium</td>
<td>mg/L</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>16</td>
<td>Iodine</td>
<td>ppm</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>17</td>
<td>Arsenic (As)</td>
<td>mg/L</td>
<td>≤0.05</td>
<td>0.01</td>
</tr>
<tr>
<td>18</td>
<td>Iron (Fe 3+)</td>
<td>mg/L</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>19</td>
<td>Zinc (Zn 2+)</td>
<td>mg/L</td>
<td>5.0</td>
<td>3.0</td>
</tr>
<tr>
<td>20</td>
<td>Conductivity</td>
<td>μS/cm</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>21</td>
<td>Bicarbonate</td>
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<td>NS</td>
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<td>22</td>
<td>Nitrite</td>
<td>mg/L</td>
<td>≤3</td>
<td>3</td>
</tr>
<tr>
<td>23</td>
<td>Magnesium</td>
<td>mg/L</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>24</td>
<td>Calcium as Ca</td>
<td>mg/L</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>25</td>
<td>Phosphate</td>
<td>mg/L</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>26</td>
<td>Potassium</td>
<td>mg/L</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>27</td>
<td>Boron</td>
<td>mg/L</td>
<td>≤0.3</td>
<td>0.3</td>
</tr>
<tr>
<td>28</td>
<td>SAR Iodine (I)</td>
<td>mg/L</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>29</td>
<td>Aluminum</td>
<td>mg/L</td>
<td>&lt;0.2</td>
<td>0.2</td>
</tr>
<tr>
<td>30</td>
<td>Antimony</td>
<td>mg/L</td>
<td>&lt;0.005</td>
<td>0.02</td>
</tr>
<tr>
<td>31</td>
<td>Cadmium</td>
<td>mg/L</td>
<td>0.01</td>
<td>0.003</td>
</tr>
<tr>
<td>32</td>
<td>Mercury</td>
<td>mg/L</td>
<td>&lt;0.001</td>
<td>0.001</td>
</tr>
<tr>
<td>33</td>
<td>Nickel</td>
<td>mg/L</td>
<td>&lt;0.02</td>
<td>0.02</td>
</tr>
<tr>
<td>34</td>
<td>Selenium</td>
<td>mg/L</td>
<td>0.01</td>
<td>0.01</td>
</tr>
<tr>
<td>35</td>
<td>Barium</td>
<td>mg/L</td>
<td>0.7</td>
<td>0.7</td>
</tr>
<tr>
<td>36</td>
<td>Total Chromium</td>
<td>mg/L</td>
<td>&lt;0.05</td>
<td>0.05</td>
</tr>
<tr>
<td>37</td>
<td>Copper</td>
<td>mg/L</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>38</td>
<td>Lead</td>
<td>mg/L</td>
<td>≤0.05</td>
<td>0.01</td>
</tr>
<tr>
<td>39</td>
<td>Cyanide (CN)</td>
<td>mg/L</td>
<td>&lt;0.05</td>
<td>0.07</td>
</tr>
<tr>
<td>40</td>
<td>Total Coliforms</td>
<td>cfu/100ml</td>
<td>0/100 ml</td>
<td>0/100 ml</td>
</tr>
<tr>
<td>41</td>
<td>Fecal Coli forms (E.Coli)</td>
<td>cfu/ml</td>
<td>0/100 ml</td>
<td>0/100 ml</td>
</tr>
</tbody>
</table>

**NS = Not Specified**

*The standards highlighted in green for each respective pollutant are the most stringent based on a*
comparison between local and international regulations and thus shall be applicable for the proposed project. Other are same in both case.

Table 2.10: Comparison of National and International Surface Water Standards

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Parameter</th>
<th>Units</th>
<th>SEQs</th>
<th>WHO Class V (Agriculture)</th>
<th>FAO Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Temperature</td>
<td>°C</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>2</td>
<td>pH</td>
<td>pH unit</td>
<td>6-9</td>
<td>&lt;5.3</td>
<td>6.0-8.5</td>
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<tr>
<td>3</td>
<td>COD</td>
<td>mg/L</td>
<td>150</td>
<td>&gt;30</td>
<td>--</td>
</tr>
<tr>
<td>4</td>
<td>(BOD5)</td>
<td>mg/L</td>
<td>80</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>5</td>
<td>Solids, Total dissolved (TDS)</td>
<td>mg/L</td>
<td>3500</td>
<td>--</td>
<td>0-2000</td>
</tr>
<tr>
<td>6</td>
<td>Solids, Total suspended (TSS)</td>
<td>mg/L</td>
<td>200</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>7</td>
<td>Chloride</td>
<td>mg/L</td>
<td>1000</td>
<td>--</td>
<td>0-1065</td>
</tr>
<tr>
<td>8</td>
<td>Fluoride (F-)</td>
<td>mg/L</td>
<td>10</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>9</td>
<td>Oil &amp; grease</td>
<td>mg/L</td>
<td>10</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>10</td>
<td>Phenols, Total (Phenolic Compounds)</td>
<td>mg/L</td>
<td>0.10</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>11</td>
<td>Cyanide (CN-)</td>
<td>mg/L</td>
<td>0.01</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>12</td>
<td>Anionic Detergents as MBAS</td>
<td>mg/L</td>
<td>20.00</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>13</td>
<td>Sulfate (SO4-2)</td>
<td>mg/L</td>
<td>600</td>
<td>--</td>
<td>0-960</td>
</tr>
<tr>
<td>14</td>
<td>Sulfide (S)</td>
<td>mg/L</td>
<td>0.01</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>15</td>
<td>Ammonia NH3</td>
<td>mg/L</td>
<td>40.00</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>16</td>
<td>Cadmium (Cd)</td>
<td>mg/L</td>
<td>0.10</td>
<td>&gt;0.0039 mg/L</td>
<td>--</td>
</tr>
<tr>
<td>17</td>
<td>Chromium (Cr) as Hexavalent &amp; Trivalent</td>
<td>mg/L</td>
<td>1.00</td>
<td>&gt;0.016 mg/L</td>
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</tr>
<tr>
<td>18</td>
<td>Copper (Cu)</td>
<td>mg/L</td>
<td>1.00</td>
<td>&gt;0.018 mg/L</td>
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</tr>
<tr>
<td>19</td>
<td>Lead</td>
<td>mg/L</td>
<td>0.50</td>
<td>&gt;0.082 mg/L</td>
<td>--</td>
</tr>
<tr>
<td>20</td>
<td>Nickel</td>
<td>mg/L</td>
<td>1.00</td>
<td>&gt;1.4 mg/L</td>
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</tr>
<tr>
<td>21</td>
<td>Zinc</td>
<td>mg/L</td>
<td>5.00</td>
<td>&gt;0.12 mg/L</td>
<td>--</td>
</tr>
<tr>
<td>22</td>
<td>Iron</td>
<td>mg/L</td>
<td>8.00</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>23</td>
<td>Manganese</td>
<td>mg/L</td>
<td>1.50</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>24</td>
<td>Selenium</td>
<td>mg/L</td>
<td>0.50</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>25</td>
<td>Silver</td>
<td>mg/L</td>
<td>1.00</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>26</td>
<td>Arsenic</td>
<td>mg/L</td>
<td>1.00</td>
<td>&gt;0.36 mg/L</td>
<td>--</td>
</tr>
<tr>
<td>27</td>
<td>Barium</td>
<td>mg/L</td>
<td>1.50</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>28</td>
<td>Magnesium</td>
<td>mg/L</td>
<td>--</td>
<td>--</td>
<td>0-61</td>
</tr>
<tr>
<td>29</td>
<td>Nitrate</td>
<td>mg/L</td>
<td>--</td>
<td>--</td>
<td>0-10</td>
</tr>
<tr>
<td>30</td>
<td>Sodium</td>
<td>mg/L</td>
<td>--</td>
<td>--</td>
<td>0-920</td>
</tr>
<tr>
<td>31</td>
<td>Boron</td>
<td>mg/L</td>
<td>6.00</td>
<td>--</td>
<td>0-2</td>
</tr>
<tr>
<td>32</td>
<td>Mercury</td>
<td>mg/L</td>
<td>0.01</td>
<td>&gt;0.0024 mg/L</td>
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<td>33</td>
<td>Chlorine</td>
<td>mg/L</td>
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<tr>
<td>34</td>
<td>Total Toxic Metals</td>
<td>mg/L</td>
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</tr>
<tr>
<td>35</td>
<td>Turbidity</td>
<td>NTU</td>
<td>NS</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>36</td>
<td>Oxygen, Dissolved</td>
<td>mg/L</td>
<td>NS</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>37</td>
<td>Pesticides</td>
<td>µg/L</td>
<td>NS</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>38</td>
<td>Nutrients as Potassium</td>
<td>mg/L</td>
<td>--</td>
<td>--</td>
<td>0-2</td>
</tr>
<tr>
<td>39</td>
<td>Nutrients as Nitrogen</td>
<td>mg/L</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>40</td>
<td>Nutrients as Phosphorous</td>
<td>mg/L</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Sr. No.</td>
<td>Parameter</td>
<td>Units</td>
<td>SEQS</td>
<td>WHO Class V (Agriculture)</td>
<td>FAO Standards</td>
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<tr>
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<td>-------------</td>
<td>------</td>
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</tr>
<tr>
<td>41</td>
<td>Total Coliform</td>
<td>MPN/100ml</td>
<td>--</td>
<td>--</td>
<td>--</td>
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<tr>
<td>42</td>
<td>Fecal Coliform</td>
<td>MPN/100ml</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

NS = Not Specified

*The standards highlighted in green for each respective pollutant are the most stringent based on a comparison between local and international regulations and thus shall be applicable for the proposed project. Other are same in both case.*

170. SEQS standards for ambient air quality, noise, water and wastewater are more stringent in comparison to USEPA and WHO/IFC standards. Based on the above comparison, local regulations or environmental quality standards (SEQS) are more stringent and consider more parameters than other and thus shall be applicable for the proposed project. As far as regulations regarding other environmental parameters are concerned such as acceptable effluent disposal parameters, the local regulations i.e. SEQS take precedence over any other international regulations such as IFC.

2.7 ADMINISTRATIVE FRAMEWORK

171. The proposed project falls under the following Institutional and Administrative Framework.

2.7.1 Local Government & HTP Department, Government of Sindh

172. The implementing agency of the proposed project is Local Government & HTP Department, Government of Sindh, therefore, it is responsible for liaising with line departments to ensure that the Project complies with the laws and regulations controlling the environmental concerns of Link Road construction and operation, and that all pre-construction requisites, such as permits and clearances are met. The office of Environment Section of Local Government & HTP Department will be responsible for ensuring that all the measures proposed in the Environmental Management Plan are effectively implemented by the contractor during construction phase and operation phase of the proposed Project.

2.7.2 PPP Unit Government of Sindh

173. Public-Private Partnership Unit, Sindh will promote and facilitate the development of Public-Private Partnership projects in the Province. The unit may provide technical and financial support to the Agencies throughout the Public-Private Partnership process, evaluate and prioritize project proposals submitted by the Agencies, submit all project proposals for consideration to Project Support Facility for the purpose of approval of funding, evaluate the type and amount of government support sought for a project; review the bid evaluation report submitted by an Agency, prepare semi-annual review, annual consolidated reports and project completion reports on the Public-Private Partnerships in the province and submit the same to the PPP Board. The Unit may procure, technical and professional
assistance and advice from other governmental authorities, multilateral agencies, professional bodies and private firms. The Unit may also provide technical assistance and advisory services to the persons and entities in the Province. The PPP Unit in performance of its function may also consult the Project Support Facility (PSF) from time to time as mentioned in the Sindh Public Private Partnership Act 2010 (Amended),

2.7.3 Sindh Environmental Protection Agency

174. Before the 18th amendment in the Constitution of Pakistan, environment related issues were governed by the federal regime through Pakistan Environmental Protection Act 1997. However, after the 18th amendment in 2010, Sindh Environmental Protection Agency (Sindh-EPA) as provincial agency and headed by Director General is responsible for environmental protection and pollution control in the province of Sindh and will be responsible for reviewing the report, issuing Environmental Approval and overall/broad based monitoring of proposed project activities.
3 PROJECT DESCRIPTION

3.1 RATIONALE OF THE PROJECT

175. Korangi Crossing Road is the main entrance to Korangi Creek Road and the adjoining residential and industrial areas for the traffic from Qayyumabad, DHA and beyond. Currently, a causeway across Malir River serves the traffic to / from this densely populated area. During rainy season, the existing causeway gets under water and the traffic across the river gets disrupted and rerouted to other longer routes causing inconvenience and traffic congestion on the other exits from Main Korangi Industrial Area Road. Unnecessary delays and travel cost is incurred by the road users and industrial supply and products are affected. Moreover, several important educational institutions like the College of Business Management (CBM), Ilma University (Formerly Institute of Business Technology), National Textile University and major health care facilities like Indus Hospital, Chinioit, General Hospital, LRBT Eye Hospital, Fazle Elahi Hospital for Heart Diseases, Baldia Hospital etc. are located along this road or in close vicinity.

176. The existing road also provides access to Korangi Creek Industrial Park (KCIP), Pakistan Refinery Ltd. (PRL) and other industries located here. Besides these, the fishing village / Jetty of Ibrahim Hyderi, commercial area and the housing colonies including Bhitai Colony, Dar us Salam Cooperative Housing Society, Gilgit Colony, PAF Colony and Airmen Golf Club are also located along or near this road.

177. An increase in traffic volumes is expected due to construction of Link Road for Korangi project that will have its start point near the existing causeway (KPT interchange) and will thus link these areas directly with the Karachi - Hyderabad Motorway i.e. M9.

178. Considering the above-mentioned situation, proposed link road to Korangi along with the new bridge on Malir River under Proposed Link Road for Korangi Project will be an alternate direct access route serving the industrial and commercial traffic to / from these areas.

3.2 OBJECTIVES OF THE PROJECT

179. The main objective of the proposed project is to improve the existing traffic flow by providing an alternative road for safe and speedy commute.

180. Expected benefits associated with the proposed project include:

- It will also facilitate the traffic movement of Korangi Creek and Korangi and Landhi Residential area and connect Creek Avenue and Malir Express to these areas
- It will facilitate the Korangi Industrial Zone by providing alternative access
for supplies and products.

- Congestion on Korangi Road will be reduced.
- Bridge on Malir River along Korangi Causeway will be continued to be used throughout the year during heavy rainfall / monsoon season which otherwise blocks during heavy rainfall / monsoon season. It will also provide access to unutilized land between Korangi Creek Industrial Park and Airmen Golf.
- Employment opportunities for the locals.

### 3.3 LAYOUT OF THE PROPOSED PROJECT ROAD

The road starts approximately from a distance of 1 km from KPT Interchange, where a bridge is proposed which connects Creek Avenue and Malir Expressway to Korangi Creek Road. The link road extends from the bridge and ends at Airmen Golf Course. Another segment of road extends from Korangi Link Road passing adjacent to Korangi Creek Industrial Park and joins Korangi Creek Road. The layout is given in Figure 3.1.
Figure 3.1: Layout of Proposed Project Road
3.4 COMPONENTS OF THE PROPOSED PROJECT

182. The salient features of the project are as follows:

- Start point – Creek Ave / Korangi Causeway Intersection
- End point – PAF Airmen Golf Club
- Total Length – Approx. 12 km (with elevated portions)
- Alignment – Parallel to Jam Sadiq Bridge along Left Bank of Malir River.
- Number of lanes –
  - 6 lanes (3 in each direction) for Ramp 1 from KPT Interchange and NewBridge at Malir River
  - 4 lanes (2 in each direction with shoulders) for Road 1 (Creek Avenue to Malir Expressway)
  - 4 lanes (2 in each directions) for Ramp 2, 3 and Road 3
  - 6 lanes (3 in each direction) for Road 2, 4 and Ramp 4 (New Malir Bridge to Attock Petrol Pump)
  - 4 lanes (2 in each direction) for Road 6 (New bridge to NRL Link) and Road 8 (NRL Link to Airmen Golf course)
  - 4 lanes (2 in each direction) for Road 7 (NRL Link Road)
- Design Speed (Link road to Korangi Creek) – 90 Km/h
- Design Speed (Korangi Bridge) – 80 Km/h
- Design Speed (interchanges) – 30 - 40 Km/h
- Right of Way (ROW) of Bridge – 26.1 m
- Right of Way (ROW) of Road depending on number of lanes – 17- 25 m

183. ROW mentioned above are without berm/slope protection width, which may vary as per site condition.

184. The cross sections of the different segments of road are attached as Figure 3.2, 3.3, 3.4 & 3.5.
Figure 3.2: Cross Sections of the Road
Figure 3.3: Cross Sections of the Road
Figure 3.4: Cross Sections of the Road
Figure 3.5: Cross Sections of the Road
3.5 DURATION OF THE PROJECT

185. The expected duration for construction is approximately 24 months.

3.6 (Deleted)

3.7 TRAFFIC FORECAST

187. In order to assess the vehicle-wise traffic volumes expected to use the subject road, traffic surveys were undertaken including:

- Traffic Count Survey
- Origin-Destination Survey (OD)

188. The traffic count was classified into 11 followings modes:

- Motorcycle / Scooters
- Rickshaws / Qingqi
- Cars / Taxis / Jeeps
- Suzuki Pickup / Vans
- Mini Bus / Coaster
- Large Bus
- 2 – Axle
- 3 – Axle
- 4 – Axle
- 5 Axle & above
- Others (Animal Drawn Vehicle, Bicycle)

189. Traffic movement count (TMC) surveys and OD surveys were performed at following locations:

190. Classified traffic counts consisting of all modes of transportation (private vehicles, motorcycles, buses, trucks, rickshaws, others) were conducted for continuous 18 hours at:

- TMC- 01 (Pakistan Refinery Road / Korangi Road Intersection),
- TMC- 02 (Korangi Causeway near Attock petrol pump intersection) and
- TMC- 03 (Khayaban-e-Ittehad / Creek Avenue Intersection) during a typical weekday.

191. In addition, Origin-Destination surveys were conducted at the intersection of Pakistan Refinery Road with Korangi Road.

3.7.1 TMC 1

192. Turning movement traffic count was performed at the T-junction of Pakistan Refinery
Road with Korangi Road as shown in Figure 3.6.

**Figure 3.6: turning movements for Traffic Count at TMC 1**

### 3.7.2 TMC 2

193. This traffic survey was performed at the intersection of Korangi Causeway near Attock Petrol Pump Intersection. Traffic survey location plan is shown below in Figure 3.7.
Figure 3.7: Turning movements for Traffic Count at TMC 2

3.7.3 TMC 3

194. Turning movement traffic count was performed at the junction of Khayaban-e-Ittehad with Creek Avenue near Ayesha Masjid. Traffic survey location plan is shown below in Figure 3.7.

![Turning movements for Traffic Count at TMC 2](image)

Figure 3.8: Turning movements for Traffic Count at TMC 3

195. The traffic towards Korangi Creek will be distributed on existing Korangi Road and on the new link to be constructed as part of the project, which will help alleviate traffic congestion on Korangi Road and also provide alternate access to the travelling public via the extension of Pakistan Refinery Limited Road to the new link along left bank of Malir River.

196. The results show that construction of bridge over Malir River will result in over 113,000 daily traffic. Since the bridge is 6-lanes and the peak hour of traffic is staggered through most of the day, this additional traffic will be catered by the 6-lane bridge.

197. Existing traffic on Creek Ave is nearly 15,000 vehicles per day, which will increase to over 31,000 daily traffic by the start of project. This is primarily due to the provision of at-grade access provided as part of the project.
3.8 CONSTRUCTION MATERIALS

198. The material in construction of project would include coarse aggregates (crush), fine aggregates (sand), steel, water, asphalt, reinforcement, cement etc. Aggregates, soil, cement and steel are locally available in the area.

3.9 CONSTRUCTION CAMP

199. Camp sites will be selected keeping in view the availability of adequate area for establishing camp sites, including parking areas for machinery, stores and workshops, access to communication and local markets, and an appropriate distance from sensitive areas in the vicinity. Final locations will be selected by the contractor after approval from Local Government Department, Government of Sindh.

3.10 MANPOWER REQUIREMENTS

200. The manpower requirement of the proposed project will be approximately 100 in number which may vary depending upon the construction period.

3.11 CONSTRUCTION EQUIPMENT

201. The list of the machinery and the equipment required for the proposed project is provided in Table 3.1.
Table 3.1: Machinery and Equipment Requirement for the Proposed Project

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Type of Machinery and Equipment</th>
<th>Sr. No.</th>
<th>Type of Machinery and Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dump Truck</td>
<td>12</td>
<td>Self-Propelled Pneumatic Roller</td>
</tr>
<tr>
<td>2</td>
<td>Front End Loader</td>
<td>13</td>
<td>Asphalt Distributor</td>
</tr>
<tr>
<td>3</td>
<td>Dozer</td>
<td>14</td>
<td>Batching Plant</td>
</tr>
<tr>
<td>4</td>
<td>Grader</td>
<td>15</td>
<td>Concrete Transit Truck</td>
</tr>
<tr>
<td>5</td>
<td>Vibratory Roller</td>
<td>16</td>
<td>Concrete Pump</td>
</tr>
<tr>
<td>6</td>
<td>Water Tankers</td>
<td>17</td>
<td>Excavator</td>
</tr>
<tr>
<td>7</td>
<td>Agg. Spreader</td>
<td>18</td>
<td>Water Pumps</td>
</tr>
<tr>
<td>8</td>
<td>Three Wheel Rollers</td>
<td>19</td>
<td>Cranes</td>
</tr>
<tr>
<td>9</td>
<td>Tandem Roller</td>
<td>20</td>
<td>Vibrators</td>
</tr>
<tr>
<td>10</td>
<td>Asphalt Plant</td>
<td>21</td>
<td>Generators</td>
</tr>
<tr>
<td>11</td>
<td>Paver</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3.12 WATER REQUIREMENTS

202. The domestic water consumption for around one hundred (100) staff during the construction phase of the project is estimated to be 5400\(^1\) gallons/day. Water consumption for construction activities will include for curing, concrete mixing, road compaction etc. and will be procured by the Contractor.

3.13 WASTEWATER GENERATION

203. The wastewater generation from construction camp during the construction phase of the project is estimated to be 3,780 gallons/day.

3.14 SOLID WASTE GENERATION

204. An average solid waste generation rate of 0.5 kg/capita/day\(^2\) is adopted for the estimation of solid waste generation. Based on this assumption, a total of about 50 kg of municipal waste will be generated from the construction camp daily. Construction waste will include empty cement bags, empty containers, debris, dismantling waste etc., and will be disposed by the Contractor in coordination of Sindh Solid Waste Management Board (SSWMB).

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1 KWSB Average Daily Per Capita Water Consumption (54 gallons/day)
2 Source: The World Bank Report 2012 – What a Waste: A global review of solid waste management. Based on UNEP estimates for waste generation in the Asia Pacific. Average is 0.45 kg/capita/day.
3.15 POWER REQUIREMENT

- **During Construction Phase:**
  205. The main source of electricity/electric power during construction phase will be diesel generators.

- **During Operational Phase:**
  206. Major source of power would be taken from main electric power grid, supplying power to the main city.
4 ANALYSIS OF ALTERNATIVES

4.1 ANALYSIS OF ALTERNATIVES

207. Following three alternatives were considered for the project.

4.2 ALTERNATIVE 1: NO PROJECT ALTERNATIVE

208. If no project alternative is selected, the existing situation of the traffic will continue to be the same. Existing Korangi Causeway remains congested, and during rainy season, the causeway is flooded with water making it inconvenient for public. Since the project area is surrounded by many industries including Pakistan Refinery Limited, residential areas, educational and health institutes, large population suffers from this problem. In addition to this, the construction of Malir Expressway that will serve as a link to M9 Motorway, the traffic is expected to increase over a period of time. If no action is taken at this stage, huge volumes of traffic will result in increased vehicular emissions, dust and noise due to traffic congestion. Time delays due to the traffic jams and associated conflicts/accidents will result in impairment of social wellbeing of the public.

ALTERNATIVE 2: resulting in noise, traffic congestion, vehicular emissions and accidents/conflicts ALIGNMENT ALONG THE EXISTING COASTLINE

4.3 ALTERNATIVE 3: was. Construction causing social disturbance and relocation cost. ALIGNMENT INCLUDING RECLAMATION OF LAND

209. Due to this option, traffic loads will be reduced because of availability of other route especially during rainy season. The reduced traffic flow will result in lesser vehicular emissions and noise. It will also save time and fuel and result in comfortable commute. However, embankment. This option will affect mangroves

- Due to reclamation, additional cost will be incurred; however the land can be utilized for future development. In this option, an alternate route will be available for the commuters of the project area, reducing traffic load on Korangi Creek Road and Korangi Causeway. Due to this option, traffic loads will be reduced because of availability of other route especially during rainy seasons. The reduced traffic flow will result in lesser vehicular emissions and noise. It will also save time and fuel and result in comfortable commute.

Table 4.1 gives a comparison of alternatives in tabular form.
Figure 4.1: Alternative 4 - Alternate access to Korangi Road (Existing Embankment)
Figure 4.2: Alternative 5 - ato
<table>
<thead>
<tr>
<th>Alternatives</th>
<th>Environmental</th>
<th>Social</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternative 1: No Project</td>
<td>• Existing environmental condition will prevail; however, by the increase in future traffic loads vehicular emissions due to traffic blockages and noise due to movement of traffic will continue to increase.</td>
<td>• Time delays due to traffic jams; • Accidents due to traffic jams may occur • Fuel consumption increase due to traffic jams; • Rerouting during rains due to flooding of causeway causing time delays and fuel consumption.</td>
</tr>
<tr>
<td>Alternative 2: oo</td>
<td>• Increased vehicular emissions due to traffic blockages and noise due to traffic jams</td>
<td>• Time delays due to traffic jams; • Accidents due to traffic jams may occur • Fuel consumption increase due to traffic jams;</td>
</tr>
<tr>
<td>Alternative 3: o</td>
<td>• Lesser vehicular emissions due to ease in movement of traffic; • Lesser noise due to reduced traffic load;</td>
<td>• Demolition of structures • Land acquisition and relocation</td>
</tr>
<tr>
<td>Alternative 4 - Alternate access to Korangi Road (Existing Embankment)</td>
<td>• Lesser vehicular emissions due to ease in movement of traffic; • Lesser noise due to reduced traffic load; • Removal of mangroves in the ROW.</td>
<td>• Lesser time delays and traffic jams; • Less Conflicts; • Less Fuel consumption; • Land acquisition will incur additional project cost; • Social disturbance and resettlement.</td>
</tr>
<tr>
<td>Alternative 5 - Alternate access to Korangi Road (New Embankment)</td>
<td>• Lesser vehicular emissions due to ease in movement of traffic; • Lesser noise due to reduced traffic load; • Removal of mangroves in the ROW.</td>
<td>• Time delays due to traffic jams; • Less conflicts due to smooth flow of traffic; • Less fuel consumption; • Improved speed and lesser travel distance; • Availability of additional land.</td>
</tr>
</tbody>
</table>
ROW;
- Reclamation of land may change hydrological regime & increase risk of flooding due to back flow. It may also affect bathymetry, current velocity and wave conditions. It

4.4 SELECTED OPTION

In the light of above discussion, Alternative 5 is considered as selected option due to its longterm benefits of reducing traffic load and consequent reduction in emissions, dust and noise from these vehicles. It will also save time and fuel and reduce conflicts. There will be ease in commuting to important destinations like hospitals, industries and educational institutes, it will also help in improved trade and development. The mangroves will be cut in both the alternatives. Land reclamation has negative impacts associated with it. However, the additional land will be utilized for proposed development. This option provides lesser travel time than alternative 2 and it helps avoid significant land acquisition and resettlement issues in alternative 2.
5 DESCRIPTION OF THE ENVIRONMENT

210. This section describes the existing conditions of physical, ecological, and socio-economic environment of the project area. Information on these aspects has been obtained from the review of available studies and data collected through field observations and analysis. The baseline surveys were carried out during November 08, 2020 to November 19, 2020.

5.1 PHYSICAL ENVIRONMENT

5.1.1 Topography

211. Karachi is located in the south of Sindh, on the coast of the Arabian Sea. It covers an area of approximately 3,600 km$^2$, comprised largely of flat or rolling plains, with hills on the western and northern boundaries of the urban sprawl. The city represents quite a variety of habitats such as the sea coast, islands, sand dunes, swamps, semi-arid regions, cultivated fields, dry stream beds, sandy plains, hillocks. The hills in Karachi are the off-shoots of the Kirthar Range. All these hills are devoid of vegetation and have wide intervening plains, dry river beds and water channels.

212. Classified according to physiographic features, Karachi City District can be divided into three broad categories: Hilly Region (Mountain Highland), Alluvial Plain (Piedmont Plain) and Coastal Areas (Valley Floor). The greatest height of the region is 76 m that gradually decreases to 1.5 m above mean sea level along the coastline. The topography of the project area ranges from 8-11 m.

213. Topography of project area is presented in Figure 5.1.
Figure 5.1: Topography of Project Area
5.1.2 Geology

214. The geology of Sindh is divisible in three main regions, the mountain ranges of Kirthar, Pab containing a chain of minor hills in the west and in east it is covered by the Thar Desert and part of Indian Platform where the main exposure is of Karonjhar Mountains, which is famous for Nagar Parkar Granite. In the north Sindh is enquired by rocks of Laki range extending to Suleiman range and its southern most part is encircled by the Arabian Sea. The rocks exposed in this area belong to upper Cretaceous which is recent in age. The sub-surface rocks are about 20,000 feet thick and belong to Cretaceous and Pre-Cretaceous periods. Mostly the rocks are of sedimentary origin of clastic and non-clastic nature and belong to marine, partly marine and fluviatile depositional environments.

215. The coastal region is found to be of tertiary and post-tertiary origin. The region has been formed by the upheaval of land from the Tethys Sea, which once extended up to the northern border of Pakistan but, gradually withdrew with the rising of the Himalayas.

216. The underlying rocks are mostly of marine origin, highly folded, faulted and fissured everywhere. They consist mainly of limestone and clay. The soil is alluvium with plenty of clay derived from land drainage and river discharge. It is rich in salts like sodium chloride, sodium carbonate and nitrates with some calcium, which comes from shell fragments. The muddy and clay-based soil is poor in other mineral substances. It is very badly drained andis not permeable. The pH of the soils ranges from 8.2 to 8.4.

217. The project site lie at the foot hills of Sulaiman Kirther Mountains and is comprised of unconsolidated surficial deposits of clay, silt, sand and gravel which forms distinct piedmont plains. These piedmont plains are characterized by gentler slope comprising of softer rocks and commonly contains parallel or concentric, low, scalloped, homoclinal ridges and hogbacks. The site-specific geological map of the area is shown in Figure 5.2.

5.1.3 Soil

218. The soil of Karachi city are classified into two types, the loamy sandy and gravelly soils of river valleys and alluvial cones near the coast line and shallow loamy gravelly soils and rock outcrops plateau. Geo-morphologically, the project area is mostly muddy comprises of mud flats with thick mangrove forest. The mangrove area is mostly sandy. The area above the mangroves is somewhat rocky and dry representing a typical habitat entirely different from the mangrove ecosystem\(^1\).

219. The geotechnical investigations indicated that the subsurface stratigraphy along the

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project alignment comprises overburden soils i.e. Lean Clay / Silty Clay / Silty Sand etc. up to the depth of 26 m below NSL. Bedrock, comprised of weak to very weak Claystone / Mudstone, from 26 m to maximum investigated depth of 30 m below NS.
Figure 5.2: Geology of Project Area
5.1.4 Seismology

220. Seismo-tectonics of Pakistan is related to interaction of the following three lithospheric plates: Indian, Arabian, and Eurasian plate. Tectonically, almost 75% of Pakistan is prone to earthquake as it lies on fault lines. Figure 5.3 shows the location of Karachi with respect to tectonic plate boundaries.

![Figure 5.3: Plate-Tectonic Sketch Map](image)

221. According to Building code of Pakistan, 2007 prepared by NESPAK, the project area falls in Seismic Zone 2B of Pakistan (moderate damage), and peak ground acceleration (PGA) from 0.16 to 0.24 g. Figure 5.4 shows the seismic zoning map of the Project area falling under Seismic Zone-2B. The Link Road for Korangi design must meet the criteria to withstand in seismic zone 2B.

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Figure 5.4: The Seismic Zoning Map of Project Area
5.1.5 Hydrology

a) Surface Water

222. Seawater despite being saltwater is also considered surface water. However, it is not being used as a source of drinking water for Karachi. Therefore, Indus River and Hub Dam on Hub River are the two major sources of surface water for Karachi.

223. The Hub Dam is a multi-purpose dam (municipal, industrial and irrigation purposes) constructed on the Hub River approximately 50 km to the north-west of Karachi city. The catchment area of the dam extends across two provinces namely Sindh and Balochistan, covering a total area of 8,730 km$^2$.

224. Two non-perennial river streams namely Lyari River and Malir River are also present in the city. The River Malir flows from the east towards the south and center, and the River Lyari flows from north to the southwest. Thaddo and Chakalo are the main tributaries of the River Malir.

225. Karachi’s untreated sewerage is being drained into the Malir River bed. Solid waste, plastic bags and other trash are also dumped in the sewerage adding to pollution. Urban flooding occurs when continuous and heavy rainfall over a short duration overwhelms the city’s drainage capacity. The heavy rainfall over a short duration, saturates the soil and increases run-off water, constructions and settlements over riverbeds and on flood plains, and unplanned infrastructure growth also contribute in urban flooding. In addition to this, encroachments on drains, the dumping of municipal waste and sewage in them, and the lack of open spaces and parklands also cause the city’s perennial flooding problem. Figure 5.5 gives surface water sources of the project area.

b) Groundwater Resources

226. Ground water resources in Karachi are limited. Small amount of groundwater is extracted for private use in the Karachi area. The aquifers close to the coastal belt are mostly saline and unusable for domestic purposes. Aquifers near the Hub River are well developed and serve as sources of water for agriculture and domestic use. The aquifers are estimated to lie at depths of 50-100 m.

227. Dumlottee Well Field, located on the banks of Malir River in the Dumlottee area about 30 km to the northeast of the city supplies water for few months after the rainy season. The system is almost dry in the rest of the year.

228. Groundwater was encountered at a depth of 0.6 m to 6.0 m below NSL in the project area.
area during field geotechnical investigations executed in the month of September 2020.

c) Groundwater Recharge Sources

229. Different water-sources are contributing to the groundwater recharge in Karachi. The first possible source is the rainfall. As the city of Karachi suffers from deficit of precipitation, the contribution to shallow groundwater storage from rain is very little. However, rainfall in the hinterlands and other areas surrounding Karachi may significantly contribute to the groundwater flow-system. The two freshwater sources are the Hub Lake/Hub Dam and the Indus River. Water from Hub Dam and the Indus River is piped to various residential zones in Karachi for drinking and irrigation purposes.

5.1.6 Karachi Coastline

230. The Sindh coastal region is located in the South-Eastern part of the country between the Indian border along Sir Creek on the east to Hub River along the Balochistan coast on the west. The Sindh Coast can further be sub-divided into two parts, the Indus Delta Creek system and the Karachi Coast. The Indus Delta (approx. 1000 sq. miles) is the most prominent ecological feature of the Sindh Coast (covers 85% of the coastal belt in Sindh) the coastal morphology of which is characterized by a network of tidal creeks and mudflats occupied by mangrove vegetation.

231. The Indus Delta starts from Korangi Creek and extends to Sir Creek. The area covered by the Indus Delta is more than 600,000 hectares of tidal land and mud flats, most of which are inundated during flood tides. There are seventeen major creeks in the Indus Delta dominated by one of the largest arid mangrove forests in the world. Mangroves are used as fuel and fodder for livestock and camels. These mangrove forests are divided into two main blocks, the Keti Bundar block and the Shah Bundar block. Beyond the Shah Bundar block of the Thatta District there is a narrow belt of the Rann of Kutch which has important wetlands. The Karachi Coast constitutes a coastal belt of about 100 km in length situated between the Gharo Creek and Hub River on the west. The Karachi Coast starts from Hub River outfall in the Arabian Sea and the open sea coastline of Karachi ends at Korangi Creek. Further along Korangi-Phitti and Gharo Creeks, it ends at the Ghagar Nala outfall into Gharo Creek. There are three main islands, i) Churna, which is located about a kilometer beyond Hub River outfall, ii) Shams Pir, in the western backwaters behind Sandspit, and iii) Bundal Island Located not far from Sea View beach. The western backwaters and the eastern backwaters (the Chinna Creek) of the Karachi Port house mangrove forests Situated along the Karachi Coast are two ports, a nuclear power plant, two fish harbors, industrial estates and the Steel Mill. Beaches of touristic importance are at Hawk’s Bay, Sandspit, Manora, Clifton and Sea View.
5.1.7 Important features of Karachi Coast

i. Left Bank Outfall Drain (LBOD)

232. In the recent past, a Left Bank Outfall Drain (LBOD) has been constructed on the area located on the left bank of the Indus with the primary aim of reclaiming the agricultural lands by lowering the water table thereby reducing the salinity from the arable lands. The drain was designed to address the problem of waterlogging and salinity by providing a comprehensive system of surface and sub-surface drainage through a network of lateral and spinal drains to transport excess salts and drainage effluents to the coastal zone near the Indian border. This saline effluent, having salinity as high as 30 millisiemens per centimeter, (15000 ppm) was continuously discharged into the Indus Delta.

ii. Coastal and Marine Islands Bundal and Buddo Islands

233. These islands are located in Korangi, Phitti and Jhari creeks. Bundal Island is one of the largest and highest of all the islands along the Sindh Coast, with a length of about 8 km. The width of the island varies - it is about 4 km wide in the north and 1 km in the south. There are shifting sand dunes on the island, some of which gain heights of up to 3 m. A portion of the northern area of the island is covered at high water and has a thick growth of mangroves at the extreme northern point. Bundal is also used by fishermen as a transit point when they venture out to the high seas for fishing, drying their catch of fish and mending their nets.

iii. Coastal Pollution

234. Karachi is a coastal city and the industrial hub of the country where many medium and large sized industries are located. It is also the biggest urban center of the country. Due to inadequate arrangements for treatment of the industrial, domestic and municipal effluents, they are discharged into the coastal waters. Coastal pollution is an ultimate threat to the biodiversity of coastal ecosystems.

5.1.8 Drainage

235. Rivers Malir and Lyari basins are the two main basins which drain about 80 per cent of the surface runoff of the city. Minor basins include Budnai and the coastal basins. Surface runoff mostly sewage is collected by hundreds of small and large sewage channels in the basins, finally draining into the Arabian Sea.

236. Unsegregated industrial and municipal wastewater is gathered through pipes and uncovered channels and drained through rivers and nullahs (streams) into the Lyari and Malir rivers, and finally disposed off to the nearest coastal belt through the 232 km network of Mainnullah and 1000 km network of town drains.
5.1.9 Water Supply in Karachi

237. The Water supply provided by Karachi Water and Sewerage Board (KWSB) is approximately 665 MGD against a demand of 820-1200 MGD resulting in a shortfall of 155-535 MGD. Unfortunately, an estimated 35 per cent (232 MGD) of the supplied water is lost during transmission thus decreasing the water availability to a mere 433 MGD.

5.1.10 Urban Flooding

238. Climate of Karachi is semi-arid and rainfall is low and highly variable. Torrential rains and heavy rainfall mostly occur in the month of June under the effect of tropical storms. Torrential and heavy rains rarely affect coastal areas but cause flooding within the city. As the result of a tropical storm (6 June 2010) Karachi received 130 mm rain within a day which caused huge surface runoff. The heavy monsoon rain mostly occurs in July and August and is the main cause of flooding in the city. However, its reoccurrence is estimated to occur at between about 3 to 5-year intervals. Flood affected areas of the city and areas susceptible to flooding include the old city areas such as Kharadar, Mithadar, Bunder Road, Ram-swami and Arambagh.

239. The recent event of floods were a result of record rainfall combined with an inadequate drainage system in the city. At least 41 people were killed in the flooding due to electrocution and rain related accidents. The rains that caused the flood was highest recorded for a single day, at 345 mm (13.58 in), after 298.4 mm (11.75 in) set in 1984. This is considered the worst flooding Karachi has suffered in its history. During the floods, authorities employed boats to rescue people stranded in the streets across the city. Fallen power lines, out of service cell phone towers, and widespread fuel shortages due to heavy reliance on alternative power sources created many problems for the residents.
Figure 5.5: Surface Water Resources of the Project Area
5.1.11 Climate

The climate of the Karachi can be characterized by dry, hot and humid conditions and in general terms it is moderate, sunny and humid. There is a minor seasonal intervention of a mild winter from mid-December to mid-February followed by a long hot and humid summer extending from April to September, with monsoon rains from July to mid-September. The level of precipitation is low for most of the year. Karachi also receives the monsoon rains from July to September. The humidity levels usually remain high from March to November, while very low in winter as the wind direction in winter is North Easterly. The description of various climatic parameters in the project area is as follows:

a) Temperature

Table 5.1 and Figure 5.6 show the maximum, minimum and average monthly temperatures of the Karachi for the recent years (2016-2020). The maximum temperature range is 24 – 37 °C. The average temperature range is 21 - 34 °C. The minimum monthly temperature range is 17– 30 °C. April to November are the hot months whereas cold months are December to March.

In 2015, Karachi also experienced the deadliest heat wave which had been seen in over 50 years. The city witnessed sweltering heat that continued for more than five days and in its wake left over 1,200 people dead and 40,000 suffering from heatstroke and heat exhaustion. On the heat index scale, which is a good explanatory concept utilized to gauge the impact of heat-wave phenomenon to a person in a particular area by combining the overall impacts of temperature, air pressure, humidity and wind speed, in Karachi, during this event, the maximum temperature recorded was 44.8°C but the heat index was around 66°C on the peak heat wave day i.e. 20th June 2015 because of low air pressure and wind speed and very high humidity.

Table 5.1: Maximum, Minimum and Average Temperature (Karachi)

<table>
<thead>
<tr>
<th>Year</th>
<th>Month's Temperature °C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Jan</td>
</tr>
<tr>
<td>2016</td>
<td>Max</td>
</tr>
<tr>
<td></td>
<td>Avg</td>
</tr>
<tr>
<td></td>
<td>Min</td>
</tr>
<tr>
<td>2017</td>
<td>Max</td>
</tr>
<tr>
<td></td>
<td>Avg</td>
</tr>
<tr>
<td></td>
<td>Min</td>
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<td>2018</td>
<td>Max</td>
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<td></td>
<td>Avg</td>
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<td>Min</td>
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<td></td>
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<tr>
<td>Max</td>
<td>27 27 30 34</td>
</tr>
<tr>
<td>Avg</td>
<td>35 36 33 31</td>
</tr>
<tr>
<td>Min</td>
<td>32 34 30 27</td>
</tr>
</tbody>
</table>

Source: Extract from Temperature Graph (World Weather Online)


Figure 5.6: Maximum, Minimum and Average Temperature (Karachi)

b) Rainfall

243. Mean monthly rainfall data and the number of rainy days recorded at Airport Weather Station, Karachi met station in the vicinity of the Project Area is given in Table 5.2. The minimum average monthly rainfall of the project area varies from 0 to 0.8 mm whereas maximum average monthly rainfall varies from 14.31 mm to 118.90 mm. As this region falls in the semi-arid climatic zone, the rainfall in Karachi is extremely low and erratic.

244. The maximum rainfall occurs during the months of July and August. The recent record breaking rainfall in August 2020 turned Karachi roads into waterways. Winter rains generally occur during the months of December to March, whereas, May, October, November is normally the months with least precipitation.
Table 5.2: Average Rainfall of Karachi

<table>
<thead>
<tr>
<th>Year</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>2.63</td>
<td>0</td>
<td>3.9</td>
<td>0.11</td>
<td>0.09</td>
<td>9.71</td>
<td>10.23</td>
<td>41.09</td>
<td>1.2</td>
<td>0.01</td>
<td>0</td>
<td>0.1</td>
</tr>
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<td>2017</td>
<td>5.61</td>
<td>0.03</td>
<td>0.1</td>
<td>0.01</td>
<td>0.06</td>
<td>3.47</td>
<td>20.4</td>
<td>27.17</td>
<td>16.92</td>
<td>0</td>
<td>0.14</td>
<td>0.22</td>
</tr>
<tr>
<td>2018</td>
<td>0.01</td>
<td>0</td>
<td>0.04</td>
<td>0.53</td>
<td>0</td>
<td>5.92</td>
<td>11.86</td>
<td>14.31</td>
<td>2.53</td>
<td>0</td>
<td>0</td>
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<tr>
<td>2019</td>
<td>13.7</td>
<td>4.8</td>
<td>3.2</td>
<td>18</td>
<td>0.8</td>
<td>2.9</td>
<td>61</td>
<td>118.9</td>
<td>16.1</td>
<td>12.6</td>
<td>5.6</td>
<td>3.3</td>
</tr>
<tr>
<td>2020</td>
<td>3</td>
<td>0</td>
<td>2.1</td>
<td>0.1</td>
<td>0.7</td>
<td>3.9</td>
<td>32.1</td>
<td>227.7</td>
<td>0.8</td>
<td>0.4</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

Source: Extract from Temperature Graph (World Weather Online)

245. Graphical representation of month-wise precipitation is provided below in Figure 5.7. The maximum rainfall occurs during the monsoon season in the months of July and August.

![Figure 5.7: Average Rainfall of Karachi (mm)](image)

c) Relative Humidity

246. The relative humidity data at Karachi metrological station at Airport near the proposed Project Area is given in Table 5.3. Relative humidity levels are mostly high during the month of July and August, whereas, these are lower during December.

Table 5.3: Average Humidity of Karachi

<table>
<thead>
<tr>
<th>Year</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>48</td>
<td>33</td>
<td>49</td>
<td>54</td>
<td>66</td>
<td>67</td>
<td>72</td>
<td>73</td>
<td>71</td>
<td>63</td>
<td>39</td>
<td>44</td>
</tr>
<tr>
<td>2017</td>
<td>37</td>
<td>29</td>
<td>49</td>
<td>52</td>
<td>63</td>
<td>68</td>
<td>74</td>
<td>72</td>
<td>69</td>
<td>55</td>
<td>38</td>
<td>25</td>
</tr>
<tr>
<td>2018</td>
<td>42</td>
<td>45</td>
<td>50</td>
<td>51</td>
<td>52</td>
<td>69</td>
<td>73</td>
<td>75</td>
<td>72</td>
<td>47</td>
<td>37</td>
<td>35</td>
</tr>
</tbody>
</table>
Graphical representation of month-wise Relative Humidity is provided below in Figure 5.8.

![Figure 5.8: Average Humidity (%) of Karachi](image)

**d) Wind Speed**

The mean monthly wind speed at Airport, Karachi meteorological station around proposed Project Area is given in Table 5.4. The data reveals that the wind speeds are generally lower during winter (December to March) while higher wind speeds are recorded during summer (May, June, July).

<table>
<thead>
<tr>
<th>Year</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max.</td>
<td>10.1</td>
<td>11.7</td>
<td>16.3</td>
<td>19.1</td>
<td>24.5</td>
<td>24.2</td>
<td>24</td>
<td>21.6</td>
<td>23.7</td>
<td>15.3</td>
<td>10.2</td>
<td>10.1</td>
</tr>
<tr>
<td>Avg.</td>
<td>10.1</td>
<td>11.7</td>
<td>16.3</td>
<td>19.1</td>
<td>24.5</td>
<td>24.2</td>
<td>24</td>
<td>21.6</td>
<td>23.7</td>
<td>15.3</td>
<td>10.2</td>
<td>10.1</td>
</tr>
<tr>
<td>2017</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max.</td>
<td>13.3</td>
<td>13.5</td>
<td>16.2</td>
<td>20.4</td>
<td>23.6</td>
<td>23.8</td>
<td>26</td>
<td>23.8</td>
<td>19.4</td>
<td>14.4</td>
<td>10.7</td>
<td>13.3</td>
</tr>
<tr>
<td>Avg.</td>
<td>13.3</td>
<td>13.5</td>
<td>16.2</td>
<td>20.4</td>
<td>23.6</td>
<td>23.8</td>
<td>26</td>
<td>23.8</td>
<td>19.4</td>
<td>14.4</td>
<td>10.7</td>
<td>13.3</td>
</tr>
<tr>
<td>2018</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max.</td>
<td>10.3</td>
<td>11.6</td>
<td>16.6</td>
<td>18.9</td>
<td>21.6</td>
<td>25</td>
<td>25.2</td>
<td>24.7</td>
<td>22.1</td>
<td>20.6</td>
<td>17.5</td>
<td>17.8</td>
</tr>
</tbody>
</table>
### Environmental Impact Assessment (EIA)

<table>
<thead>
<tr>
<th>Year</th>
<th>Avg.</th>
<th>10.3</th>
<th>11.6</th>
<th>16.6</th>
<th>18.9</th>
<th>21.6</th>
<th>25</th>
<th>25.2</th>
<th>24.7</th>
<th>22.1</th>
<th>13.6</th>
<th>11.4</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>2019</td>
<td>Max.</td>
<td>18.6</td>
<td>23.3</td>
<td>24.1</td>
<td>29.5</td>
<td>32.8</td>
<td>29.7</td>
<td>34.7</td>
<td>28.8</td>
<td>25.6</td>
<td>20.9</td>
<td>20.4</td>
<td>21.4</td>
</tr>
<tr>
<td></td>
<td>Avg.</td>
<td>12.3</td>
<td>16.3</td>
<td>16.8</td>
<td>22.7</td>
<td>26.2</td>
<td>23.8</td>
<td>30.6</td>
<td>24</td>
<td>20.4</td>
<td>14.8</td>
<td>15</td>
<td>15.9</td>
</tr>
<tr>
<td>2020</td>
<td>Max.</td>
<td>24.2</td>
<td>21.7</td>
<td>26.6</td>
<td>29.4</td>
<td>33.3</td>
<td>28.9</td>
<td>31.9</td>
<td>29.5</td>
<td>23.6</td>
<td>20.9</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>Avg.</td>
<td>17.3</td>
<td>14.1</td>
<td>17.6</td>
<td>20.9</td>
<td>25.7</td>
<td>23.1</td>
<td>25.8</td>
<td>23.7</td>
<td>19</td>
<td>14.3</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

**Source:** Extract from Temperature Graph (World Weather Online)

249. Graphical representation of month-wise wind speed at Airport Karachi meteorological gauging station is provided below in Figure 5.9.

![Wind Speed Graph](image)

**Figure 5.9: Monthly Average and Maximum Wind Speed of Karachi**

### 5.1.12 Air Quality Index

250. Air Quality Index (AQI) is a uniform index for reporting and forecasting daily air quality. It is used to report criteria pollutants for ambient air including ground-level ozone, Total Suspended Particulate Matter, PM$_{10}$ and PM$_{2.5}$, carbon monoxide (CO), and sulfur dioxide (SO$_2$) and Nitrogen dioxide (NO$_2$) and (NO). The Index is used for reporting air quality to public. Usually the values communicated to public comprises of PM$_{2.5}$ as these particles can be easily inhaled and affect human health. It is color coded system that ranges from 0 to 500 (no units). **Table 5.5** indicates the colours, range of PM$_{2.5}$ and associated Health Concerns to the people.
Table 5.5: Ambient Air Quality Monitoring

<table>
<thead>
<tr>
<th>AQI Value</th>
<th>AQI Category</th>
<th>Health Concerns</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 50</td>
<td>Good</td>
<td>None</td>
</tr>
<tr>
<td>51 - 100</td>
<td>Moderate</td>
<td>Unusually sensitive people should reduce prolonged or heavy exertion</td>
</tr>
<tr>
<td>101 - 150</td>
<td>Unhealthy for Sensitive Groups</td>
<td>Sensitive groups should reduce prolonged or heavy exertion</td>
</tr>
<tr>
<td>151 - 200</td>
<td>Unhealthy</td>
<td>Sensitive groups should avoid prolonged or heavy exertion; general public should reduce prolonged or heavy exertion</td>
</tr>
<tr>
<td>201 - 300</td>
<td>Very Unhealthy</td>
<td>Sensitive groups should avoid all physical activity outdoors; general public should avoid prolonged or heavy exertion</td>
</tr>
<tr>
<td>301 - 500</td>
<td>Hazardous</td>
<td>Everyone should avoid all physical activity outdoors</td>
</tr>
</tbody>
</table>

251. Recently, Karachi is being ranked in top five places in the world with higher AQI values as indicated in Air Visual. Now a days AQI of Karachi is in the range of unhealthy to very unhealthy (AQI 238 to 177 from 7 December to 10 December, Ref: iqair.com).

5.1.13 Climate Risk and Vulnerability

252. Karachi city has an arid climate with low rainfall which is highly variable, with torrential rain taking place from time to time and bringing with it heavy rainfall within a short duration, leading to an intensification of the surface runoff. This is because the rate of water percolation into soil is lower than the amount of rain water falling on the surface. Heavy showers take place in the city either due to the effects of tropical storms usually in June, which rarely affect coastal areas but bring heavy showers for short periods and cause flooding. Recent studies of Climate Risk Screening and Assessment carried out in the area indicates risks of flooding due to precipitation and heat waves due to extreme and prolonged high temperatures. The area is sensitive in general to tropical Cyclone and Sea Level Rise.\(^4\)

5.1.14 Environmental Monitoring

253. In order to determine the ambient air, noise levels, water and surface water quality of the study area, some locations were selected for environmental monitoring and samples collection. The selection was based on the following criteria.

- Ambient air and noise monitoring points are selected based on the Source-Receptor Approach. The sources include traffic, construction activities and construction camps whereas the receptors comprise educational, health, religious, cultural, archeological, ecological resources, etc. along the project alignment; and
- Major surface water bodies e.g. river, nullahs and nearby water estuary within the

\(^4\) Climate Risk Assessment: Karachi Bus Rapid Transit (BRT) Red Line Project
COI are considered for selection of surface as well as wastewater sampling locations.

- Drinking Water available in the vicinity of project area.

254. **Table 5.6** gives selected locations for environmental monitoring.

### Table 5.6: Ambient Air Quality Monitoring

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Parameters</th>
<th>Sampling Points</th>
<th>Sampling Locations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ambient Air</td>
<td>3</td>
<td>Attock Petrol Pump Korangi Crossing, Jam Sadiq Bridge, Korangi, Barrett Hodgson University</td>
</tr>
<tr>
<td>2</td>
<td>Noise Level</td>
<td>3</td>
<td>Attock Petrol Pump Korangi Crossing, Jam Sadiq Bridge, Korangi, Barrett Hodgson University Road</td>
</tr>
<tr>
<td>3</td>
<td>Surface/Wastewater</td>
<td>2</td>
<td>Adjacent to Attock Petrol Pump Korangi Crossing, Malir River Estuary</td>
</tr>
<tr>
<td>4</td>
<td>Drinking Water</td>
<td>1</td>
<td>Attock Petrol Pump Korangi Crossing</td>
</tr>
</tbody>
</table>

a) **Air Quality**

255. The ambient air quality monitoring for Nitrogen Dioxide (NO\(_2\)), Nitrogen Oxide (NO), Sulfur Dioxide (SO\(_2\)), Carbon Monoxide (CO), Ozone (O\(_3\)), Particulate Matter (PM\(_{2.5}\), PM\(_{10}\)), Suspended Particulate Matter (SPM) and Lead was carried at three locations; i. Attock Petrol Pump Korangi Crossing, ii. Jam Sadiq Bridge, Korangi and iii. Barrett Hodgson University. The monitoring was conducted for 24 hours duration for NO\(_2\), NO, SO\(_2\), Lead, PM\(_{2.5}\), PM\(_{10}\) and SPM, 1 hour for O\(_3\) and 8 hours for CO.

256. The average concentration of ambient air pollutants are given in **Table 5.7**.

### Table 5.7: Ambient Air Quality Monitoring

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Units</th>
<th>Average Obtained Concentration</th>
<th>SEQS, 2016</th>
<th>IFC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Attok Petrol Pump, Korangi Crossing</td>
<td>Jam Sadiq Bridge, Korangi</td>
<td>Barrett Hodgson University</td>
</tr>
<tr>
<td>Nitrogen Dioxide (NO(_2))</td>
<td>µg/m3</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>Nitrogen Oxide (NO)</td>
<td>µg/m3</td>
<td>9.4</td>
<td>9.2</td>
<td>8.2</td>
</tr>
<tr>
<td>Sulfur Dioxide (SO(_2))</td>
<td>µg/m3</td>
<td>5.8</td>
<td>4.6</td>
<td>3.9</td>
</tr>
<tr>
<td>Carbon Monoxide (CO)</td>
<td>mg/m3</td>
<td>2.8</td>
<td>3.1</td>
<td>3.1</td>
</tr>
<tr>
<td>Particulate Matter (PM(_{10}))</td>
<td>µg/m3</td>
<td>465.4</td>
<td>378.3</td>
<td>219.1</td>
</tr>
<tr>
<td>Particulate Matter (PM(_{2.5}))</td>
<td>µg/m3</td>
<td>141.9</td>
<td>81.3</td>
<td>73.6</td>
</tr>
<tr>
<td>Total Suspended Particulate Matter (TSP)</td>
<td>µg/m³</td>
<td>616.9</td>
<td>510.5</td>
<td>287.0</td>
</tr>
<tr>
<td>Lead</td>
<td>µg/m³</td>
<td>&lt;1.0</td>
<td>&lt;1.0</td>
<td>&lt;1.0</td>
</tr>
<tr>
<td>Ozone (O₃)</td>
<td>µg/m³</td>
<td>20.7</td>
<td>19.3</td>
<td>39.1</td>
</tr>
</tbody>
</table>

*Source: SGS Laboratory Test Results, 2020*

257. The above table indicates that the concentrations of CO, NO₂ and SO₂ are well within limits specified by the SEQS. However, Suspended Particulate Matter including both PM₂.₅ and PM₁₀ are higher in the project area as the location is adjacent to the Korangi Industrial Area.

b) Noise Monitoring

258. Noise levels were monitored with the help of digital sound meter at three locations for twenty-four (24) hours with an interval of one hour. The average noise levels at the given locations are tabulated under:

**Table 5.8: Noise Level Monitoring**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Day Time</td>
<td>70</td>
<td>65</td>
<td>71.72</td>
<td>60.04</td>
<td>63.02</td>
</tr>
<tr>
<td>2.</td>
<td>Night Time</td>
<td>70</td>
<td>55</td>
<td>64.30</td>
<td>57.56</td>
<td>59.40</td>
</tr>
</tbody>
</table>

*Source: SGS Laboratory Test Results, 2020*

259. Noise monitoring results show that the noise levels at day and night time exceed from the permissible limits of SEQS (commercial) near Attok Petrol Pump Korangi Crossing. Whereas, near Jam Sadiq Bridge, Korangi and Barrett Hodgson University, noise levels exceed only during nigh time from SEQS limits. The locations monitored are along the road and movement of traffic increases noise level in the area.

c) Surface / Wastewater Quality

260. The surface/wastewater quality was measured at two (02) locations. The samples were analyzed for the parameters specified in SEQS, 2016. The detailed surface and wastewater results are given in **Table 5.9.**

**Table 5.9: Surface / Wastewater Quality Monitoring**

<table>
<thead>
<tr>
<th>Test Results</th>
<th>SEQS, 2016</th>
<th>IFC</th>
</tr>
</thead>
</table>
### Environmental Impact Assessment (EIA)

#### Adjacent to Attock Petrol Pump Korangi Crossing (Wastewater)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Adjacent to Attock Petrol Pump Korangi Crossing (Wastewater)</th>
<th>Malir River Estuary (Surface water)</th>
<th>(Wastewater)</th>
<th>(Wastewater)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>24.2</td>
<td>22.2</td>
<td>&lt;3°C</td>
<td>&lt;3°C</td>
</tr>
<tr>
<td>pH</td>
<td>8.00</td>
<td>5.59</td>
<td>6-9</td>
<td>6-9</td>
</tr>
<tr>
<td>Biochemical Oxygen Demand (BOD₅)</td>
<td>63.00</td>
<td>-</td>
<td>80</td>
<td>50</td>
</tr>
<tr>
<td>Chemical Oxygen Demand (COD)</td>
<td>159.00</td>
<td>-</td>
<td>150</td>
<td>250</td>
</tr>
<tr>
<td>Total Suspended Solids (TSS)</td>
<td>40.00</td>
<td>-</td>
<td>200</td>
<td>50</td>
</tr>
<tr>
<td>Total Dissolved Solids (TDS)</td>
<td>2820.00</td>
<td>38516.00</td>
<td>3500</td>
<td>-</td>
</tr>
<tr>
<td>Phenolic Compounds (as Phenols)</td>
<td>0.016</td>
<td>&lt;0.002</td>
<td>0.1</td>
<td>0.5</td>
</tr>
<tr>
<td>Grease and Oil</td>
<td>35.00</td>
<td>-</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Chloride (Cl)</td>
<td>1037.44</td>
<td>20272.58</td>
<td>1000</td>
<td></td>
</tr>
<tr>
<td>Fluoride (F)</td>
<td>0.38</td>
<td>0.35</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>Cyanide (CN)</td>
<td>&lt;0.01</td>
<td>&lt;0.01</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>An-ionic Detergents (as MBAs)</td>
<td>0.39</td>
<td>-</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Sulfate (SO₄)</td>
<td>360.88</td>
<td>-</td>
<td>600</td>
<td></td>
</tr>
<tr>
<td>Sulfide (S)</td>
<td>&lt;1.00</td>
<td>-</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Ammonia (NH₃)</td>
<td>34.98</td>
<td>-</td>
<td>40</td>
<td>10</td>
</tr>
<tr>
<td>Cadmium (Cd)</td>
<td>&lt;0.003</td>
<td>&lt;0.003</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>Chromium (Cr)</td>
<td>0.020</td>
<td>&lt;0.005</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>Copper (Cu)</td>
<td>0.042</td>
<td>0.014</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Lead (Pb)</td>
<td>&lt;0.005</td>
<td>&lt;0.005</td>
<td>0.5</td>
<td>0.1</td>
</tr>
<tr>
<td>Mercury (Hg)</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
<td>0.01</td>
<td>0.01</td>
</tr>
<tr>
<td>Selenium (Se)</td>
<td>&lt;0.005</td>
<td>&lt;0.005</td>
<td>0.5</td>
<td>0.1</td>
</tr>
<tr>
<td>Nickel (Ni)</td>
<td>&lt;0.005</td>
<td>&lt;0.005</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Silver (Ag)</td>
<td>&lt;0.005</td>
<td>-</td>
<td>1.0</td>
<td>0.5</td>
</tr>
<tr>
<td>Total Toxic Metals</td>
<td>0.76</td>
<td>-</td>
<td>2.0</td>
<td>10</td>
</tr>
<tr>
<td>Zinc (Zn)</td>
<td>0.027</td>
<td>0.005</td>
<td>5.0</td>
<td>2.0</td>
</tr>
<tr>
<td>Arsenic (As)</td>
<td>&lt;0.005</td>
<td>&lt;0.005</td>
<td>1.0</td>
<td>0.1</td>
</tr>
<tr>
<td>Barium (Ba)</td>
<td>0.043</td>
<td>0.016</td>
<td>1.5</td>
<td>-</td>
</tr>
<tr>
<td>Iron (Fe)</td>
<td>0.33</td>
<td>-</td>
<td>8.0</td>
<td>3.5</td>
</tr>
<tr>
<td>Manganese (Mn)</td>
<td>0.16</td>
<td>0.087</td>
<td>1.5</td>
<td>-</td>
</tr>
<tr>
<td>Boron (B)</td>
<td>0.68</td>
<td>2.0</td>
<td>6.0</td>
<td>-</td>
</tr>
<tr>
<td>Residual Chlorine (Cl₂)</td>
<td>&lt;1.00</td>
<td>&lt;1.00</td>
<td>1.0</td>
<td>0.2</td>
</tr>
</tbody>
</table>

**Source:** SGS Laboratory Test Results, 2020

261. It is evident from the results that COD and Chloride of wastewater (adjacent to Attock Petrol Pump Korangi Crossing) is higher than the prescribed limits of SEQS.

### d) Drinking/Ground Water Quality

262. Drinking water samples were taken from at project site and was analyzed for physical, chemical and microbiological parameters.

263. Table 5.10 shows the results of ground water analysis.
### Table 5.10: Drinking Water Quality Monitoring

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>Results</th>
<th>SEQS</th>
<th>WHO</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A) Physical and Chemical Analysis</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature</td>
<td></td>
<td>23.2</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Color</td>
<td></td>
<td>5.00</td>
<td>&lt; 15 TCU</td>
<td>&lt;15TCU</td>
</tr>
<tr>
<td>Taste</td>
<td></td>
<td>Sweet</td>
<td>Non Objectionable/ Acceptable</td>
<td>Non Objectionable/ Acceptable</td>
</tr>
<tr>
<td>Odor</td>
<td></td>
<td>odorless</td>
<td>Non Objectionable/ Acceptable</td>
<td>Non Objectionable/ Acceptable</td>
</tr>
<tr>
<td>Turbidity</td>
<td>PT-Co</td>
<td>2.0</td>
<td>&lt; 5 NTU</td>
<td>&lt; 5 NTU</td>
</tr>
<tr>
<td>Total Hardness (as CaCO₃)</td>
<td>NTU</td>
<td>185.37</td>
<td>&lt;500.00</td>
<td>NS</td>
</tr>
<tr>
<td>Total Dissolved Solids (TDS)</td>
<td>mg/l</td>
<td>312.00</td>
<td>&lt; 1000</td>
<td>&lt; 1000</td>
</tr>
<tr>
<td>pH</td>
<td>mg/l</td>
<td>7.58</td>
<td>6.5-8.5</td>
<td>6.5-8.5</td>
</tr>
<tr>
<td>Aluminum (Al)</td>
<td>mg/l</td>
<td>0.017</td>
<td>0.2</td>
<td>0.2</td>
</tr>
<tr>
<td>Antimony (Sb)</td>
<td>mg/l</td>
<td>&lt;0.005</td>
<td>0.02</td>
<td>0.02</td>
</tr>
<tr>
<td>Arsenic (As)</td>
<td>mg/l</td>
<td>&lt;0.005</td>
<td>0.01</td>
<td>0.01</td>
</tr>
<tr>
<td>Barium (Ba)</td>
<td>mg/l</td>
<td>0.047</td>
<td>0.7</td>
<td>0.7</td>
</tr>
<tr>
<td>Boron (B)</td>
<td>mg/l</td>
<td>0.077</td>
<td>0.3</td>
<td>0.3</td>
</tr>
<tr>
<td>Cadmium (Cd)</td>
<td>mg/l</td>
<td>&lt;0.003</td>
<td>0.003</td>
<td>0.003</td>
</tr>
<tr>
<td>Chloride (Cl)</td>
<td>mg/l</td>
<td>102.04</td>
<td>250</td>
<td>250</td>
</tr>
<tr>
<td>Chromium (Cr)</td>
<td>mg/l</td>
<td>&lt;0.005</td>
<td>0.05</td>
<td>0.05</td>
</tr>
<tr>
<td>Copper (Cu)</td>
<td>mg/l</td>
<td>0.011</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Cyanide (CN)</td>
<td>mg/l</td>
<td>&lt;0.01</td>
<td>0.07</td>
<td>0.07</td>
</tr>
<tr>
<td>Fluoride (F)</td>
<td>mg/l</td>
<td>0.10</td>
<td>1.5</td>
<td>1.50</td>
</tr>
<tr>
<td>Lead (Pb)</td>
<td>mg/l</td>
<td>&lt;0.005</td>
<td>0.01</td>
<td>0.01</td>
</tr>
<tr>
<td>Manganese (Mn)</td>
<td>mg/l</td>
<td>0.005</td>
<td>0.5</td>
<td>0.01</td>
</tr>
<tr>
<td>Mercury (Hg)</td>
<td>mg/l</td>
<td>&lt;0.001</td>
<td>0.001</td>
<td>0.001</td>
</tr>
<tr>
<td>Nickel (Ni)</td>
<td>mg/l</td>
<td>&lt;0.005</td>
<td>0.02</td>
<td>0.02</td>
</tr>
<tr>
<td>Nitrate (NO₃)</td>
<td>mg/l</td>
<td>0.11</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Nitrite (NO₂)</td>
<td>mg/l</td>
<td>&lt;0.003</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Selenium (Se)</td>
<td>mg/l</td>
<td>&lt;0.005</td>
<td>0.01</td>
<td>0.01</td>
</tr>
<tr>
<td>Residual Chlorine (Cl₂)</td>
<td>mg/l</td>
<td>&lt;1.00</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Phenolic Compounds (as Phenols)</td>
<td>mg/l</td>
<td>&lt;0.002</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Zinc (Zn)</td>
<td>mg/l</td>
<td>0.025</td>
<td>3.0</td>
<td>3.0</td>
</tr>
<tr>
<td><strong>B</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Coliforms</td>
<td>CFU/ 100ml</td>
<td>27</td>
<td>Must not be detectable in 100 ml</td>
<td></td>
</tr>
<tr>
<td>Feacal Coliforms</td>
<td>CFU/ 100ml</td>
<td>absent</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*SGS Laboratory Test Results, 2020*
264. The sample of drinking water showed presence of Coliforms whereas fecal Coliform was not found in the sample. The chemical parameters were within the range of SEQS.

265. The detailed laboratory results of environmental monitoring and testing are attached in Annex-I.

266. The environmental monitoring map is shown in Figure 5.10. The plate 5.1 shows the photographs of environmental monitoring and sample collection points for the proposed project.
Figure 5.10: Environmental monitoring Locations along the alignment
Plate 5.1: Environmental Monitoring and Sampling Locations
5.1.15 Industrial Activity in Project Area

267. Karachi is the hub of the industrial and commercial activities of the country. It has major industrial estates of Pakistan like, Sindh Industrial Trading Estate (S.I.T.E.), Korangi Industrial Trading Estate (K.I.T.E.), North Karachi Industrial Trading Estate (N.I.T.E.), Landhi Industrial Trading Estate (L.I.T.E.) and Bin Qasim Industrial Zone.

268. The project area is close to Korangi Industrial Area. Industrial activities discharge several types of pollutant in the environment which are polluting the air, water and soil of the area. Pakistan Refinery Limited (PRL) is also close to the project alignment.

5.1.16 Land Use of Project Area

269. The landuse of the project area is mainly commercial and industrial areas, it also includes water bodies which needs to be reclaimed and considerable area is covered with mangroves.

270. Korangi Industrial Area (KIA) is located in Korangi District, in Karachi, Sindh, Pakistan. It is one of the largest industrial areas of Pakistan. It comprises of industries, commercial and trading units including textile, steel, pharmaceutical, automobile, chemical, engineering and flour mills.

271. The Index map for Land use in the project area within Corridor of Impact is attached as Figure 5.11 whereas the detailed maps of land use are attached as Annex -II.
Figure 5.11: Key map of Land use of the Project Area
Table 5.11 gives the area distribution of land according to land type within in Corridor of Impact.

<table>
<thead>
<tr>
<th>Land use Type</th>
<th>Area in COI (Acres)</th>
<th>Area in ROW (Acres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barren / Open Area</td>
<td>387.86</td>
<td>60.16</td>
</tr>
<tr>
<td>Built-up Area</td>
<td>38.04</td>
<td>0.29</td>
</tr>
<tr>
<td>Creeks</td>
<td>97.84</td>
<td>20.88</td>
</tr>
<tr>
<td>Cultivated Land</td>
<td>0.27</td>
<td>-</td>
</tr>
<tr>
<td>Graveyard</td>
<td>4.18</td>
<td>-</td>
</tr>
<tr>
<td>Green Belt</td>
<td>1.11</td>
<td>0.22</td>
</tr>
<tr>
<td>Mangroves</td>
<td>80.50</td>
<td>23.12*</td>
</tr>
<tr>
<td>Overhead Bridge</td>
<td>0.04</td>
<td>0.03</td>
</tr>
<tr>
<td>River</td>
<td>12.27</td>
<td>3.13</td>
</tr>
<tr>
<td>Road / Track</td>
<td>32.29</td>
<td>9.78</td>
</tr>
<tr>
<td>Stream / Nullah</td>
<td>5.26</td>
<td>0.29</td>
</tr>
<tr>
<td>Trees / Bushes</td>
<td>0.30</td>
<td>-</td>
</tr>
<tr>
<td>Water Pond</td>
<td>2.44</td>
<td>0.27</td>
</tr>
</tbody>
</table>

* The land use is based on the GIS assessment and may vary due to variation of slopes and other features. The mangrove vegetation was assessed as per the ground situation and study requirement. In the project area the vegetation was found young and bushy, so during construction phase more damages/other than the proposed RoW is expected to the mangroves (assessed and presented in report) due the variation of berm /slopes protection width as per the site condition and nature of vegetation.
Environmental Impact Assessment (EIA)

- KWSB water supply line at RD 1+200
- Mangroves outside the alignment at RD 2+100
- Mangroves along the alignment at RD 2+000
- Traffic movement on Cantonment Korangi Creek Road near Attock Petrol Pump
- Malir River Estuary at RD 3+200
- Solid waste inside Malir River at RD 1+600
Environmental Impact Assessment (EIA)

Plantation within ROW along Road near at RD 2+400
Overview of the area near IBM

Pakistan Refinery Limited at RD 1+600
Institute of Business Management

Barret Hodgson University at RD 1+100
Vacant land for proposed road at RD 0+800
Plate 5.2: Land Use of Project Area

5.1.17 Solid Waste in Karachi

273. Karachi generates more than 12,000 tons of waste per day. In Karachi, municipalities allot different sites for dumping of waste, but they are all out of capacity and garbage flows out on the roads. Illegal dumping is one of the largest issues faced by the society. The equipment and machinery for waste collection and disposal are insufficient in Karachi. There were heaps of solid waste dumped in the River bed as shown in the plate below.

Plate 5.3 Solid Waste dumped on project site

5.1.18 Environmental Sensitive Receptor

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274. The sensitive receptors identified for the proposed project within 50 meter each side of the route are commercial and residential area, mosque and educational institutes. They are prone to sensitivity during construction phase, due to emission of air pollutants, noise and vibration, traffic jams, temporary edifice of construction camps, and mobilization issues. A comprehensive map showing environmental sensitive receptors of the project area is given as Figure 5.12. Tentative locations of these sensitive receptors along the proposed alignment are indicated on the map.
Figure 5.12: Sensitive Receptors in the Project Area
5.2 ECOLOGICAL ENVIRONMENT

275. Information regarding the ecological profile of Study Area was gathered through desk study, reconnaissance and field visit. Consultation with concerned field formations of Provincial departments of Forestry, Wildlife and Fisheries sectors was done to obtain information regarding Flora (terrestrial and aquatic), Fauna (mammals and birds with migration pattern) and Aquatic life (fish species, distribution, spawning and forage grounds).

276. Sindh has more than 400 km of coastline along the Arabian Sea. This coastal zone is endowed with abundant natural resources especially mangrove forests, fisheries and wildlife eco-systems. The coast of Karachi is classified as sub-tropical maritime desert influenced by the Arabian Sea with high relative humidity and strong wind velocity. High winds are characteristic of beach environment.

5.2.1 Flora

277. Project area is devoid of any vegetation, however few trees, mostly of Conocarpus, Neem, Ber, Eucalyptus etc. have been raised on roadsides and on proposed project area, mostly close to the commercial buildings boundary walls.

278. The coastline around project area consists of mangrove areas and various creeks and backwater habitats. Nearest mangrove forests are located at Creek areas, towards eastern side of the project site.

279. Dense forests of mangroves in the project area falling near the Barrett Hodgson University, and running Korangi area. The mangrove forests are falling in the proposed project area. Mangroves are natural vegetation, developed along the shoreline in closed seas and are significant sanctuaries and breeding places for wide variety of aquatic organisms. These forests are dominated by one particular species, namely Aveinia marina.

280. The locations of mangrove forests within RoW (Right of Way) of the project are shown in Landuse map. The area of mangroves falling within the RoW is 12.76 hectares.

5.2.2 Terrestrial Vegetation

281. Along the barren lands in study area, towards the north, various xerophytic species exist and the prominent amongst them is there is Musket (Prosopis Glandulosa), a bushy growth, which is a very hardy species, covered with strong thorns. It is a very low form of fuel wood and its foliage is unpalatable. It is in fact, regarded as a weed and is eradicated regularly in the forests, plantations of Punjab and Sindh. Scattered bushes of Kareer (Cappares Decidua) Calatropis (Procera) have also been reported, another bushy species, salsola foetida (lani) exists in the adjoining barren areas.
282. The proposed project area sustains an arid environment. The harsh climate, minimum rainfall, and poor soil conditions limits the growth of floral species. The quality of soil is also poor with little organic matter to support large-scale vegetation. Therefore over grazing is another issue limiting the frequency of floral species within the proposed project area. Most common species, present in project site include Aerva javanica, Suaeda fruiticosa, Tribulus terrestris, Prosopis juliflora, Parkinsonia aceulata, and Calotropis procera, most of the species are of minor ecological importance. The plant species within the vicinity are mainly dominated with Acacia nilotica and Salvadora persica. List of the floral species is given below.

Table 5.12: List of Floral Species Reported in the Area

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Plant Species Names</th>
<th>Local Names</th>
<th>Life Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Avicenia marina</td>
<td>Timer</td>
<td>Tree</td>
</tr>
<tr>
<td>2</td>
<td>Acacia nilotica</td>
<td>Babul</td>
<td>Tree</td>
</tr>
<tr>
<td>3</td>
<td>Aerva javanica</td>
<td>Booh</td>
<td>Herb</td>
</tr>
<tr>
<td>4</td>
<td>Azadirachta indica</td>
<td>Neem</td>
<td>Tree</td>
</tr>
<tr>
<td>5</td>
<td>Calotropis procera</td>
<td>Ak</td>
<td>Shrub</td>
</tr>
<tr>
<td>6</td>
<td>Tamarix aphylla</td>
<td>Ghaz</td>
<td>Tree</td>
</tr>
<tr>
<td>7</td>
<td>Tamarix dioca</td>
<td>Lai</td>
<td>Shrub</td>
</tr>
<tr>
<td>8</td>
<td>Capparis decidua</td>
<td>Kirar</td>
<td>Shrub</td>
</tr>
<tr>
<td>9</td>
<td>Leptadenia pyrotechnica</td>
<td>Khimp</td>
<td>Shrub</td>
</tr>
<tr>
<td>10</td>
<td>Prosopis juliflora</td>
<td>Davi</td>
<td>Shrub</td>
</tr>
<tr>
<td>11</td>
<td>Prosopis cineraria</td>
<td>Kandi</td>
<td>Tree</td>
</tr>
<tr>
<td>12</td>
<td>Salvadora persica</td>
<td>Meswak</td>
<td>Tree</td>
</tr>
<tr>
<td>13</td>
<td>Zizyphus nummularia</td>
<td>Jhangoori Ber</td>
<td>Shrub</td>
</tr>
</tbody>
</table>

5.2.3 Mangroves

283. The mangrove forests are among the most important component of the area. The area has significant ecological and biodiversity value. Mangrove forest provides good feeding, sheltering and breeding ground for many species of bird mangroves ecosystem provides roosting place to a variety of migratory birds. Local fishing communities also use these forests for fodder and fuel. Avicennia marina, locally called as timer is the dominant species of the area and occurs almost as mono tyopic stand throughout the area. It is a tree species and attains about 10 m height in regularly in inundated areas, or growing in the adjoining small Islands. With the increase in elevation and decreasing tidal waves, the tree height is gradually reduced and takes a bushy appearance. A few stands of Aegicereus corniculation and ceriops tagal also exist on relatively. Which are reported to have been planted by Sind Forest Department. These forests are located on tidal flats with their richly productive bio-mass, which besides, providing fish nurseries and form a natural protective system against storms and tidal waves. These mangroves forests being part of the Indus delta system are perhaps unique in being the largest area of arid climate mangrove forests in the world. They are almost wholly dependent upon fresh water discharge from the river Indus and a small quantity of fresh water from run off and domestic and industrial effluents from adjoining areas. These mangrove forests were declared as protected forest under the Forest Act 1927, during 1958, when the area was transferred to Forest Department.
284. The following activities are prohibited in these forests:

a. Cutting, conversion or removal of trees,
b. Cutting or removal of all other vegetative growth, including grass.
c. Cultivations of all types
d. Breaking of the soil and removal of soil or stones,
e. All grazing or browsing, and
f. All other works inside the mangroves were prohibited.

285. The listed activities could, however, be done with the permission of the Sind Forest Department.

a) Importance of Mangroves Forests

286. The greatest economic importance of the mangroves comes from the fisheries, they harbour. The creeks and mangroves provide excellent nursery area for young fish, especially shrimp. Shrimp are a major export commodity, making up to 68% of the US$100 million, which Pakistan earns in foreign exchange from fish exports. A large proportion of the fish caught in Pakistan's coastal water spend at least part of their life cycle in the mangroves, or depend on food webs originating there. Whilst there is room for expansion of some parts of the fishing industry, the most valuable species, shrimp, is seriously overfished and after a number of years of fishing above the estimated maximum sustainable yield, the catches have begun to decline.

287. The mangroves themselves are used directly for fuelwood and fodder for domestic animals by the coastal villagers, although, avicennia wood is not considered a good fuelwood as other mangrove species, e.g. rhizophora. It is still used extensively by local people for their domestic use and it is rarely sold outside the coastal areas. On the other hand, avicennia leaves are excellent fodder for animals and are collected regularly by the villagers. In addition to collecting fodder for cattle, sheep and goats kept in the villages, it has been observed that at certain time of years' large number of camels are herded into the mangroves, who stay their day and night. This activity puts considerable pressure on the existing stand of mangroves nearest to the coastal to such an extent that many mature stands are stunted due to overgrazing, browsing and lopping.

288. One of the most important benefits of the mangrove ecosystem is protecting the coastline from wind and ocean currents. The Indus Delta is low lying and bear the full force of the south-west monsoon. The natural protection provided by the mangroves is shown by the siting of Port Qasim, Pakistan's second largest port some 25 kms within the Korangi-Phitti Creek system. Without the mangroves, it is unlikely that Port Qasim would have been located there in the first place. If they were lost, the cost of engineering measures to protect the coast would be prohibitive.

b) Major Threats to Mangroves

289. Factors responsible for the degradation of mangroves, resulting in the reduction of
resource base are as under:

a. Reduced flow of sweet water and silt from the Indus
b. Inflow of pollutants from industries; navigational activities and intermix of industrial effluents.
c. Browsing by camels and goats and grazing by buffaloes and cows.
d. Wood and fodder harvesting
e. Over fishing and use of non-judicious fishing techniques
f. Gradual rise in sea level.

5.2.4 Grazing

Since the leaves of the predominant species i.e., Avicennia spp. have good nutritional value to cattle, herds of goats and sheeps graze in the area. Being within the vicinity of a metropolitan city, the Study Area is under constant pressure of grazing by the cattle of local inhabitants. During field visits, about 4-5 herds of were observed grazing in the Study Area. Act of lopping of branches for feeding of cattle by local people is another common phenomenon which is injurious to vegetative cover.

5.2.5 Browsing

The damage due to browsing by camels in the area is an alarming threat to vegetation, as the camel herds migrate from lower Sindh to mangroves during flood season. These herds are owned by professional graziers who move in groups and stay in coastal islands during June-July up to October each year. This process of browsing of Avicennia leaves by camels is degrading the mangroves into an almost barren/wasteland in the Study Area.

5.2.6 Agriculture and Horticulture

No significant Agriculture or Horticulture practices were noticed in the area being within the vicinity of residential and commercial communities/metropolitan population.

5.2.7 Fauna

Proposed project site is located in semi urban and arid environment, however the faunal species as per available data are mainly of desert or forest origin. A list of reported avifauna, mammals and reptile species of the proposed project area is produced below.

5.2.8 Natural Habitats

The project area is located along the coastal belt. The area is partially covered by mangrove forests towards its southern side. These mangroves are an important part of the coastal habitat. They provide food, shelter and breeding ground to fishery; they support diverse fowls of plant and animal life, reduce wave action and
help stabilize the coastline.

5.2.9 Mammals

295. The proposed project area sustains few insignificant mammals, common terrestrial animals found in the area are jackals, (Oanis aureu), red Roof rat and House mouse are the common species of the area while small Indian mongoose and fox (Vulpes vulpes), are less common les. None of the species recorded is protected, threatened or included in the CITES appendices.

296. Land mammals including stray dogs, bats, camels, goats are visitors for purpose of foraging and taking shelter in the mangrove forest.

297. The list of reported mammals is presented below

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>English Name</th>
<th>Scientific Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Roof Rat</td>
<td>Rattus Rattus</td>
</tr>
<tr>
<td>2</td>
<td>Small Indian Mongoose</td>
<td>Herpestes javanicus</td>
</tr>
<tr>
<td>3</td>
<td>Hare</td>
<td>Lepus</td>
</tr>
<tr>
<td>4</td>
<td>House Mouse</td>
<td>Mus musculus</td>
</tr>
<tr>
<td>5</td>
<td>Jackal</td>
<td>Oanus aureu</td>
</tr>
<tr>
<td>6</td>
<td>Fox</td>
<td>Vulpes Vulpes</td>
</tr>
</tbody>
</table>

5.2.10 Reptiles

298. The site is very poor in reptiles. Only few lizards were reported. Confirmation was done through literature review. None of the species are protected or threatened under the IUCN Red List 2006.

<table>
<thead>
<tr>
<th>S. No</th>
<th>English Name</th>
<th>Scientific Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Viperine Sea Snake</td>
<td>Praescutata viperina</td>
</tr>
<tr>
<td>2</td>
<td>Annulated Sea Snake</td>
<td>Hydrophibyscan cinctus</td>
</tr>
<tr>
<td>3</td>
<td>Common Krait</td>
<td>Hydrophibyscan cinctus</td>
</tr>
<tr>
<td>4</td>
<td>Spiny tailed lizard</td>
<td>Uromastyx</td>
</tr>
<tr>
<td>5</td>
<td>Monitor lizard</td>
<td>Varanus</td>
</tr>
<tr>
<td>6</td>
<td>Glossy –bellied Racer</td>
<td>Coluber ventromaculatus</td>
</tr>
</tbody>
</table>

5.2.11 Avifauna

299. The avian species, which are quite abundant and common in the proposed project area, include Indian Roller, Green Bee Eater and Indian Myna. The list of reported species is presented.

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Common Name</th>
<th>Scientific Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Blue Rock Pigeon</td>
<td>(Columba livia)</td>
</tr>
<tr>
<td>2</td>
<td>House Crow</td>
<td>Corvus splendens</td>
</tr>
<tr>
<td>No.</td>
<td>Species</td>
<td>Scientific Name</td>
</tr>
<tr>
<td>-----</td>
<td>-----------------------------</td>
<td>----------------------------------</td>
</tr>
<tr>
<td>3</td>
<td>House Sparrow</td>
<td><em>Passer domesticus</em></td>
</tr>
<tr>
<td>4</td>
<td>Common Myna</td>
<td><em>Acridotheres tristis</em></td>
</tr>
<tr>
<td>5</td>
<td>White cheeked Bulbul</td>
<td><em>Pycnonotus leucogenys</em></td>
</tr>
<tr>
<td>6</td>
<td>Hoopoe</td>
<td><em>Upupa epops</em></td>
</tr>
<tr>
<td>7</td>
<td>Desert Lark</td>
<td><em>Ammomanes deserti</em></td>
</tr>
<tr>
<td>8</td>
<td>Little green bee eater</td>
<td><em>Merops orientalis</em></td>
</tr>
<tr>
<td>9</td>
<td>Lapwing</td>
<td><em>Hoplopterus indicus</em></td>
</tr>
<tr>
<td>10</td>
<td>Indian Roller</td>
<td><em>Coracias benghalensis</em></td>
</tr>
<tr>
<td>11</td>
<td>Black drongo</td>
<td><em>Dicrurus macroceccercus</em></td>
</tr>
<tr>
<td>12</td>
<td>Purple Sunbird</td>
<td><em>Nectarinia asiatica</em></td>
</tr>
</tbody>
</table>

300. Several species of reptiles, birds, and terrestrial mammals inhabit the project area, wherever suitable habitats are found. The beaches and coast of Karachi are home to an abundance of marine fauna, such as birds, reptiles, fish, and marine mammals. The evergreen forests of Indus delta mangroves provide a habitat for some of the waterfowls. (Migratory birds) such as flamingos, pelicans, cranes, cormorants.

5.2.12 Aquatics

301. The aquatic ecology study area of the project comprises outfall area of the Malir River, coastal area and the area of the mangrove forest along the sea shore alignment of the Link Road up to Airmen Golf Club. Aquatic fauna of the coastal area is described below;

5.2.13 Fish

302. Although more than 1,500 types of finfish and shellfish are found along the Pakistan coast, about 200 species are commercially harvested. Shrimp is the most important commodity which is mainly exported. Nearly 100 species of fish have so far been recorded from the mangroves, of which 46 species were in fingerling or young stages while 52 in sub-adult or adult stages. Among the fish fauna of the swamps, mudskippers (*Periophthalmidae*) are the best adapted for this peculiar type of habitat. Many mudskippers (Genus: *Boleophthalmus*) have become partially independent of water. They jump about in the swamps and when alarmed or when the tide begins to recede they burrow into the ground. In these fishes’ respiration is taken over by skin; well vascularized papillae on the bark and the sides of the body allow gaseous exchange between humid air and the blood.

303. Another type of mudskipper (Genus: *Periophthalmidae*) has gone a step forward: it lives about entirely out of water. As the tide comes in, some species actually flee from the water, clinging to the trunks or prop roots of the mangrove a few centimeters above surface; when the tides recedes, they descend and hunt for food. During the breeding season, these fish build funnel shaped nests in the mud; leading down to the ground water when the young grow until they have become adapted to life on land. Bottom dwelling fish such as *Pleuronectiformes* living on muddy bottom in channels or other water masses near mangrove swamps generally move towards the swamps to share the food at high tide.
304. Many detritus feeders like elupeids, gray mullets etc. find this region perfectly suitable and pony fish (Leiognathidae) also like this environment, as they are safer here compared to the open environment where there is little or no refuge against their predators.

305. Most of the adult stages of the fish were observed / collected at high tide. The order and the number of mangrove fish fauna found are listed in the table given below (Mangroves of Pakistan Status and Management, IUCN, 2005).

Table 5.16: Mangrove Fish Species

<table>
<thead>
<tr>
<th>Order</th>
<th>No. of Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clupeiformes</td>
<td>15</td>
</tr>
<tr>
<td>Scopeliformes</td>
<td>4</td>
</tr>
<tr>
<td>Cypriniformes</td>
<td>6</td>
</tr>
<tr>
<td>Anguiliformes</td>
<td>2</td>
</tr>
<tr>
<td>Pereiformes</td>
<td>46</td>
</tr>
<tr>
<td>Beloniformes</td>
<td>3</td>
</tr>
<tr>
<td>Syngnathiformes</td>
<td>5</td>
</tr>
<tr>
<td>Mugiliformes</td>
<td>6</td>
</tr>
<tr>
<td>Polynemiformes</td>
<td>4</td>
</tr>
<tr>
<td>Pleuronectiformes</td>
<td>6</td>
</tr>
<tr>
<td>Batrachoidiformes</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>196</strong></td>
</tr>
</tbody>
</table>


306. Most of these species are attracted towards mangrove swamps during high tide due to nutrients present in these areas. Commercially important fish of the mangrove /coastal area with annual production during 2014 is given in the following table (A Handbook on Pakistan’s Coastal and Marine Resources, Mangroves for the Future (MFF), Pakistan IUCN, 2016).

5.2.14 Crustaceans

307. The crustaceans form a major component of the fauna with highest density and biomass. The fauna includes, Crab, Paned prawns, Carideans, Squillas, Barnacles, Upogebians, Isopods, Amphipods, Sergestids and Leptostracans. Brachyuran crabs form a major component of the micro fauna. They occur virtually throughout the intertidal zone with abundance from mean low tide level to mean high water level of spring tide.

308. The mangroves along the backwaters of sand spit have the species referable to Grapsidae, Ocypodiidae, Xanthidae and Portunidae; the Graprids and Ocypodids are dominant, the family Grapsidae is represented by an assortment of crabs mostly belonging to sub family Sesarmidae. They include Sesarma, Utica, Nanosesarma, Metapographus, Metaplex, Ilyograpsus and Illyoplax. The Ocypodid
genera associated with mangroves include Uea, Comptandrium and some of the numerous species of Macrophthalmus, Cliesto ceoloma and Serenella; on the xanthids; one of the most conspicuous family of crabs on the tropical shores, only a few representatives have penetrated the mangroves. This includes Eucarirus orientalis and Heteropanope glabra. Swimming crabs, Scylla senata (family Portunidae), can be seen darting for safety under the root cover of mangroves, or the holes of the trunks of mangroves. Crabs are harvested, mainly for export, with very little consumed locally. Their ecological role in recycling nutrients and enhancing the rate of decay of plant material is very significant. Organic material is produced through a complex detrital based food web and represents a major source of food for a variety of marine and brackish water organisms, juveniles and adult species of Crustacea.

309. The prawn species utilize the mangrove ecosystem as a temporary habitat maybe for spawning, nursery or for temporary shelter. In countries like Indonesia, Thailand and Malaysia the shrimp fisheries are correlated with the distributions of mangrove forests and prawn production has been reported to have been significantly reduced where mangrove vegetation has been removed. In Pakistan, Penaeus and Metapenaeus have been collected in shallow pools.

5.2.15 Benthic community

310. This community includes the microbes, detritus feeders, small and large herbivores and small and large carnivores. Environmental conditions change gradually with increase in the depth. In the mangrove ecosystem, the benthic community of the adjacent shallow water is a subject of interest. Here, the microbes decompose the plant litter into organic detritus – a fundamental commodity of energy of the system. This detrital matter is picked up by the detritus feeders over the bottom such as some fishes, shrimps and shell fishes and then carried to the littoral zone by the wave actions, shared by the intertidal fauna such as crabs, shrimps, mudskippers, invertebrates and waders etc. Gray mullets, gizzard shads, flat fishes many skates and rays are some of the fishes which prefer to live on soft bottom and feed on bottom detritus. The suspended detritus is picked by plankton and pelagic forms. The detritus feeders readily pick up plankton also. At low tide, when a large part of muddy bottom is exposed, crabs, mudskippers and waders are seen in large number picking up their food which include worms, different animals left behind by the receding tide in pools and organic matter left by the sea (Mangroves of Pakistan Status and Management IUCN, 2005).

5.2.16 Coastal area

311. The coast of Pakistan is rich in marine resources like estuaries, creeks, bays, peninsulas, islands and river outfalls. Due to this variety of physical features Pakistan is characterized with both floral and faunal diversity in coastal regions. Karachi, which is the largest city of Pakistan and also included in the mega cities of the world, is located at the coastal area of Sindh, Pakistan. The coastal zone of Karachi is
extended up to 135 km that contains outfalls of two major rivers Lyari River and Malir River (Munshi et al., 2004). Karachi is a hub of industrial activities and due to unavailability of specially designed sewage drains, the two Rivers are exposed to heavy pollution load of both domestic and industrial origin. Expectedly, these toxicants have perilous impact on the marine biodiversity and fish-eating birds and the related food chains. The impact of these pollutants on commercial fin-fish and shrimp fisheries are unknown, but likely to be significant (WWF, IUCN and GOP, 2000). In addition to that high levels of suspended solids reduce the light penetration into the marine ecosystem which eventually leads the marine ecosystem to hypertrophic situation. The same situation prevails with the outfall of ecosystem situated in front of Karachi fisheries, due to continuous disposal of untreated effluents.

5.2.17 Aquatics and Mangroves

312. Mangroves are salt tolerant plants (trees and shrubs) found in tropical which have adapted to survive in saline and brackish water. They occur naturally in sheltered coastal areas such as river mouths, creeks, backwaters, lagoons, bays and estuaries where freshwater meets the seawater. Their survival is dependent on tidal inundation. Mangroves make up one of the world’s most unique ecosystems because they thrive where no other trees can survive – in the transition zone between the ocean and land. They are also among the world’s most productive ecosystems. Protect the land from erosion.

• Play an invaluable role as nature's shield against cyclones and disasters, protect shorelines.
• Provide breeding and nursery grounds for a variety of fish and shrimp.
• Give shelter for a variety of life forms like invertebrates, fish, amphibians, reptiles, birds and even mammals like tigers.
• Source of timber, fuel and fodder.
• Sequestration of CO₂
• Purify the water by absorbing impurities, harmful heavy metals and help us breathe clean air by absorbing pollutants.
• Potential source for recreation and tourism.

313. Pakistan’s coastline is 990 km long and very rich in marine resources as its vast creek system of the River Indus and shallow sub-tidal areas provide ideal conditions for growth of fisheries resources.

314. Fishing is an important economic activity along the coast of Pakistan as about 80 % of the coastal population (excluding Karachi) is engaged in fisheries related activities. The Fisheries sector has shown a steady increase since the creation of Pakistan. In the beginning, all the fleet consisted of sail-driven boats that used to operate in shallow waters along the coast. Motorization of fleets began in the 1960s and now large fishing vessels, fitted with onboard freezing facilities, are being constructed locally and operated in coastal and offshore waters. The present production of fish
and shellfish is estimated to be about 355,000 m. tons.

315. Two mega projects for mangroves rehabilitation, financed by the Government of Sindh, are under implementation by the Sindh Forest Department in the Indus Delta. These projects target mangrove rehabilitation over 100,000 ha in the Indus Delta. One of these projects is being implemented jointly by the Sindh Forest Department and IUCN Pakistan. The Sindh Forest Department achieved the Guinness World Record during 2013 for planting the highest number of mangroves by a team of 300.6

316. There is a very close link between the fisheries resources and the mangroves. Mangroves, and their associated tidal flats, provide a habitat for clams, crabs, oysters, and other species. Mangroves are known to be an important breeding, nursery and feeding ground for a large number of fish and shellfish species and other aquatic resources. The coastal mangrove creek systems are shallow and nutritionally rich, providing an ideal habitat for a variety of marine animals in addition to commercial fish and shrimp species. The shrimp industry largely depends upon the shrimp nurseries located in the mangroves of the Indus Delta. Although the shrimp are distributed along the entire coast, the main fishing grounds in the sea are usually located along the coastline adjacent to mangroves.

5.2.18 Integrated Biodiversity Assessment Tool (IBAT)

317. Integrated Biodiversity Assessment Tool (IBAT) is a web-based mapping and reporting tool used by companies, governments, researchers, and financial institutions to access global biodiversity datasets with which to make better decisions around the environment. The Integrated Biodiversity Assessment Tool (IBAT) software was utilized to carry out the initial ecological based screening of the proposed URI project area. The species presence/confirmation with the utilization of various tools including literature review, stakeholders/departmental consultations and random ground trothing was conducted for the authentication of data. Based on the below detailed working.

318. Based on the ground realities and values, the habitats in the study area have been assessed in detail which are as under:

319. Based on the findings of IBAT Proximity report 1, initially 111 nos. of IUCN red list species were identified at point 1 i.e. Ramp 1 – Ramp 4 (Location: [ 24.8, 67.1 ] Date of analysis: 15 April 202, Buffers applied: 1 km | 3 km | 5 km). No (0) Protected Area and Key Biodiversity Area were identified within this buffer. However, the initial screening species identified by IBAT are potentially found within 5km of the area of interest.

320. Based on the findings of IBAT Proximity report 2, initially 111 nos. of IUCN red list species were identified at point 2 i.e. Road 7 – Road 7 (Location: [ 24.8, 67.1 ] Date of analysis: 15 April 202, Buffers applied: 1 km | 3 km | 5 km). No (0) Protected Area and Key Biodiversity Area were identified within this buffer. However, the initial screening species identified by IBAT are potentially found within 5km of the area of interest.

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6 The Handbook on Pakistan's Coastal and Marine Resources, IUCN, 2016
321. Based on the findings of IBAT Proximity report 1, initially 112 nos. of IUCN red list species were identified at point 3 i.e. Ramp 2 – Road 8 (Location: [ 24.8, 67.1 ] Date of analysis: 15 April 202, Buffers applied: 1 km | 3 km | 5 km). No (0) Protected Area and Key Biodiversity Area were identified within this buffer. However, the initial screening species identified by IBAT are potentially found within 5km of the area of interest.

322. The reports of IBAT Proximity are attached as Annex III. As mentioned in the IBAT reports, there is however a possibility of incomplete, incorrect or out-of-date information. All findings in this report must be supported by further desktop review, consultation with experts and/or on-the-ground field assessment. Based on this, the presence/confirmation of initially securitized IBAT species were verified/authenticated through various tools including literature review, stakeholders/departmental consultations and random ground trothing. Based on the ground realities and values, the habitats in the study area have been assessed in detail which are as under:

**Literature Review**

323. The extensive literature and research papers were thoroughly reviewed which majorly deal with the habitat and biodiversity features of the proposed project area.

324. Coastal mangrove ecosystems in Pakistan have been seriously degraded over the last 50 years as a result of freshwater diversion for agriculture, industrial and urban water pollution, and over-fishing. These proximate causes are largely driven by national policies that have favored agriculture and industry over the coastal regions and that have given high priority to exports.

325. Pakistan is largely arid and semi-arid, receiving less than 250 mm annual rainfall, with the driest regions receiving less than 125 mm of rain annually. It has a diverse landscape, with high mountain systems, fragile watershed areas, alluvial plains, coastal mangroves, and dune deserts. The flora and fauna are mainly Palaearctic and Indomalayan. Forests cover approximately 4.58 million ha (5.7 percent) in Pakistan. (Government of Pakistan, 1996) Of these, 0.132 million ha (less than 3 percent) are coastal mangrove forests. Pakistan is divided into 18 habitat types, among them mangrove forests, which occur mainly in the Indus Delta and in a few patches westward along the Baluchistan Coast.

326. “The study team was composed of Sarah Ahmad and Osman Mian (Study Coordinators), Akhtar A. Hai (Economist and Team Leader), Najam Khurshid (Environmental Expert), Abdul Rafiq Qadir (Hydrologist), and Noor-un-Nisa (Sociologist). The team would like to acknowledge the contributions of Dr. Arshad Ali Baig, Qaisar Anjum, Shaukat Ali, and the WWF-Pakistan staff Salman Ashraf,
Fayyaz Rasool, Rahat Jabeen, and Akram Farooqi, in the various phases of the report. The team would also like to express its gratitude to local community members, fishermen, officials, researchers, and scientists for the valuable information and guidance extended during the course of the study”.

327. Unfortunately, various land reclamation projects along with pollution and climate change have led to a sizable reduction of mangrove forests in Pakistan. However, various public and private-sector organizations are now working to restore these forests in order to stabilize the shorelines, protect the natural habitat for thousands of species, prevent erosion and keep the area safe from storms and high tides.

328. Despite being such a diverse and utterly important part of our ecological systems, mangrove forests in Pakistan, as well as the rest of the world, are facing serious threats.

329. Firstly, they provide ideal breeding grounds for the most species of fish, jellyfish, sponges, shrimps, crabs and other shellfish. Several fish species even live under the mangroves for most of their juvenile lives and swim into the open oceans once they are adults. These marine animals are largely dependent on the food webs provided by these coastal swamps. Moreover, crabs and shrimps also forage in the soft mud beneath the mangrove roots.

330. Mangrove forests in Pakistan began diminishing at an alarming rate due to urbanisation and climate change. However, efforts are being made to restore these ecosystems along the coastlines in Sindh and Balochistan.

331. Here are some of the major factors posing a threat to these mangroves forests in Pakistan as well as the rest of the world.

- Deforestation is the biggest threat to mangrove swamps in Sindh and Balochistan. The mangroves are usually cut to make room for urban development and infrastructure.
- Pollution is one of the main reasons why mangroves are reducing around the world. The pesticides, chemical wastage, untreated sewage water, fertilizers, oil, and other toxic substances carried by river systems can weaken these ecosystems. ([blog/mangrove-forests-pakistan.html](blog/mangrove-forests-pakistan.html) & WWF-Pakistan)

332. “Commercial and residential development can impact the connectivity of the landscape, which is important for species persistence and maintaining genetic diversity (Turner 1989), however, wildlife populations can tolerate some fragmentation as long as critical movement corridors are maintained otherwise a single change and alteration can lead to habitat modification (Turner 1989).

333. With such heavy population pressure and consequential heavy demand on natural resource sustaining forests even at current level seems an uphill task as remaining meagre forest resources are insufficient to fulfil the demand for timber fuel wood and Non-Timber, Forest Products (NTFPs) on a sustainable basis. Demographic data
suggests that the existing pressure from increases in population will further rise when 76 percent population in less than 25 years (41.6 percent under 15 and 34.5 percent from 16 to 25 years of age) will begin to construct new homes. In view of future planning, housing societies are mushrooming especially in mega cities of Karachi, Lahore, Faisalabad, Rawalpindi, Peshawar, and Islamabad. Due to land hunger and lust for money, many big investors are grabbing forest lands resulting in resource depletion. (FAO- Forest sector review: Pakistan-2019)

**Focus Group Discussions (FGDs)**

334. Socioeconomic Aspects: The coastal areas of the country lack basic amenities such as drinking water, fuel sources, and road infrastructure. Over time, the coastal population has grown as a result of increased returns from fishing, despite the poor physical infrastructure. Consequently, the demand for fresh water for household consumption has increased several fold. Local authorities have not assessed the household demand for water, causing the meagre water supplies from seasonal rivers on the Baluchistan Coast, in particular, to be under pressure due to population growth.

335. The native wildlife species are mostly disappeared because of human induced activities and climate change. Now the available habitat is quite degraded due to forest destruction, uncontrolled hunting and grazing resulting in loss of habitat for wildlife in the result of non-environmental friendly activities. The wildlife of the project area is connected with forest so, after damaging the tree cover wild species of the particular area are almost vanished and hardly some common wild fauna (as given in baseline) is reported. In the last few decades. The unplanned commercialisation is playing major role in damaging the local habitats (flora & fauna) and same practice is on its peak and nothing was considered for environmental protection and the land sue has been converted from its original status/shape which leads to the disappearance of many ecologically important species of the zone.

**Field Observations**

336. The findings of literature review and FGDs were verified during the field observations. Species on the sites during field survey and different ecological aspects were considered for assessing the approximate values different areas. The forestry, wildlife resources conditions were assessed/observed as for as study is concern. Most of the soil was found degraded due to anthropogenic activities of the local masses. The mangroves growth and cover was also recorded extremely poor and with open canopy cover altered from original conditions which were once healthy forests and was home to different wildlife species including mammals, reptiles, Amphibians and Avifauna. Now the habitats of wild species are found unsuitable and detreated, only those species are surviving which have adopted the current physiological and climatic conditions which are presented in baseline.

337. The problem is severe and of the regional nature because of conversion of tree land into agricultural lands dwindling fuel wood supply; the rate of forest devastation to
provide basic human necessities in the project area is alarming and which leads to disappearance of many plants and wildlife species and shrinkages of habitats. The ecosystem basic functions of the project area are damaged and not working properly. Based on the above reasons and discussions, the past conditions were totally different. We must look upon all the natural resources as renewable resources. If effectively managed could alleviate the problem not only for the present but also for the future generation.

Site Specific Field Data and Primary Observations

338. Consultant carried out a detailed survey to assess flora and fauna of the URI project area and limits to RoW. Habitat characteristics along with Flora and Fauna diversity has been observed in detail. Consultant found no legally and ecologically protected/important sites related to localized habitats and termed the overall area as degraded habitat.

Vegetation Surveys

339. A comprehensive field survey plan was prepared for flora baseline data collection. The florist investigations for flora were carried out. The vegetation in these habitats was recorded for the identification of species and coverage.

Faunal Surveys

340. In the study area, different parameters were taken into account while collecting data including secondary data collection, field surveys, consultations with forest and wildlife departments. Field survey were organized with the help of local people. The background information was collected from wildlife departments and then were observed during field surveys. Different mammals, reptiles and bird’s species were recorded on the pre-designed data sheets and then were organized in the ecological baseline.

341. Moreover, to detect the presence of wild fauna in the project site, indirect methods were also used including foot-tracks and road kills.

Departmental Consultations

342. The departmental consultations were carried out as per the methodology adopted. These departments were consulted during the field visits to discuss and evaluate the current forests conditions, wildlife status, trends and possible impacts on the present native species due to the project interventions. The officials shared that due to the human induced activities on a large scale involving trees cutting for fuel wood and timber requirements, over grazing, Hunting and poaching of precious wildlife species, soil disturbances due to developmental activities, malicious fire and grass cutting, the proposed project area have been subjected to another stage.

343. Moreover, the concerned departments delivered the problem that in general, entire ecosystem is under degradation due to illicit cuttings of trees, illegal hunting and poaching of wildlife species, overgrazing, over exploitation of natural resources, fires
and other biotic factors. The illicit cutting of trees, damages to soil and wildlife disturbances is common in the region and the concerned departments are trying their best to deal with the law violators and to protect the precious natural resources and which is under biotic pressure and climate change due to which, the wildlife and forests habitats become degraded, fragmented and shrunk. The virginities and originalities of natural conditions are now altered and modified which leads to non-proper functioning of ecosystem.

344. After the consideration of all the above techniques and methodologies, only those IBAT results are part of the report which have been verified by utilising the above best available resources. By considering the above methods, the species given in the ecological baseline were developed and augmented, only those species are remains part of the report which were verified and authenticated specific to the project area after passing through different reliable stages.

5.3 SOCIO- ECONOMIC CHARACTERISTICS

5.3.1 Objectives of the Socio-economic Baseline Survey

345. Socio-economic baseline survey presents an overview of the socio-economic conditions of project area in general, focusing on the key socio-economic development indicators such as demography, education and health facilities, income, expenditure trends and employment, to provide the context of the area in general. The main objective of the study was to analyze socioeconomic and cultural characteristics of the project beneficiaries in order to understand their interrelationships, dynamics, and qualities. The study also provide information to the project design in order to make the project interventions more effective, socially acceptable, culturally appropriate, gender sensitive and economically viable.

346. One of the key objectives of the study was to plan more sustainable and equitable development through adequate social risk management by identifying and assessing negative and positive impacts caused by a project, to design and implement measures to prevent, reduce or compensate adverse impacts and enhance positive ones.

5.3.2 Information / Data Collection Methodology

347. The methodology adopted for the survey included a detailed desk review of Project documents and relevant secondary information including official records and statistics, as well as academic and other subject matter reports. The secondary source information/data/reports include Detail Design drawings and latest Population Census Reports (2017) of Karachi and possible available data regarding district Korangi of Karachi Division. Similarly, primary source include focus group discussions (FGDs), community consultations, individual interviews and walk through in the Project area, which helped the survey team to physically observe the socio-economic conditions in the project area and data collection. Meetings were held with all stakeholders including the affected community. The socioeconomic survey was
conducted from November 10th to 11th, 2020 whereas, in order to improve the sample size another socioeconomic survey was conducted on 19th and 20th of March, 2021.

348. The sample size for the survey depends on the size of the affected persons in a project. A sample survey of 63 households was undertaken for the socio-economic survey from the possible affected communities.

349. Sample of 63 respondents including (males and females) was taken from the different locations depending on the proportion of route of the proposed road passing in the areas on the basis of random sampling technique, which included local residents, shop keepers, pedestrians, drivers, government and private job holders etc. The objective of using the random sampling technique was to get the data of the respondents of different categories along the alignment of the proposed road and covering the entire area. The purpose of this survey was to assess socio-economic condition of the area and get responses about the perceived impacts and preferences towards the project implementation.

350. Although the representative sample size is little low but due to law & order situation in the Karachi it was difficult to have an access to the people who can provide information. Generally, people hesitate to provide information in the urban settings due to security concerns. Even female enumerators were appointed for socioeconomic survey but due to uncertain law & order situation in the city, respondents were reluctant in providing any information. In addition, a complete list of affected private/government structures and public utilities was prepared.

351. The key variables covered in the surveys and qualitative interviews were included (i) identification and enumeration of the affected population; (ii) demography, (iii) social organization (iv) education and health facilities, (v) occupational structures, (vi) income and expenses level, (vi) access to social amenities, (vii) project’s impacts on the local communities (viii) identification of gender impact including priorities and needs of the women. Questionnaire for socio-economic baseline is attached herewith as Annex-III.

5.3.3 Socio-economic Baseline Survey

352. The proposed road will be started from Creek Ave Korangi Causeway Intersection and will be ended at PAF Airmen Golf Club. To find out the social status of the residents, social survey near the Project Area was carried out at the Korangi crossing, Korangi Creek, Industrial area and Airmen Golf Club.

353. The Project area is located in Karachi city and profile is discussed as under:

5.3.4 Political and Administrative Settings

354. The Karachi City District is a three-tiered system comprising the City District Government (CDG), the Town Municipal Administration (TMA) and the Union
There are following seven district of Karachi:

i. South Karachi;
ii. East Karachi;
iii. Malir;
iv. Korangi;
v. Central Karachi;
vi. West Karachi ,and
vii. Keamari

355. The district is managed by the Deputy Commissioner (DC) who is District Magistrate as well as district Collector. As District Magistrate, he is responsible for law & order and other allied matters for whole of the district.

356. Union Council (UC) is the lowest tier of the local government. A union council is an area within a district consisting of one or more revenue estates, one or more census villages or one or more census blocks. Union councils are divided into rural and urban and have been demarcated as such, that the population of within each are equal.

357. Tehsil Council is the next tier of local government. About 4 to 5 UCs fall in the Tehsil Council (TC). Tehsil is a sub-unit of the district, which is the highest tier of the local government system, dealing with the administrative matters at district level.

358. A district is composed of 3 to 5 Tehsil’s. Our proposed project falls at Korangi district. The district was a part of District East in Karachi, which was divided in November 2013.

a) Population

359. Provisional results of the 2017 census show urban Karachi with a population of 14,910,352 capita, an increase of 58% over the 1998 urban population 9,448,808. Karachi grew at an average annual rate of 2.43%. Karachi’s urban population is divided into six districts, two of which also contain rural populations.

360. According to census of 2017, the population of District Korangi is 2457019 whereas population of korangi sub division/Town is 1,071,560.

b) Language

361. Ethnically, the majority of the people who live in district Korangi are Muhajir people who have settled here after partition in 1947. Apart from Muhajir, the other major ethnicities in the area are Baloch, Pashtun, Sindhi and Punjabi. Though a large majority of the inhabitants are Muslims, there are small pockets of Hindu and Christian communities residing in the area. As per findings of socioeconomic survey, Urdu, Sindhi and Pashto are dominant languages of the study area.
c) **Education**

There are large number of private as well as govt. schools and madrassahs in the District Korangi and particularly in the proposed Project area. Hundreds of boys and girls schools are there in the district Korangi. A high percentage of the young population are studying in schools, colleges and universities. However, literacy rate is not much satisfactory in the district. Mostly people are poor in these areas they cannot afford children higher level education expenses due to most of the children are not sent to school after basic education. Whereas, few private colleges and universities like IOBM, Ilma University and Barrett Hodgson university are providing excellent education services in the project area but are much expensive and out of reach of common people. Training in technical skills is inadequate. Skilled labor consists of drivers, mechanics and electricians.  

362.

d) **Health**

Health problems of the respective area are generally associated with water availability and quality aggravating sanitary conditions due to lack of facilities and reliable water supply. Health facilities are inadequate and sub-standards in small scale government hospitals, whereas, few private and trust owned hospitals like Indus hospital, LRBT free tertiary eye hospital Korangi and Sultan general hospital are providing quality health facilities.

363.

e) **Local Economy**

The area is well connected with the surrounding areas and other Karachi towns through public bus as well as taxis, auto and motorcycle rickshaws. The majority of the people in the area of the proposed project are associated with different kind of private and government jobs and associated with business as well. Many local community members are working in Korangi Industrial area for earning their livelihood. Many residents of the proposed project area are also working in various professions at posh residences, offices and recreational areas of Clifton and Defense Housing Authority as drivers, gardeners, sweepers, security guards, and house maids.

f) **Religion**

As per social survey majority people are Muslim, then followed by Christian and Hindu.

365.

g) **Mother Language**

The most commonly spoken language in the study area is Urdu, the national language. Other regional languages spoken in the study area are Sindhi, Punjabi,

7 Socioeconomic Survey and Community Consultations
8 Socioeconomic survey and Community Consultations.
h) **Ethnicity/Tribes of the Project Area**

367. The population of the project area is a mixture of various heterogeneous groups and cultures. The main tribes are Muhajir, Pathan, Syeds, Baluchs, Rajpoot, Arain, Qureshi and Sheikh. Many people from Punjab and KPK have settled in the project area.

i) **Main Occupation of the Project Area**

368. A large number of local population is associated with government or private jobs. Whereas, businessmen community also present in huge numbers who are associated with different type of business and works.

### 5.4 FINDINGS OF THE SOCIO-ECONOMIC BASELINE SURVEY

#### 5.4.1 Sex Ratio of the Respondents

369. About 63 respondents, comprising 83% male and 17% female population in the project was contacted to carry out socio-economic and impact assessment survey.

**Table 5.17: Sex Ratio of the Respondents**

<table>
<thead>
<tr>
<th>Sex Ratio of the Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sr. No.</strong></td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>

**Figure 5.13: Sex Ratio of the Respondents**

#### 5.4.2 Age Composition

370. The demographic characteristics of the survey show Table 5.18 that 10% of the respondents were 15 to 25 years of age. About 51% and 20% of the respondents were between the age group of 26 to 35 years and 36 to 45 years respectively. The
remaining 19% were bearing up to 46 years of age and above of this age group. These age brackets of the respondents show that by and large respondents were mature enough to express their opinion/concerns about construction of proposed project and foresee its impacts.

**Table 5.18: Age Composition of the Respondents**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Frequency Distribution</th>
<th>Number</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>15-25</td>
<td>06</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td>26-35</td>
<td>32</td>
<td>51</td>
</tr>
<tr>
<td>3</td>
<td>36-45</td>
<td>13</td>
<td>20</td>
</tr>
<tr>
<td>4</td>
<td>Above 45</td>
<td>12</td>
<td>19</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>63</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

**Figure 5.14: Age Composition of the Respondents**

### 5.4.3 Educational Status of the Respondents

Educational distribution of the respondents is shown in Table 5.18. The data in the table presents that 16% of the respondents were illiterate. Moreover, 32% were educated up to primary level, 14% & 18% were for the middle and matriculation respectively. Whereas, 14% respondents were reported themselves intermediate level. A very small number, i.e., 06% respondents were found graduates and masters and above for each level. The chart representation of educational status of project people is depicted in Figure 5.13 below:

**Table 5.19: Educational Level of the Respondents**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Educational Status</th>
<th>Number</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Illiterate</td>
<td>10</td>
<td>16</td>
</tr>
<tr>
<td>2</td>
<td>Primary</td>
<td>20</td>
<td>32</td>
</tr>
<tr>
<td>3</td>
<td>Middle</td>
<td>09</td>
<td>14</td>
</tr>
<tr>
<td>4</td>
<td>Metric</td>
<td>11</td>
<td>18</td>
</tr>
<tr>
<td>5</td>
<td>Intermediate</td>
<td>09</td>
<td>14</td>
</tr>
<tr>
<td>6</td>
<td>Graduation &amp; Above</td>
<td>04</td>
<td>06</td>
</tr>
</tbody>
</table>
5.4.4 Occupation of the Respondents

Socio-economic condition of the respondents was also studied during the field survey. Majority (25%) of the respondents were running different types of business and shops. 11% were associated with profession of driving, 16% were associated with different types of labor, 22% and 08% were associated with private and government jobs respectively. While, 10% were indulged in fishing as their source of income. Whereas, 08% respondent were associated with different types of professions for their livelihood. The detailed statistics regarding occupational status of the respondents is presented in Table 5.19 given below. Figure 5.14 shows the chart view of occupational status of the interviewed people in project area of influence.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Professional Status</th>
<th>Number</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Business / Shopkeeper</td>
<td>16</td>
<td>25</td>
</tr>
<tr>
<td>2</td>
<td>Driver</td>
<td>07</td>
<td>11</td>
</tr>
<tr>
<td>3</td>
<td>Labor</td>
<td>10</td>
<td>16</td>
</tr>
<tr>
<td>4</td>
<td>Pvt Job</td>
<td>14</td>
<td>22</td>
</tr>
<tr>
<td>5</td>
<td>Govt Job</td>
<td>05</td>
<td>08</td>
</tr>
<tr>
<td>6</td>
<td>Fisherman</td>
<td>06</td>
<td>10</td>
</tr>
<tr>
<td>7</td>
<td>Any Other</td>
<td>05</td>
<td>08</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>63</td>
<td>100</td>
</tr>
</tbody>
</table>
5.4.5 Monthly Income of the Respondents

373. Most of the families are comprised of big family size. These young adults are associated with the profession of private jobs or working as skilled and unskilled work force in different walk of life. Many of them are working on hotels and different shops. Due to prevailing trend of joint family system, they become able to earn a handsome amount in the end of month. From the Table 5.17, it is clear that just 06% of the respondents fall in the low income group up to rupees 17,500. 22% from the range 17,501 – 30,000 rupees, and 24% of the respondents were earning their monthly income between the ranges of 30,001 – 50,000 rupees per month. Whereas, the income ranges of 50,001-75,000 reported by 19% and about 10% households were getting between 75,001-100,000. Furthermore, 19% were earning more than 100,000 per month. Income distribution details are given below;

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Average Monthly Income (Rs.)</th>
<th>Number of Respondent</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Upton 17,500</td>
<td>04</td>
<td>06</td>
</tr>
<tr>
<td>2</td>
<td>17,501 – 30,000</td>
<td>14</td>
<td>22</td>
</tr>
<tr>
<td>3</td>
<td>30,001 – 50,000</td>
<td>15</td>
<td>24</td>
</tr>
<tr>
<td>4</td>
<td>50,001-75,000</td>
<td>12</td>
<td>19</td>
</tr>
<tr>
<td>5</td>
<td>75,001-100,000</td>
<td>06</td>
<td>10</td>
</tr>
<tr>
<td>6</td>
<td>Above 100,000</td>
<td>12</td>
<td>19</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>63</strong></td>
<td><strong>100</strong></td>
<td></td>
</tr>
</tbody>
</table>

374. In the pie chart the income groups of various respondents are shown below.
5.4.6 Expenditure of the Respondents

Household expenditure depends on the earning of the family members. 11% respondents reported their monthly expenditure up to than 17,500, and 29% respondents found within the range of 17,501 – 30,000 per month. While, 30% fall between the expenditure range of 30,001 – 50,000 and 13% recorded their monthly expenditures between the range of 50,001- 75,000 per month. 08% were recorded between ranges of 75,001-100,000. Whereas, 10% were having their expenses more than 100,000 per month. The average monthly expenditures has shown in below table and Figure 5.18 below;

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Average Monthly Income (Rs.)</th>
<th>Number of Respondent</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Upton 17,500</td>
<td>07</td>
<td>11</td>
</tr>
<tr>
<td>2</td>
<td>17,501 – 30,000</td>
<td>18</td>
<td>29</td>
</tr>
<tr>
<td>3</td>
<td>30,001 – 50,000</td>
<td>19</td>
<td>30</td>
</tr>
<tr>
<td>4</td>
<td>50,001-75,000</td>
<td>08</td>
<td>13</td>
</tr>
<tr>
<td>5</td>
<td>75,001-100,000</td>
<td>05</td>
<td>08</td>
</tr>
<tr>
<td>6</td>
<td>Above 100,000</td>
<td>06</td>
<td>10</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>63</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>
5.4.7 Ownership Status of the Houses

Sampled respondents were asked about their housing ownership status in order to know their level of living standard as reflected in Table 5.19. Majority of respondents 73% were living in their own houses whereas, 27% were living in rented houses in the town area.

Table 5.22: Houses Ownership Status

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Type of Ownership of House</th>
<th>Number of Respondent</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Owner</td>
<td>46</td>
<td>73</td>
</tr>
<tr>
<td>4</td>
<td>Renter</td>
<td>17</td>
<td>27</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>63</td>
<td>100</td>
</tr>
</tbody>
</table>

Figure 5.19: Ownership Status of the Respondents
5.4.8 Borrowing Status

377. There are two types of credit sources available to the people, formal and informal. The survey revealed that only 10% sampled household’s availed credit from informal sources whereas none of the remaining respondents availed any type of loan facility. The loan was obtained for marriages or to observe other rituals and to meet household expenditure. Table 5.20 shows the borrowing status of the respondents and also depicted in Figure 5.15.

Table 5.23: Borrowing Status of the Respondents

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Borrowing Status</th>
<th>Number</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Yes.</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td>No.</td>
<td>57</td>
<td>90</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>63</td>
<td>100</td>
</tr>
</tbody>
</table>

Figure 5.20: Borrowing Status

5.4.9 Mode of Transport

378. Table 5.21 describes mode of transport being used by the respondents sampled during social impact assessment survey. About 14% of respondents were using public transport and 86% reported their own personal transport. While, the respondents using personal transport, use to go for public transport when they have to travel a far distance area in Karachi city. In this way they were enjoying both mode of transport including public & private for travel purpose. Data also depicted in the Figure: 5.19.

Table 5.24: Mode of Transport

<table>
<thead>
<tr>
<th>Mode of Transport</th>
<th>Number of Respondents</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public</td>
<td>9</td>
<td>14</td>
</tr>
<tr>
<td>Personal</td>
<td>54</td>
<td>86</td>
</tr>
<tr>
<td>Total</td>
<td>63</td>
<td>100</td>
</tr>
</tbody>
</table>
5.4.10 Respondents Access to Amenities in the Project Area

379. Social infrastructure and amenities are crucial to creating sustainable communities. This assessment sets spaciousness of a household’s dwelling, household amenities like availability of electricity and modern appliances, nature of access to water, fuel for cooking (ease of fetching in what are primarily women’s tasks), and type of sanitation facilities available as primary indicators for assessing standard of living.

380. The result of the survey revealed that 97% of the households had electricity facility, water supply was available for the 60% of the sampled households while the health care facilities in shape of dispensaries/hospitals were available to majority 96% of the surveyed population. Providing basic level of education is the responsibility of the government, and facility of school was available in the area to almost 98% of the respondents and facility of mettle road and proper sewerage system mentioned by 95% and 96% households respectively. The information in respect of access to social amenities and their quality of services is given in Table 5.22.

Table 5.25: Access to Social Amenities in the Project Area

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Facility</th>
<th>Available (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Electricity</td>
<td>97</td>
</tr>
<tr>
<td>2</td>
<td>Water Supply</td>
<td>60</td>
</tr>
<tr>
<td>3</td>
<td>Dispensary/hospital</td>
<td>96</td>
</tr>
<tr>
<td>4</td>
<td>School</td>
<td>98</td>
</tr>
<tr>
<td>5</td>
<td>Mettle Road</td>
<td>95</td>
</tr>
<tr>
<td>6</td>
<td>Sewerage</td>
<td>96</td>
</tr>
</tbody>
</table>

Source: field survey

5.4.11 Source of Drinking Water in the Project Area

a) Water Supply

381. Drinking water, also known as potable water or improved drinking water is water
safe enough for drinking and food preparation. Access to safe drinking water supply is not only a basic need and a precondition for healthy life, but is also a basic human right. The quality of water is directly linked to the quality of health.

382. Clean and safe water is one of the major problems being faced by the residents of Project area especially in Korangi creek and Korangi crossing where there is poor water supply facility is available to the local residents. Although quality of water is not good which comes through water supplies but local people are forced to drink this water as the purchasing of tanker water is a separate task and difficult to achieve due to its price and shortage. People are supposed to purchase water from tankers or by the water purification centers on high rates. The water of supply lines is insufficient and polluted in many of the areas which is not hygienic for drinking purpose. In many of the areas, water normally comes for few hours and not available in sufficient quantity. Table 5.23 shows the source of water for domestic usage. The findings of the impact study indicate that water supply and purchase of water from watertanker. Details are given below;

Table 5.26: Sources of Drinking Water

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Water Supply Source</th>
<th>Number of Respondent</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Water Supply</td>
<td>38</td>
<td>60</td>
</tr>
<tr>
<td>2</td>
<td>Tanker</td>
<td>25</td>
<td>40</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>63</td>
<td>100</td>
</tr>
</tbody>
</table>

383. In the pie chart (Figure 5.20), sources of domestic water have been shown below.

Figure 5.22 : Sources of Water Drinking Water in the Project Area

b) Satisfaction about Quality of Water

384. Table 5.24 shows the current situation of the water quality in the project area. Majority of the respondents 84% were not satisfied with the quality of water available in the project area. While, 16% respondents were happy with the quality of water.
Table 5.27: Satisfaction about Quality of Water

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Satisfaction about Quality of Water</th>
<th>Number of Respondent</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>No</td>
<td>53</td>
<td>84</td>
</tr>
<tr>
<td>2</td>
<td>Yes</td>
<td>10</td>
<td>16</td>
</tr>
</tbody>
</table>

Total 63 100

385. In the pie chart (Figure 5.21), the satisfaction about quality of water is shown below.

Figure 5.23: Level of Satisfaction with Quality of Water

5.4.12 Summary of Comments and Suggestions of the Respondents

386. Comments and Suggestions about the proposed project were asked by the respondents of the socio-economic baseline survey. Respondents pointed out the following concerns and suggestions relating to proposed project activities;

- During the socioeconomic survey it was observed that most of the respondents were in favor of the proposed project and they showed their consent about the need of the project.
- Construction of the proposed road and rehabilitation of numerous roads will resolve the traffic issues and make easy access by avoiding traffic jam.
- Respondents demanded the compensation as per replacement value for the possible affected land and their assets if any;
- Many of the respondent raised their concerns regarding their privacy. They were of the view that during construction phase their family privacy will be disturbed. In this regard, it was made sure to those respondents that their privacy will be ensured by adopting defined SoPs and implementation will make sure by the contractor. They were satisfied in this regard.
- Respondents were of the view that during the construction period, in populated areas the mobility of local women will be restricted. Women and children cannot move easily during construction activities.
- Construction should be done as fast as can be, because, in some emergencies,
women and children will have to go hospitals for health care purposes; even alternateroute is required under this condition.

- Dust and noise should manage during construction activities.
- Construction activities must carried out in night to avoid traffic issues.
- Respondents demanded that the supply of public utilities will remain continue during construction phase.
- Local business operators were of the view that proper way will be provided to our customers to avoid business disturbance.
- The educated youth should be given the job opportunities during project execution where possible;

5.4.13 Gender Situation

387. The women had no recognized role in the authority structure in the past despite representing of 50% of the population of the project area but the trend is changing now; the literacy rate of female population is 47%.9 The traditional attitude of not sending the girls to school is changing now, because the parents realized and understand that the basic education is necessary for each individual without the discrimination of sex. Most of the women stay at home and only travel outside in case of going to relatives and weddings and to hospitals.

388. Local women pointed out the following major issues relating to this project activities;

- Local women mobility will be restricted because of construction activities in populated areas;
- Alternate routes should be provided during construction phase and mobility of the local community shouldn't be restricted.
- Contractor should consider the option of construction in night time in populated areas to avoid any inconvenience for the local community.
- Construction should be done as fast as can be because, in some emergencies, women and children will have to go hospitals for health care purposes.
- Women demanded the improvement in available health facilities in the local hospitals.
- Women demanded for the upgradation of educational facilities in local schools.
- Drinking water is not safe and sufficient. Women demanded for the improvement in quality and quantity of the drinking water because water of tankers is also not good for health.
- The job opportunities should be provided to the local people during execution of the proposed project.
- Numerous women are doing the embroidery work for domestic use; their skill should be enhanced through providing training and setting up the skill development centers in the project area.

5.4.14 Women Participation Level

389. The women participation in different activities was assessed as part of socioeconomic survey. The views of the females were obtained so that the true

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feelings can be captured about their role in the society. The participation level is discussed as in Table 5.25.

Table 5.28: Women Participation in the Various Activities

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Activities</th>
<th>Physical Participation Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Household</td>
<td>95%</td>
</tr>
<tr>
<td>2</td>
<td>Child caring</td>
<td>97%</td>
</tr>
<tr>
<td>3</td>
<td>Business Activities</td>
<td>02%</td>
</tr>
<tr>
<td>4</td>
<td>Employment</td>
<td>03%</td>
</tr>
<tr>
<td>5</td>
<td>Sale &amp; Purchase of properties</td>
<td>25%</td>
</tr>
<tr>
<td>6</td>
<td>Social obligations (marriage, birthday&amp; other functions)</td>
<td>85%</td>
</tr>
<tr>
<td>7</td>
<td>Local representation (councilor/political gathering)</td>
<td>30%</td>
</tr>
</tbody>
</table>

Source: Field Survey

390. The Table 5.25 above reveals the women participating in the daily life activities however; their participation level was varied in various activities. The women participation was 95% in the household activities and 97% for child caring. Very few females were associated in earning activities like only 02% & 03% were earning thorough business and jobs respectively. Only 25% were of the view that they were asked in matters like sale and purchase of properties by their male family members. 85% women participants revealed that they celebrate and participate in social obligations with great enthusiasm. Moreover, 30% of the participants told that they participate in political gatherings etc.

5.4.15 Women Issues

391. The women of the project area reported the following issues during the survey which are prioritized as under;

i. Unavailability of safe and sufficient drinking water in the area.

ii. Unavailability of any skill development center particularly for females.

iii. Women demanded for more income generating opportunities by which they can improve their financial status.

iv. Access to better medical treatment facilities particularly women related issues.

v. Access to improved education facilities in native schools.

vi. Good transport services for local community.
6  STAKEHOLDER CONSULTATIONS

6.1 GENERAL

392. Stakeholder’s involvement especially the local population is an important feature of the environmental assessment and can lead to a better and more acceptable decision-making regarding the project design and implementation. Public involvement, undertaken in a positive manner and supported by a real desire to use the information gained to improve the Project design, will lead to better outcomes and lay the basis for on-going positive relationships between the stakeholders. It gives the feeling of an ownership to the local population. Public involvement is necessary for smooth implementation of the project and especially the local community whose support is also required for the success of the project.

393. Given the dimension and nature of the project, the proposed project management and implementation authorities are committed for undertaking public consultation at all the relevant departments as a part of project planning/design.

6.2 OBJECTIVES

394. The objectives of consultation are to:

- Inform the stakeholders about the proposed project;
- Provide an opportunity to those who remained unable to present their views and values, thus allowing more sensitive consideration of mitigation measures and trade-offs;
- Provide those involved with planning, the proposal with an opportunity to ensure that the benefits of the proposal are maximized and that any major impact has not been overlooked;
- Provide an opportunity for the public to influence the project design in a positive manner;
- Increase public confidence in front of proponent, reviewers and decision makers;
- Provide better transparency and accountability in decision making;
- Reduce conflict through the early identification of contentious issues, and working through these to find acceptable solutions; and
- Create a sense of ownership of the proposal in the minds of the stakeholders.

6.3 STAKEHOLDER IDENTIFICATION

395. Identification of stakeholder is an important step which ensures that all stakeholders are identified and classified as per their role in the Project. The Project identified different types of stakeholders i.e. classified as primary and secondary stakeholders.

396. Primary stakeholders are those who are directly concerned with the Project or directly affected due to the proposed project activities. The primary stakeholders of the Project include all the Project AFs/Aps and Government/Private departments.
being affected by project activities such as the areas of Creek Avenue, Korangi Bridge, Korangi Bridge to NIP, Airmen Golf Club, Link road to NRL and General public travelled through the area. Whereas, KMC, NTDC, KW&SB, Sindh EPA and conservators of forest mangroves were consulted. Under the proposed Project, public and stakeholder consultations with the locals carried out in the above mentioned nearby areas and departments.

397. As per definition of sociology “Secondary stakeholders would be those with a more indirect interest, such as those involved in institutions or agencies concerned with managing the resource or those who depend at least partially on wealth or business generated by the resource”10. It means Secondary stakeholders are people or groups that are indirectly affected from the project activities and they have no direct concern with the project such as in this project, Health department, local NGOs etc.

398. Considering the importance of the project, consultations were carried out at all the important relevant departments. Consultation is an on-going process which continues during the project life cycle and even after the submission of Environmental Assessment. Therefore, four-tier approach was adopted. Stakeholders were identified, categorized and consulted at government level departments, and community level.

399. Consultation with the relevant departments were carried out through meetings and presentations while consultations with local communities and directly affected people, etc. were undertaken during the baseline survey of the Study Area. Consultations were held with the following departments and areas;

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Agency / Department / Stakeholder</th>
<th>Type of Stakeholder</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PPP Unit</td>
<td>Primary</td>
</tr>
<tr>
<td>2</td>
<td>PPP Support Facility (PSF)</td>
<td>Primary</td>
</tr>
<tr>
<td>3</td>
<td>Client/ Local Government Department</td>
<td>Primary</td>
</tr>
<tr>
<td>4</td>
<td>Sindh EPA</td>
<td>Primary</td>
</tr>
<tr>
<td>5</td>
<td>Conservator Wildlife</td>
<td>Primary</td>
</tr>
<tr>
<td>6</td>
<td>Conservator of Forest Mangroves</td>
<td>Primary</td>
</tr>
<tr>
<td>7</td>
<td>Forest Department</td>
<td>Primary</td>
</tr>
<tr>
<td>8</td>
<td>KW&amp;SB</td>
<td>Primary</td>
</tr>
<tr>
<td>9</td>
<td>NTDC</td>
<td>Primary</td>
</tr>
<tr>
<td>10</td>
<td>Karachi Fisheries</td>
<td>Primary</td>
</tr>
<tr>
<td>11</td>
<td>Local Community</td>
<td>Primary</td>
</tr>
<tr>
<td>12</td>
<td>Barret Hodgson University</td>
<td>Primary</td>
</tr>
<tr>
<td>11</td>
<td>Pak Arab Refinery Ltd. (PARCO)</td>
<td>Primary</td>
</tr>
</tbody>
</table>

---

10 https://www.britannica.com/topic/stakeholder#:~:text=Secondary%20stakeholders%20are%20those%20influenced.and%20local%20business%20support%20groups.
### Table 6.2: Role of Concerned Agencies/Departments

<table>
<thead>
<tr>
<th>Project Stakeholders</th>
<th>Roles and Responsibilities</th>
</tr>
</thead>
</table>
| **Sindh Environmental Protection Agency**    | • SEPA is the regulatory authorities and mainly responsible for the development and implementation of the environmental policies and strategies in order to integrate the environmental issues and sustainable development approaches into the legal and regulatory frameworks as per Sindh Environmental Protection Act, 2014.  
• EPAs are responsible for the issuance of NOC of the Proposed Project.  
• EPA Sindh is responsible for the compliance of EMMP and NOC provision during the construction and operation stages of the Project. |
| **Forest Department**                         | • Protection, improvement and maintenance of existing forests  
• Increase forests by planting new trees  
• Extension and advisory services to the general public about tree plantation |
| **Wildlife Department**                       | • To save and protect wildlife |
| **Fisheries Department**                     | • Conservation of fisheries reservoirs  
• Management and development of resources on scientific lines  
• Extension services to private sector |
| **Revenue Department**                        | • Provide land ownership data of DPs which include but not limited to the ownership record, land categorization and price details.  
• Responsible for implementation of all relevant Sections of LAA, 1894. |
| **Karachi Metropolitan Corporation (KMC)**   | • Planning development and maintenance of Karachi roads, bridges, street lights, storm water drains, land control/ removal of encroachment, solid waste management, municipal watch and ward, firefighting, traffic engineering, charged parking, etc. |
| **Local Government Department Sindh (PPP Node / Line Agency)** | • Administration and fiscal support to the various tiers of Local Councils;  
• Human Resource Management for the offices of Local Councils;  
• Secretariat of Local Government Commission; |
### Project Stakeholders

<table>
<thead>
<tr>
<th>Roles and Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Coordination in the matters related to audit and accounts of various tiers of Local Councils;</td>
</tr>
<tr>
<td>• Coordination, Supervision and Monitoring of Provincial, Foreign-aided and Mega Projects of Local Government / Councils; and</td>
</tr>
<tr>
<td>• Capacity building for Local Councils employees and elected representatives.</td>
</tr>
</tbody>
</table>

#### Karachi Water and Sewerage Board (KWSB)

- Undertake bulk production, filtration / treatment transmission and retail distribution purifying of water.
- Under take collection, pumping, treatment & disposal of sewage & industrial waste.
- Billing and collection of water & sewerage charges including arrears thereof.

#### Works and Services Department (GoS)

- This Department is responsible for planning, execution, development and maintenance of all Provincial Roads and Bridges through Annual Development Programme, and Foreign assistance.
- To serve the wider public, in line with the policy of the Government of Sindh, by designing, constructing and maintaining roads, bridges and buildings, in the fairest, just and equitable manner to ensure optimal development for all people living in the province.
- Management of Technical and Financial Affairs related to all scheme undertaken by various attached department of W&S Department.
- Control of Administrative matters including organizational affairs, logistics and human resource management.

### 6.3.1 Concerns/Feedback

401. Feedback received during public/stakeholder consultations includes both project related concerns and other/general concerns.

402. Project related concerns/issues and suggestions of the people are related to their willingness and acceptability of the project, livelihood, drinking water supply & sewerage, health facilities, road infrastructures, education and women health issues. Brief Introduction about the proposed project, its various components, positive and negative impacts and other technical details related to the environment, social and economic considerations were provided before the consultation to stakeholders.

403. Details of the officials contacted are given in Table 6.3 below and pictorial view of departmental consultations is provided as Plate 6.1.

### Table 6.3: List of Stakeholder Officials Consulted

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Agency / Department / Stakeholder</th>
<th>Representative’s Details</th>
<th>Date</th>
<th>Apprehensions and Suggestions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PPP Unit</td>
<td>Mr. Sajjad Gilal Director</td>
<td>19-10-2020</td>
<td>Required documents were provided by the concerned</td>
</tr>
<tr>
<td>Sr. No</td>
<td>Agency / Department / Stakeholder</td>
<td>Representative’s Details</td>
<td>Date</td>
<td>Apprehensions and Suggestions</td>
</tr>
<tr>
<td>--------</td>
<td>----------------------------------</td>
<td>--------------------------</td>
<td>------------</td>
<td>-------------------------------</td>
</tr>
<tr>
<td>2</td>
<td>PSF</td>
<td>Mr. Irfan Hashmi Environment Specialist&lt;br&gt;Mr. Shahzad Hasan Rizvi Social Development Specialist</td>
<td>19-03-2021</td>
<td>Projects (URI 1,2&amp;3) modalities were discussed along with the draft EIA report of the URI subproject-1. It was suggested that remaining two EIA reports of URI subprojects 2&amp;3 need to be strengthen specially with respect to mangroves, biodiversity impacts and further revised in the light of review meeting decisions. For biodiversity assessment, IBAT software findings need to be incorporated in the EIA reports.</td>
</tr>
<tr>
<td>3</td>
<td>Client/ Local Government Department</td>
<td>Syed Mohammad Taha Special Secretary (Tech)/ PD (URI) ‘0300-9232470, (021) 99230658</td>
<td>26-10-2020</td>
<td>Mr. Taha brief advantages of initiatives of the Project as after the implementation of all three sub-Projects neighborhood along the route will be benefited. Congestion of traffic will be reduced.</td>
</tr>
<tr>
<td>4</td>
<td>Works &amp; Services Department GoS</td>
<td>Mr. Ghulam Haider Assistant Chief Development (ACD)</td>
<td>26-10-2020</td>
<td>After the Project brief, ACD was satisfied with the Project benefits and considered it as a good step for the development of the proposed Project area.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ms. Shama Parveen Assistant Chief Development</td>
<td>26-10-2020</td>
<td>After the Project brief, ACD was satisfied with the Project benefits and considered it as a good step for the development of the proposed Project area.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mr. S. M Khalid Huda Chief Development ‘021-99212953</td>
<td>26-10-2020</td>
<td>After the Project brief, Mr. Khalid Huda was satisfied with the Project benefits and considered it as a good step for the development of the proposed Project area.</td>
</tr>
<tr>
<td>5</td>
<td>Irrigation Department</td>
<td>Mr. Jamaluddin Mangan Special Secretary (Tech)</td>
<td>27-10-2020</td>
<td>Mr Jamal shared his concerns that ownership of Lyari and Malir Rivers are out of irrigation department jurisdiction. He suggested regarding design that it</td>
</tr>
<tr>
<td>Sr. No</td>
<td>Agency / Department / Stakeholder</td>
<td>Representative' s Details</td>
<td>Date</td>
<td>Apprehensions and Suggestions</td>
</tr>
<tr>
<td>--------</td>
<td>----------------------------------</td>
<td>---------------------------</td>
<td>------------</td>
<td>-------------------------------</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>Should be such that it create less hindrance in water way of the river. Plan should be of 200 years flood data. Reimbursement must be at least 5 times.</td>
</tr>
<tr>
<td>2</td>
<td>Mr. Fahad ali Jagrani, S.O 0333-7578749</td>
<td>27-10-2020</td>
<td>After the Project brief, Mr. Fahad Jagrani was satisfied with the Project benefits and considered it as a good step for the development of the proposed Project area.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Culture &amp; Antiquity Department</td>
<td>Mr. Ashfaq Ahmed Patholy S.O ‘0336-3119904</td>
<td>27-10-2020</td>
<td>After the Project brief, Mr. Ashfaq Pathology was satisfied with the Project benefits and considered it as a good step for the development of the proposed project area.</td>
</tr>
<tr>
<td>4</td>
<td>World Wide Fund for Nature (WWF) Pakistan, Karachi</td>
<td>Mr. Salvador Fernandez Office Manager 021-34544791-2</td>
<td>29-10-2020</td>
<td>After the Project brief, it was requested to share the information with relevant person for apprehensions / suggestions.</td>
</tr>
<tr>
<td>5</td>
<td>Shehri NGO</td>
<td>Ms. Amber Ali Bhai General Secretary 021-34530346, 0300-8209296</td>
<td>29-10-2020</td>
<td>Madam Amber Ali showed her concerns regarding mangroves cutting along the Project alignment. She suggested for aerial survey to investigate depth and total no of mangroves along the Project route. The route should be improved so that traffic load is distributed.</td>
</tr>
<tr>
<td>6</td>
<td>Parks &amp; Horticulture KMC</td>
<td>Mr. Junaid Ullah khan Director Parks.Khi, KMC ‘021-99204300</td>
<td>29-10-2020</td>
<td>He has concerns regarding widening as there are 6-6 encroachment and very less space available for widening.</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>Mr. Mohammad Azad Khan PA to DG parks ‘021-99204301</td>
<td>29-10-2020</td>
<td>After the Project brief, Mr. Mohammad Azad Khan was satisfied with the Project benefits and considered it as a good step for the development of the proposed Project area.</td>
</tr>
</tbody>
</table>

After the Project brief, Ms.
<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Agency / Department / Stakeholder</th>
<th>Representative’s Details</th>
<th>Date</th>
<th>Apprehensions and Suggestions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Khatoon Finance Secretary ‘021-99204302</td>
<td>2020</td>
<td>Mehreen Khatoon was satisfied with the Project benefits and considered it as a good step for the development of the proposed Project area.</td>
</tr>
<tr>
<td>10</td>
<td>Sindh Wildlife Department</td>
<td>Mr. Javed Ahmed Maher (SWD) conservator ‘021-99204951</td>
<td>29-10-2020</td>
<td>After the Project brief, Mr. Javed was satisfied with the Project benefits and considered it as a good step for the development of the proposed Project area. But he asked to take permission from all the authorities along the route as per act 2020 sec 9. Act 2020 sec 9 should be followed and permission is required.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mr. Mumtaz Ali Summro (Assistant Conservator Admin)</td>
<td></td>
<td>The official recommended the utmost care should be taken to protect the wildlife and other associated ecological resources for the sustainability of the ecological environment and Project as well. No faunal and floral species should be disturbed or damaged during all activities of the Project, and adequate mitigation measures should be adopted to mitigate the risks. He suggested to consider the passages for the movement of wildlife and livestock across the road.</td>
</tr>
<tr>
<td>12</td>
<td>Conservator of Forest Mangroves</td>
<td>Mr. Shezad Sadiq Gill Divisional Forest officer ‘021-34400236</td>
<td>3/11/2020</td>
<td>After the Project brief, Mr. Shezad was satisfied with the Project benefits and considered it as a good step for the development of the proposed Project area. Parent department should approach and submit assessment report to forest department. Approx 4500 $ /hector is the compensation cost for mangrove replantation, wood value will be</td>
</tr>
<tr>
<td>Sr. No</td>
<td>Agency / Department / Stakeholder</td>
<td>Representative's Details</td>
<td>Date</td>
<td>Apprehensions and Suggestions</td>
</tr>
<tr>
<td>--------</td>
<td>-----------------------------------</td>
<td>--------------------------</td>
<td>------------</td>
<td>------------------------------</td>
</tr>
<tr>
<td>13</td>
<td>Forest Department</td>
<td>Mr. Riaz Ahmad Waghan (CCF Mangroves &amp; Rangelands) Mr. Shehza Sadiq Gill (DFO Coastal (RB) KHI) Mr. Gul Junejo (DFO Social Forestry)</td>
<td>17/11/2020</td>
<td>The officials were briefed about the URI proposed road Projects by the NESPAK Environment team. The CCF and DFO mangroves shared that the mangroves forest is legally protected forests and having high environmental /ecological value so, the route of the proposed road may be reconsidered to avoid losses to the mangroves habitat. Recommended that, the compensation for the loss of mangroves should be carried as per formula which is 4200$/ha/year for ten (10) years which includes compensation and ecosystems services as well. Sindh forest department should be in the loop in all the activities as major stakeholder. The DFO social forestry recommended that damages to the local trees/flora must be avoided and the Project design must be environmental friendly to avoid tree cuttings and loss of biodiversity. Further, he added to plant the native species along the road (on both side) as per the TBTTAP standards in consultation with officials of Forest Department.</td>
</tr>
<tr>
<td>14</td>
<td>KW&amp;SB</td>
<td>Mr. Mohammad Hanif Baloch Project Director '0306-3310750</td>
<td>3/11/2020</td>
<td>After the Project brief, Mr. Mohammad Hanif Baloch was satisfied with the Project’s benefits and considered it as a good step for the development of the proposed Project area. Embankment shall be</td>
</tr>
<tr>
<td>Sr. No</td>
<td>Agency / Department / Stakeholder</td>
<td>Representative's Details</td>
<td>Date</td>
<td>Apprehensions and Suggestions</td>
</tr>
<tr>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>strengthened High tide level should be considered while designing road.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mr. Muktiaar Ali samtio</td>
<td>3/11/2020</td>
<td>After the Project brief, Mr. Muktiaar Ali was satisfied with the Project benefits and considered it as a good step for the development of the proposed Project area.</td>
</tr>
<tr>
<td>15</td>
<td>Sindh EPA</td>
<td>Ms. Farzana Naseem</td>
<td>5/11/2020</td>
<td>After the Project brief Ms. Farzana Naseem showed her concerns regarding flooding and suggested that embankments should be high enough to cater any worst scenario of flooding as catchment area will get narrow. She instructed it should be assured in design that all IFC guidelines have being followed, Environmental Monitoring at all environmental sensitive areas should be considered. NOC of all utility owner should be attached along with EIA report.</td>
</tr>
<tr>
<td>16</td>
<td>Karachi Fisheries</td>
<td>Dr. Asfand Jawar</td>
<td>5/11/2020</td>
<td>After the Project brief, Mr. Asfand Jawar was satisfied with the Project benefits and considered it as a good step for the development of the proposed Project area as they suffer traffic congestion on Korangi causeway due to traffic load. He also ensured to forward the letter to field office for their comments and will let us know and requested to draft additional letter to Secretary Fisheries. Mr. Asfand also suggested that all port activities should be routed outside of city area so that load on city traffic can be minimized, Further, he shared his concerns that before wastewater disposal to sea, it</td>
</tr>
<tr>
<td>Sr. No</td>
<td>Agency / Department / Stakeholder</td>
<td>Representative' s Details</td>
<td>Date</td>
<td>Apprehensions and Suggestions</td>
</tr>
<tr>
<td>--------</td>
<td>----------------------------------</td>
<td>---------------------------</td>
<td>------------</td>
<td>-------------------------------</td>
</tr>
<tr>
<td>17</td>
<td>NTDC</td>
<td>Mr. Nek Muhammad Executive Engineer '0333-57402578</td>
<td>28-10-2020</td>
<td>After the project brief, Nek Muhammad was satisfied with the project benefits and considered it as a good step for the development of the proposed project area.</td>
</tr>
<tr>
<td>18</td>
<td>Local Community</td>
<td></td>
<td>12,13/11/2020</td>
<td>Local community was briefed about the proposed Project during consultation and socio economic baseline interviews. Complete Project features and anticipated positive and negative impacts were discussed with the local residents and business operators. Participants discussed their concerns regarding possible difficulties which they may face during construction period. Their concerns were recorded and they were briefed that every possible protective measure will be taken to protect their interests. Participants were satisfied with the briefing as well as with the proposed Project.</td>
</tr>
<tr>
<td>19</td>
<td>Road Users</td>
<td>Pedestrian, transporters, drivers, and commuters</td>
<td>12,13/11/2020</td>
<td>Pedestrian, transporters and commuters are important stakeholders of the proposed Project. They were also consulted at the site of proposed Project. They were briefed about the proposed Project during consultation and socio economics baseline interviews. These particular stakeholders demanded for the alternate traffic plans during construction period so that they can easily travel in the city. They were briefed that...</td>
</tr>
<tr>
<td>Sr. No</td>
<td>Agency / Department / Stakeholder</td>
<td>Representative's Details</td>
<td>Date</td>
<td>Apprehensions and Suggestions</td>
</tr>
<tr>
<td>--------</td>
<td>-----------------------------------</td>
<td>--------------------------</td>
<td>------</td>
<td>-------------------------------</td>
</tr>
<tr>
<td>20</td>
<td>Traffic Police, Karachi</td>
<td>Various traffic wardens</td>
<td>12,13/11/2020</td>
<td>their concerns will be addressed well before starting of the construction. They were of the view that this proposed road will be helpful in reducing traffic burden on roads.</td>
</tr>
<tr>
<td>21</td>
<td>IUCN</td>
<td>Mr. Danish Rashdi Programme Coordinator</td>
<td>3/11/2020</td>
<td>Briefed about the proposed Project and they mentioned about traffic congestion issues at Korangi causeway Road. There must be an alternative route for smooth traffic flow and also ensured the alternate route for commuter during construction of proposed Project.</td>
</tr>
<tr>
<td>22</td>
<td>SSGC</td>
<td>Mr. Azeem Khan General Manager P&amp;D '021-99021000 Pictorial view see Plate:10</td>
<td>3/11/2020</td>
<td>The mangroves forest habitats were discussed briefly in the light of the proposed Projects among the NESPAK experts and IUCN Professionals. The relevant information regarding the mangroves were shared.</td>
</tr>
<tr>
<td>23</td>
<td>Barret Hodgson University</td>
<td>Mr. Muneeb Shah HoD Engineering 03159911987, 03008228727</td>
<td>19/11/2020</td>
<td>After the project brief, Mr. Azeem Khan was satisfied with the project benefits and considered it as a good step for the development of the proposed project area.</td>
</tr>
<tr>
<td>24</td>
<td>PARCO</td>
<td>Mr. Aamir Khan Chief Engineer (Pipeline Maintenance) 0300-2262334</td>
<td>---</td>
<td>The official was contacted, however, time was not provided for consultation.</td>
</tr>
</tbody>
</table>
Consultation with the Client

Consultations with Irrigation Department

Consultation with Culture & Antiquity Department

Consultation with Parks & Horticulture KMC

Consultation with Conservation Wildlife Sindh

Consultation with Conservator of Forest Mangrove
6.4 COMMUNITY CONSULTATION AND PARTICIPATION PROCESS

404. For ascertaining the perceptions of different stakeholders about the project (during/after construction) meetings were held within the project area of influence. These meetings were held in an open atmosphere, in which participants expressed their views freely. Informal group discussions were also held as an additional tool for the assessment of the perceptions of the stakeholders about the project and potential impacts both positive and adverse likely to occur due to its implementation.

6.4.1 Methods of Public Consultation

405. The following methods were used for public consultation with project stakeholders in order to ascertain their stakes regarding project implementation. The views of the beneficiaries were formally recorded. The respondents were selected randomly residing or working near the proposed project locations.

- Community/Public Consultations
- Individual meetings
- Gender Consultations

406. The detail of the locations with number of participation is provided in the Table 6.4.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Town</th>
<th>District</th>
<th>Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Korangi Crossing</td>
<td>Korangi</td>
<td>16</td>
</tr>
<tr>
<td>2</td>
<td>Industrial Area</td>
<td>Korangi</td>
<td>15</td>
</tr>
</tbody>
</table>

6.4.2 Categories of Stakeholders Contacted
Different categories of stakeholders contacted, during consultation is shown in the Table 6.5.

Table 6.5: Stakeholders Contacted in the Project Area

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Stakeholder Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Residents</td>
</tr>
<tr>
<td>2</td>
<td>Business/shop owners</td>
</tr>
<tr>
<td>3</td>
<td>Transporters</td>
</tr>
<tr>
<td>4</td>
<td>Drivers</td>
</tr>
<tr>
<td>5</td>
<td>Laborers</td>
</tr>
<tr>
<td>6</td>
<td>Students</td>
</tr>
</tbody>
</table>

6.4.3 Consultations with Local Communities and Project affected Persons

Consultations have been conducted with the local communities and possible Affected People in the Project area to take their views and incorporating in the project planning. Two(02) Consultative meetings were held with 31 participants in the Study Area. The major categories participated in these meetings were local population, community groups, and possible Affected Persons (APs). The location map of the community consultations is attached as Annex-IV. and details of the participants with venue are given in Table 6.6 below:

Table 6.6: Consultation Meetings and Participants

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Date</th>
<th>Venue</th>
<th>Name</th>
<th>Profession</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>09-11-2020</td>
<td>Korangi Crossing</td>
<td>Meharban Khan s/o Taj Khan</td>
<td>Transporter</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Shareef s/o M. Nawaz</td>
<td>Pvt. Job</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Jameel s/o Ghulam Yaseen</td>
<td>Pedestrian</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ameer Gulab s/o Taj Muhammad</td>
<td>Business</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Faraz Ahmad s/o Noor Muhammad</td>
<td>Business</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Javed s/o Muhammad Ibrahim</td>
<td>Business</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Waqas s/o Muhammad Ameen</td>
<td>Pvt. Job</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Irfan s/o Laal Muhammad</td>
<td>Resident</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Zia Ullah s/o Muhammad Kamal</td>
<td>Teacher</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Naveed Abbas s/o Allah Ditta Khan</td>
<td>Business</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Iqbal Hussain s/o Ghulam Qadir</td>
<td>Business</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ahmad Ramzani s/o Abdul Ghani</td>
<td>Pvt. Job</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Waqar Ali s/o Zulfiqar Ali</td>
<td>Business</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>M. Bilal s/o Haji Sher Muhammad</td>
<td>Pvt. Job</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Syed Saiman Ali Hashmi s/o Rafique Ali</td>
<td>Business</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Bilal Ali s/o Saleem ul Din</td>
<td>Business</td>
</tr>
</tbody>
</table>

Question Raised                          | Response                                                                 |
---                                     |--------------------------------------------------------------------------|
What will be the route design of the proposed new road? | The participants were briefed about the route and length of the proposed Korangi link road. It was also briefed that how the proposed new road and flyover will reduce traffic load from the road. |
Is there any land acquisition involved in the project from private sector or residential | During designing of the proposed road efforts have been made to minimize the impacts on residential structures and business infrastructure as the most of the route of the road is based on |
and commercial infrastructures would be impacted?

new alignment which pass through the river area. If any structure and business would be affected will be shifted with the proper compensation. Shifting allowance and livelihood disturbance allowance for the disturbance period will be provided. Moreover, the rehabilitation of the roads will be carried out in already available RoW.

<table>
<thead>
<tr>
<th>Case No.</th>
<th>Date</th>
<th>Venue</th>
<th>Name</th>
<th>Occupation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>10-11-2020</td>
<td>Industrial</td>
<td>Saqib Ali s/o Liaquat Ali</td>
<td>Transporter</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Muhammad Waqas s/o Sarfaraz</td>
<td>Business</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Jameel s/o Mian Muhammad</td>
<td>Vendor</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Mazhar Khursheed s/o Khursheed</td>
<td>Business</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Tariq Javed s/o Ghulam Rasool</td>
<td>Business</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Abdul Saboor s/o Muhammad Ikram</td>
<td>Private Job</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Muhammad Safiullah s/o M. Syedullah</td>
<td>Driver</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Mansoor s/o Muhammad Ali</td>
<td>Resident</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Yousaf s/o Abdur Razaq</td>
<td>Resident</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Kamran Mehtooz s/o Mehtooz Ali</td>
<td>Resident</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Khalid Hussain s/o Ghulam Hassan</td>
<td>Business</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Muhammad Waheed s/o Ameer Khan</td>
<td>Pvt. Job</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Zaki Abidi s/o Syed Hassan Abidi</td>
<td>Student</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Azeem Qureshi s/o Ishrat Qureshi</td>
<td>Pvt. Job</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Mushtaq Ahmad s/o Ayaz Ahmad</td>
<td>Driver</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Muneer Ahmad s/o Hazoor Ahmad</td>
<td>Driver</td>
</tr>
</tbody>
</table>

Question Raised | Response
--- | ---
When will construction of the road start? | After completion of all studies and final approval the construction of the road will start.
Dust and Traffic Jam at Korangi crossing will disturb our business. | It was ensured to the local residents that such type of issues will be settled with mutual consultation and no problem will be faced to the local community in this regard. Alternate traffic route plan will also be shared with local community during working hours.
What is the purpose of the public consultations and social survey? | The concerns of the local people will be recorded, addressed and design of the project will be improved with valuable suggestions.

6.4.4 Summary of Briefing to Participants of Community Consultations

409. During the consultations, people were informed/briefed about the project objectives and extensive question and answer sessions were conducted to clarify the project related works and activities to resolve the possible resettlement issues. They were briefed that the purpose of the consultations and discussions is to find out the possible solutions of the issues which you may face before and during the construction of the proposed project. The concerns of the participants were recorded and it was assured to the participants that all possible protective measure will be
taken by the client and contractor to facilitate all possible project affected persons including local residents as well business operators. Importance of the proposed project was highlighted during the discussions, participants were of the view that proposed project is very important in its nature and will be beneficial for the local community. It will reduce the traffic load on the existing road by avoiding the worst traffic jams. It was briefed that your entire concerns have an importance but these are minor and temporary in nature. These concerns will be addressed before and during construction. It was briefed that entire public utilities will be rehabilitated well before execution of construction work. Participants of the discussion were satisfied with the consultations and showed their fully cooperation for the smooth implementation of the project.

6.4.5 Stakeholders Concerns/Feedback

410. Feedback received during public consultation includes both project related concerns and other/general concerns. Concerns of the local people were mostly related to disturbance of the public utilities during construction phase. Brief Introduction about the proposed project, its various components, positive and negative impacts and other technical details related to environment, social and economic considerations were provided before the consultation to stakeholders.

411. During consultations participants raised following concerns;

- Disturbance for the local inhabitants and commercial activities in the populated areas;
- Disturbance of livelihoods in the COI of the proposed project;
- Mobility of women and children will be disturbed due to outside labor force during construction work;
- Dust & noise, disruption to Local inhabitants, and
- Increase of traffic pressure on the local roads in the area due to construction activities particularly in the streets.

6.4.6 Opinions of the Consulted Communities

412. In general, the consulted community consider the Project beneficial for the area. Due to construction of proposed Korangi link road and rehabilitation of the associated roads, the traffic flow will become smooth on the adjacent roads. Indirect benefits include employment opportunities for the locals, they will able to get jobs during construction of the proposed project, resulting in the increase of income and reduction in poverty. Moreover, due to construction on new alignment, the price of the adjacent lands will increase. Furthermore, possibly new industry will be established and people will get job opportunities.

- Participants demanded less impact on the residential and commercial structures by adopting proper protective measures. They were also of the view that fair compensation should be given for affected private land (if any) with
livelihood disturbance allowance.

- Civil work should be completed in the shortest possible time to avoid the adverse impacts on the daily activities and health of the people.
- Contractor should consider the option of construction in night time in populated areas to avoid inconvenience.
- Land should be acquired at market price (if any).
- Drinking water supplies should not be disturbed or restored on priority basis to facilitate the local communities.
- Impact on housing and commercial structures should be minimize and if not avoidable proper resettlement compensation should be given.
- Sign boards should be provided along the construction site.
- Proper arrangements should be done to avoid construction hazards.
- The local communities during the stakeholder consultations have shown great desire to be included in the project’s workforce.

6.4.7 Gender Consultations

413. Keeping in view the important role of the females in the household as well as in the society, gender consultation was also conducted to record views of the females and issues related to the project implementation (list of participants is provided in Table 6.7).

Table 6.7: Consultation Meetings and Participants

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Date</th>
<th>Name</th>
<th>Age</th>
<th>Education</th>
<th>Occupation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>14-11-2020</td>
<td>Tehzeeb Sakina Amir</td>
<td>48</td>
<td>M.A</td>
<td>Teacher</td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td>Sana Yousaf</td>
<td>22</td>
<td>B.A</td>
<td>Student</td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td>Uzma Fatima</td>
<td>20</td>
<td>B.A</td>
<td>Student</td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td>Fareeha</td>
<td>36</td>
<td>F.A</td>
<td>Housewife</td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td>Javeria</td>
<td>42</td>
<td>Middle</td>
<td>Housewife</td>
</tr>
<tr>
<td>6.</td>
<td></td>
<td>Sana Fatima</td>
<td>32</td>
<td>Matric</td>
<td>Housewife</td>
</tr>
<tr>
<td>7.</td>
<td></td>
<td>Maah Jabeen</td>
<td>44</td>
<td>Primary</td>
<td>Housewife</td>
</tr>
<tr>
<td>8.</td>
<td></td>
<td>Kaneez Bibi</td>
<td>62</td>
<td>Illiterate</td>
<td>Housewife</td>
</tr>
</tbody>
</table>

6.4.8 Awareness, Concerns about the Project and Response to their Queries

414. Women actively participated in the meeting and showed their support for the proposed project. Most of the women were un-aware about the proposed project. They were briefed about the proposed project and they considered the project valuable for the local community and highlighted sever issues related to women due to project execution. Their concern were of minor nature related to residential disturbance and mobility of women in the area. Location map for consultation is attached as Annex -IV
6.4.9 Problems Faced and Pressing Needs of the Women

415. Female participants highlighted various issues faced in the area which are:

- Lack of facilities of safe and sufficient drinking water,
- Females were of the view that they were unable to get water from supply lines for 24 hours. Water occasionally comes in the pipelines and mostly when they are sleeping. The water is insufficient to meet the daily requirements. Whereas, during the construction activities, this insufficient supply can be more disturb. It was briefed that these type of social amenities will not be disturbed. And it will be handled carefully.
- Lack of health facilities for females in the government hospitals.
- Insufficient educational facilities for girls in schools,
- Females were of the view that Karachi city must be facilitated with modern and sophisticated transport city like other cities of Pakistan. Public transport system is very poor, and
- Job opportunities must be provided to local females in project activities if possible.

416. Pictures for Public Consultation are given in Plate 6.2.
Environmental Impact Assessment (EIA)

Socioeconomic Survey at Korangi Crossing

Socioeconomic Survey at Korangi Crossing

Socioeconomic Survey at Korangi Crossing

A View of Consultation at Korangi Crossing

Socioeconomic Survey near Jam Sadiq Bridge

Socioeconomic Survey near Jam Sadiq Bridge
6.4.10 Proposed Consultations for Next Phases

417. The stakeholder consultation and engagement is an ongoing process and will continue throughout the project’s construction as well as operation and maintenance phases. The ongoing consultation process could be scheduled on need basis with the stakeholders including but not limited to the concerned government departments, local administration, and community representatives and affected Persons from the proposed project area.

418. The overarching goal of consultations and community engagement is to support and facilitate the project’s design and implementation, to reduce conflicts and project opposition, and to increase project’s acceptability.

419. The community members will be compensated by project proponent (if eligible) and they will be encouraged to participate in project activities during construction and operation phases. The consultations will be made in future to facilitate the community at the local level.

420. Further consultations to be undertaken as part of the Project EIA process include the Project public hearing. The Sindh EPA will require that public hearings to assess public opinion on the environmental impacts of the Project. The Sindh EPA will advertise the public hearings in a newspaper. The legal requirement is advertisement in at least one English or Urdu national newspaper, but in practice, advertisements are usually placed in two national newspapers and also in local newspapers. The public hearings will be held at least 30 days after the public notice. Concerns raised during the public hearing will be addressed in the EIA report before approval.

421. The consultations will be carried out during the construction and operation phases of project. Consultations will be undertaken in all the communities twice or more time in a year, depending on the number of concerns raised under each consultation. Ongoing stakeholders’ engagement activities include:

- Ongoing reporting on progress on the implementation of environmental and
social management measures identified during the EIA process and recording of comments on the effectiveness of these measures;

- Updating communities and other stakeholders about project developments and recording comments on these; and,
- Ongoing action of the grievance redress mechanism.

422. Efforts will be made to maximize the consultations during the project implementation. The consultations will be carried out with the objectives to develop and maintain communication linkages between the project promoters and stakeholders, provide key project information to the stakeholders, and to solicit their views on the project and its potential or perceived impacts, and ensure that views and concerns of the stakeholders are incorporated during the implementation with the objectives of reducing or offsetting negative impacts and enhancing benefits of the proposed project. The framework for the future consultations is elaborated in Table 6.8 but not limited to the following:

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Stakeholders</th>
<th>Project Phase</th>
<th>Frequency of Consultation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Institutions/Departments</td>
<td>• Pre-Implementation</td>
<td>• One round of consultation before start of implementation of project.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• During the Project Implementation</td>
<td>• Bi-annually during operation phase</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• At Closure period</td>
<td>• Once before the closure of the project.</td>
</tr>
<tr>
<td>2</td>
<td>Local Communities/Key Persons</td>
<td>• Pre-Implementation</td>
<td>• Consultation at different stages, before implementation, periodic meetings during construction phase and at the time of Project completion.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• During the Project Implementation</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• At Closure period</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>NGOs/CBOs</td>
<td>• Pre-Implementation</td>
<td>• Periodic meetings will be conducted as per requirement of the Project.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• During Project Implementation</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• At Closure period</td>
<td></td>
</tr>
</tbody>
</table>

423. During the operational phase of the project consultation of stakeholder are important to assess the benefits of the project and impacts on the local communities. A comprehensive plan will be prepared to get feedback from the stakeholders and to resolve the issues.

6.4.11 Information Disclosure Plan

424. After suggesting the possible solutions of the stakeholders’ concerns, the solutions (final EIA report) will be disclosed once again before the stake holders and general public. EIA report will be accessible to interested parties on request and the version of final report will be available in the project office and its summary will be available in national language.
7 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

425. This section provides the analysis of the potential impacts during pre-construction/design, construction and operational phases of the proposed project on the biophysical and socio-economic environment of the project area. It also describes the measures that will mitigate the project’s potential environmental impacts.

7.1 IDENTIFICATION OF IMPACTS

426. The Impacts associated with project are identified using the following tools;

1. Impact Evaluation Matrix
2. Overlays

7.2 PROJECT IMPACT EVALUATION MATRIX

427. The Impact Evaluation Matrix was developed by placing project activities along one axis (i.e. Y-axis), and environmental parameters likely to be affected by the proposed project action on the other axis (i.e. X-axis) grouped into categories i.e. physical, ecological and socio-economic environment.

428. For the impact assessment, project impact evaluation matrix is used by dividing the project action into different phases (design/pre-construction, construction and operational phases).

7.3 OVERLAYS

429. In order to identify spatial impacts, overlays were used. An overlay map is a composite map which characterizes the area’s physical, social, ecological, land use and other relevant parameters related to the location of the proposed intervention. It is based on a set of transparent maps, each of which represents the spatial distribution of an environmental attribute. Information of selected variables such as land use, infrastructure, water courses, vegetation etc. is recorded within the Study Area on a series of maps.

7.4 CHARACTERIZATION OF IMPACTS

430. Characterization of Impacts is given both at construction and operation phase using following categories on given environmental settings:

O = Negligible/No Impact
LA = Low Adverse
MA= Medium Adverse
HA = High Adverse
B = Beneficial

431. The criteria used to define the high medium and low adverse impacts are as follows:

432. **Negligible/No Impact**: The impact which has unapparent and negligible influence on natural and socio-economic environment.

433. **Low Adverse Impact**: The impact which has a slight influence on the natural and socio-economic environment.

434. **Medium Adverse Impact**: The impact which can be eliminated/mitigated after applying the appropriate mitigation measures.

435. **High Adverse Impact**: The impact which can be partially but not fully mitigated by applying the mitigation measure.

436. **Positive/Beneficial Impact**: The impact which improve/enhance the natural and socio-economic environment.

7.5 **CORRIDOR OF IMPACT (COI)**

437. COI is a limit which identifies the area where direct and indirect impacts of the project activities are envisaged like existence of forests, game reserves, wetlands, archaeological sites etc. The limit for COI for the proposed project was taken as 50 meter from edge of the ROW of road, impacts assessment and mitigation measures of physical, ecological as well as social resources.

438. As the location of construction/contractor camps, vehicles, equipment yard, material quarry areas and access tracks have not been identified yet, so impacts evaluated due to these facilities in this section have been predicted on the basis of similar projects.

7.6 **ENVIRONMENTAL IMPACTS**

439. Environmental sensitive receptors map indicates sensitive locations as given in section 5 **Figure 5.11**. The schools, mosques and health facilities may be affected during and after the construction of the proposed alignment. Beneficial Impacts and adverse environmental impacts anticipated for each phase are discussed below:
Table 7.1: Characterization of Environmentally Potential Impacts for Design/Pre-Construction Phase

<table>
<thead>
<tr>
<th>Environmental Component</th>
<th>Impact Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Type</td>
</tr>
<tr>
<td></td>
<td>Positive</td>
</tr>
<tr>
<td>Land Acquisition &amp; Resettlement</td>
<td>●</td>
</tr>
<tr>
<td>Flora &amp; Vegetation</td>
<td>●</td>
</tr>
<tr>
<td>Physical Cultural Resources</td>
<td>●</td>
</tr>
<tr>
<td>Public Utilities</td>
<td>●</td>
</tr>
</tbody>
</table>

Legend: Negative Impact (●)  Positive Impact (◙)
<table>
<thead>
<tr>
<th>Environmental Component</th>
<th>Impact Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Type</td>
</tr>
<tr>
<td></td>
<td>Positive</td>
</tr>
<tr>
<td>Topography</td>
<td>●</td>
</tr>
<tr>
<td>Surface Water Quality</td>
<td>●</td>
</tr>
<tr>
<td>Groundwater Quality</td>
<td>●</td>
</tr>
<tr>
<td>Air Quality</td>
<td>●</td>
</tr>
<tr>
<td>Soil Quality/Erosion</td>
<td>●</td>
</tr>
<tr>
<td>Noise</td>
<td>●</td>
</tr>
<tr>
<td>Flora</td>
<td>●</td>
</tr>
<tr>
<td>Fauna</td>
<td>●</td>
</tr>
<tr>
<td>Access</td>
<td>●</td>
</tr>
<tr>
<td>Generation of waste</td>
<td>●</td>
</tr>
<tr>
<td>Land Acquisition</td>
<td>●</td>
</tr>
<tr>
<td>Traffic Management</td>
<td>●</td>
</tr>
<tr>
<td>Health and Safety</td>
<td>●</td>
</tr>
<tr>
<td>Disruption of public utilities</td>
<td>●</td>
</tr>
<tr>
<td>Employment</td>
<td>●</td>
</tr>
</tbody>
</table>

**Legend:**  
- Negative Impact (●)  
- Positive Impact (◙)
### Table 7.3: Characterization of Environmentally Potential Impacts for Operation Phase

<table>
<thead>
<tr>
<th>Environmental Component</th>
<th>Impact Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Type</td>
</tr>
<tr>
<td></td>
<td>Positive</td>
</tr>
<tr>
<td></td>
<td>Duration</td>
</tr>
<tr>
<td></td>
<td>Location</td>
</tr>
<tr>
<td></td>
<td>Frequency</td>
</tr>
<tr>
<td></td>
<td>Extent</td>
</tr>
<tr>
<td></td>
<td>Significance</td>
</tr>
<tr>
<td></td>
<td>Reversibility</td>
</tr>
<tr>
<td>Air Quality</td>
<td>●</td>
</tr>
<tr>
<td>Noise</td>
<td>●</td>
</tr>
<tr>
<td>Flora</td>
<td>●</td>
</tr>
<tr>
<td>Fauna</td>
<td>●</td>
</tr>
<tr>
<td>Traffic Situation in the area</td>
<td>●</td>
</tr>
<tr>
<td>Improvement in movement of industrial freight</td>
<td>●</td>
</tr>
</tbody>
</table>
### Table 7.4: Environmental Impacts Evaluation Matrix during the Design / Pre-Construction Phase

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Project Activities</th>
<th>Physical Environment</th>
<th>Biological Environment</th>
<th>Socioeconomic Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Land Acquisition &amp; Resettlement</td>
<td>O O O O O O O O HA HA O</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Flora &amp; Vegetation</td>
<td>LA LA LA LA HA HA LA O O O O</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Physical Cultural Resources</td>
<td>O O O O O O LA LA O MA LA</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Legend**

- **O** - Insignificant / no impact
- **LA** - Low Adverse
- **MA** - Medium Adverse
- **HA** - High Adverse
- **LB** - Low Beneficial
- **MB** - Medium Beneficial
- **HB** - High Beneficial
- **NA** - Not Applicable
# Table 7.5: Environmental Impact Matrix for Construction Phase

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Project Activities</th>
<th>Physical Environment</th>
<th>Biological Environment</th>
<th>Socioeconomic Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Vegetation/land Clearing</td>
<td>MA</td>
<td>MA</td>
<td>LA</td>
</tr>
<tr>
<td>2</td>
<td>Construction camps, workshops etc.</td>
<td>O</td>
<td>LA</td>
<td>LA</td>
</tr>
<tr>
<td>3</td>
<td>Excavation Operations</td>
<td>LA</td>
<td>MA</td>
<td>MA</td>
</tr>
<tr>
<td>4</td>
<td>Transportation of construction materials</td>
<td>O</td>
<td>LA</td>
<td>O</td>
</tr>
<tr>
<td>5</td>
<td>Movement of construction Machinery</td>
<td>O</td>
<td>LA</td>
<td>O</td>
</tr>
<tr>
<td>6</td>
<td>Operation of concrete batching plants</td>
<td>O</td>
<td>LA</td>
<td>O</td>
</tr>
<tr>
<td>7</td>
<td>Operation of asphalt plants</td>
<td>O</td>
<td>LA</td>
<td>O</td>
</tr>
<tr>
<td>8</td>
<td>Storage of Hazardous Chemicals</td>
<td>O</td>
<td>LA</td>
<td>O</td>
</tr>
</tbody>
</table>

**Legend**

- **O** - Insignificant / No impact
- **LA** - Low Adverse
- **MA** - Medium Adverse
- **HA** - High Adverse
- **NA** - Not Applicable
- **B** - Beneficial
### Table 7.6: Environmental Impact Matrix for Operation Phase

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Environmental Components</th>
<th>Project Activities</th>
<th>Physical Environment</th>
<th>Biological Environment</th>
<th>Socioeconomic Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Soil Erosion Quality</td>
<td>Flora</td>
<td>Public Transport</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Surface Runoff</td>
<td>Fauna</td>
<td>Improvement in movement of</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Air Quality</td>
<td></td>
<td>industrial freight</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Groundwater Quality</td>
<td></td>
<td>HES Issues</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>Movement of Vehicles</td>
<td>O</td>
<td>O</td>
<td>B  O  B  LA</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Maintenance</td>
<td>O</td>
<td>LA</td>
<td>B  B  B  LA</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Enhancement Measures</td>
<td>O</td>
<td>B</td>
<td>B  B  B  B</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Improved transport facility</td>
<td>O</td>
<td>B</td>
<td>B  O  B  B</td>
</tr>
</tbody>
</table>

**Legend**

- O - Insignificant / No impact
- LA - Low Adverse
- MA - Medium Adverse
- HA - High Adverse
- NA - Not Applicable
- B - Beneficial
7.7 POSITIVE IMPACTS OF THE PROJECT

- **Reduced Travelling Time:** The commuters of project area observes severe traffic blocks which will be resolved with the project and the commute at this intersection will become easier, time saving and comfortable.
- **Employment Opportunities:** Construction of project will generate employment opportunities for skilled and unskilled labour.
- **Increased Accessibility:** Resolving the traffic issues at project location will increase accessibility to residential colonies, health care facilities, educational institutes and commercial facilities in the vicinity of the area.
- **Availability of Land:** Due to land reclamation additional land will be available.

7.8 ANTICIPATED ADVERSE IMPACTS DURING PRE CONSTRUCTION/DESIGN PHASE

440. Following is the brief description of impacts envisaged and the recommended mitigation measures during Pre-construction and Design Phases.

7.8.1 Topography and Bathymetry

**Impact Analysis**

441. The topography in the project area will change due to the construction of structures such as embankments, roads, flyover and reclamation of land. Change in topography and Bathymetry will be adverse and permanent in nature.

**Mitigation measures**

442. Mitigation measures include design considerations to minimize impact on surroundings due to change in topography and bathymetry.

**Residual Impact**

443. Residual impact will be minor after adequate consideration in design.

7.8.2 Reclamation of Land

**Impact Analysis**

444. The project involves reclamation of about 290 Acres land including mangrove area. The potential effects of land reclamation may include biological, physical and chemical impacts. Reclamation may affect the physical environment by changing the bathymetry, current velocity and wave conditions. It may change hydrological regime & increase risk of flooding due to back flow. Land reclamation may also result in high significant impacts by disturbing marine ecosystem including mangroves, etc. All these potential impacts are perceived during the construction and operation phases of the proposed Project and needs to be thoroughly addressed during the design phase.
Mitigation measures

- If it is unavoidable, engineering solutions to ensure stability of the land shall be provided.
- A comprehensive study shall be conducted to address all the above mentioned potential impacts with provision of adequate environmental solutions to avoid/reduce these impacts.

Residual Impact

445. Residual impact will be moderate negative after adequate design considerations/studies.

7.8.3 Route (Alignment) Optimization

Impact Analysis

446. The proposed Project involves construction of a bridge and a Korangi Link Road which follows existing RoW and new alignment as well. Improper route selection of proposed Project may lead to disturbance of mangroves on large scale which may cause ecological imbalance and social issues. This impact would be of high significance.

Mitigation measures

447. The proposed Project should be carefully aligned to avoid social issues and ecological issues. The optimized alignment should strictly be followed to avoid social and ecological disturbances.

Residual Impact

448. Residual impact will be moderate negative after adequate design considerations.

7.8.4 Waste Management

Impact Analysis

449. Waste will be generated from daily activities and construction activities. The estimated quantities of general waste are discussed in Section 3. Proper waste management system is required for the efficient handling of waste. The waste may result in nuisance, odour and may serve as breeding ground for diseases vector. The Impacts due to waste are expected to be temporary and moderate negative in nature.

Mitigation measures

450. Mitigation measures will include:

- Planning for disposal sites with reasonable distance from the human settlements;
- Disallow siting for work camps, including waste dump sites, in a distance closer than (0.5) kilometer to any inhabited areas;
- Incorporate technical design features for refuse collection containers at sites that would minimize burning impacts;
- Devise plan(s) for safe handling, storage and disposal of harmful materials; and
- Burning of waste will not be allowed in any case.

**Residual Impact**

451. Residual impact will be minor after adequate mitigation measures.

**7.8.5 Change in Hydrologic Regime**

**Impact Analysis**

452. A bridge is proposed to be constructed on Malir River along with Korangi Link Road which may change the hydrologic regime of the River. The construction of bridge, road, dismantling of causeway and reclamation of land may affect water characteristics, flow and infiltration. The impact may be low and permanent in nature.

**Mitigation measures**

453. A detailed study has been conducted to analyze the hydrological impacts due to the proposed Project. According to which analysis and selection of design discharge for a new structure along the stream has been conducted. It is considered necessary to get maximum discharge carrying capacity of existing structures located upstream/downstream of newly proposed location. This information is required to avoid bottle necks corresponding to design flood magnitude in the stream. The design capacity of existing Jam Sadiq Bridge is 409,000 ft³/s (11,580 m³/s). This design capacity should be given due importance at the design phase of the proposed Project.

454. Climate change projections of the area indicates higher frequencies as well as higher magnitude of extreme events (rainfall, floods, etc.). Recent flood events of August 2020 may be considered as the impact of climate change. In view of the uncertainties associated with the rainfall data and likelihood of higher rainfall intensities and magnitude under future climate change scenarios, it is highly recommended that 100-year flood estimate by Hydro Electric Planning Organization (HEPO) - 1990 (*Table 7.7*), as more conservative estimate, may be adopted as design flood for providing flood protection structures in the study reach. The recommended flood magnitude has already been adopted at existing bridge and flood embankments.

**Table 7.7: Peak Discharges of Malir River**

<table>
<thead>
<tr>
<th>Return Period</th>
<th>Discharge (ft³/s)</th>
<th>Discharge (m³/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100-Year</td>
<td>409,000</td>
<td>11,580</td>
</tr>
<tr>
<td>75-Year</td>
<td>372,000</td>
<td>10,500</td>
</tr>
<tr>
<td>50-Year</td>
<td>240,000</td>
<td>7,000</td>
</tr>
<tr>
<td>20-Year</td>
<td>193,000</td>
<td>5,460</td>
</tr>
</tbody>
</table>

**Residual Impact**

---

11 Hydrology and Hydraulic Study Report for Realignment of Existing Left Bank of Malir River at Korangi Causeway (January, 2021)
455. Residual impact will be minor after adequate consideration in design.

7.8.6 Seismic Hazard

456. The Project Area is located in Seismic Zone 2B, where 2B (lower limit of moderate damage) represents peak horizontal ground acceleration from 0.16 to 0.24 g. In this Zone, designing of various types of structures (especially bridge) should be done on the basis of Peak Ground Acceleration (PGA). The earthquake can adversely impact the proposed Project. This will be a major negative impact.

Mitigation Measures

- The proposed project should be designed and constructed keeping in view low to moderate earthquakes. For seismic hazard analysis, updated structural and seismic evaluations should be conducted by the design engineer/consultant. Moreover, geotechnical investigations must be conducted prior to construction phase;
- Seismic Building Code of Pakistan 2007 (SBC-07) should be adopted. This code specifies minimum requirements for seismic safety of buildings and has to be applied and used by engineers in conjunction with the necessary understanding of the concepts of structural, geotechnical and earthquake engineering; and
- The structure of the proposed project should also be studied to evaluate its durability/strength to withstand moderate to high intensity earthquake.

Residual Impacts

- The residual impacts will be minor adverse to insignificant in nature after the implementation of mitigation measures.

7.8.7 Drainage

Impact Analysis

457. The project area is prone to flood and has a fair record of flooding events, as discussed in section 5. Flooding/pooling of water may result in inconvenience for commuters, deterioration of structures and act as breeding grounds for disease vector and generate foul odour. The impact is temporary and moderate negative in nature.

Mitigation measures

458. Mitigation measures include;

- Provision of adequate drainage structures along the proposed road to avoid flooding especially during the monsoon season.

Residual Impact

459. Residual impact will be minor after adequate consideration in design.

7.8.8 Flora
Impact Analysis

460. Mangroves forest area should be avoided during design and alternate route best possible must be considered. The mangroves importance is very high which is discussed in baseline in details so, these habitats of wildlife and aquatics should be kept undisturbed and its development is important instead of cutting and damages.

461. Proposed construction work will have impacts in the proposed alignment, trees coming within the ROW and lands that will be used for camp sites, quarry sites, material processing plants, material storage, disposal sites, & also quarry access roads.

Mitigation measures

- Selection of temporary lands for labor camps and other purposes should be at least 500 m away from the water bodies, forests or vegetated areas, natural flow paths, agricultural lands & residential areas to avoid impacts in future.
- Only barren lands or lands with minimum vegetation shall be selected for the abovementioned purposes.
- Incorporate technical design measures to minimize removal of trees and loss of agricultural land. Road alignment shall be designed or changes made as far as possible in a way to keep the tree loss to its minimum level.

Residual Impact

462. After considering the adequate mitigations/recommendations during design phase minor impact on flora is expected.

7.8.9 Land Acquisition and Resettlement

Impact Analysis

463. The land acquisition and resettlement is a major issue in the proposed project as land will be acquired for the construction of proposed Korangi Link Road. Almost 5.53 acres land will be acquired for the proposed project. The actual ownership of land to be acquired is yet to be identified but possibly the land belongs to NIP, KW&SB, KMC, KDA and Sindh Irrigation department. Whereas, in order to rehabilitate the existing roads, most of the civil work will be done in the existing RoW of the proposed roads. Affected land will be purchased/transferred after negotiations at departmental level. The landuse by type of land falling in ROW of the proposed project is as mentioned below in Table 7.8.

Table 7.8: Type of Land Falling in ROW of the Project

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Landuse Type</th>
<th>Area (acres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Barren / Open Area</td>
<td>60.16</td>
</tr>
<tr>
<td>2</td>
<td>Builtup Area</td>
<td>0.29</td>
</tr>
<tr>
<td>Sr. No.</td>
<td>Landuse Type</td>
<td>Area (acres)</td>
</tr>
<tr>
<td>---------</td>
<td>----------------</td>
<td>--------------</td>
</tr>
<tr>
<td>3</td>
<td>Creeks</td>
<td>20.88</td>
</tr>
<tr>
<td>4</td>
<td>Green Belt</td>
<td>0.22</td>
</tr>
<tr>
<td>5</td>
<td>Mangroves</td>
<td>23.12</td>
</tr>
<tr>
<td>6</td>
<td>Overhead Bridge</td>
<td>0.03</td>
</tr>
<tr>
<td>7</td>
<td>River</td>
<td>3.13</td>
</tr>
<tr>
<td>8</td>
<td>Road / Track</td>
<td>9.78</td>
</tr>
<tr>
<td>9</td>
<td>Stream / Nullah</td>
<td>0.29</td>
</tr>
<tr>
<td>10</td>
<td>Water Pond</td>
<td>0.27</td>
</tr>
</tbody>
</table>

Total Land 118.2

Moreover, no particular private residential and commercial structures falls in the RoW except, boundary wall of a commercial plot which is owned by a private owner. The current land acquisition process and procedures are not adequate enough to ensure fair and justifiable compensation to the affectees (if private land involve during finalization of the design at any stage). Serious negative impacts may result if proper mitigation measures are not adopted. The detail of land under the impact and record of ownership status will be prepared by the Revenue Department. The impact will be permanent and high adverse.

The community and religious structures are very sensitive to impact and need special care during execution of the project because people think that these structures might not be rebuilt if once demolished. During the design of the proposed project, it was keenly observed that no such type of structure get affected by the road alignment. Hence, no community or religious structure will be disturbed due to project alignment. Moreover, in future, further mitigation measures will take into account to avoid any inconvenience at different stages of the project.

Mitigation measures

Mitigation measures will include:

- Effort has been and will be further made to avoid relocation of houses, religious structures, graves and protected areas while selecting the final alignment of the proposed project.
- The process of land acquisition and compensation should be followed in a transparent manner to minimize the impacts to provide judicious compensation to the displaced by providing sufficient budget in the project cost. The Land Acquisition Act (LAA) of 1894 is the main law regulating land acquisition for public purpose. This impact can be mitigated by ensuring compliance of Land Acquisition Act, 1894, addressing community grievances on priority basis and timely compensation to affectees. LARP document will be prepared for the proposed project.

Residual Impact
Residual impact will be moderate adverse after adopting mitigation measures

7.8.10 Disruption of Existing Public Utilities/ Infrastructure

Impact Analysis

There may be some disruption to the already existing utilities as following;

- 2 poles of 132 KV electric transmission line will be relocated.
- Almost 23 street lights need to relocate;
- 01 electric pole with transformer; and
- Oil pipelines of PARCO and PRL need to manage.

These impacts are, however, temporary and minor negative in nature.

Mitigation measures

Mitigation measures during planning stage will include provision of adequate budget for rehabilitation of existing utilities before construction to avoid any inconvenience to the residents of the project area or provide them with alternate arrangement during the construction period.

Residual Impact

Residual impact will be negligible after adopting mitigation measures

7.9 ANTICIPATED PROJECT IMPACTS DURING CONSTRUCTION PHASE

Following is the brief description of impacts and their mitigation envisaged during the Construction Phase.

7.9.1 Economic Activity

Due to the construction of the proposed Project, economic activity will be generated in the project area as the labourers and semi-skilled staff will have an opportunity to work during the construction of the proposed project. This will provide them an opportunity to develop their skills and capacities. This is a moderate positive impact.

7.9.2 Soil

Due to the construction of the proposed Project, soil erosion may occur on roadside, at contractors’ camps and at embankment works as a result of uncontrolled run-off from equipment washing yards, excavation of earth/cutting operations and clearing of vegetation; whereas, contamination of soil may be caused by oil and chemical spills at asphalt plant sites, workshop areas and equipment washing yards. Also, due to unauthorized use of borrow areas and quarries, soil erosion may occur resulting in degradation of landscape. This may limit
the future use of land for other purposes. This impact is, however, of temporary and minor negative in nature.

**Mitigation measures**

Mitigation measures will include:

- Low embankments will be protected by appropriate plantation;
- High embankments will be protected by constructing stone pitching or riprap across embankments. This practice will also be applied across cross-drainage structures where embankments are more susceptible to erosion by water run-off;
- Soil contamination by asphalt will be minimized by placing all containers in a bunded area away from water courses;
- Provision of impervious platform with oil and grease trap for collection of spillage during equipment and vehicle maintenance;
- Collection of oil and tube drips in container during repairing construction equipment/vehicles;
- Providing impervious platform and collection tank for spillage of liquid fuel and lubes at storage area;
- Decanting and or controlled disposal of oil and grease as collected at collection tanks of maintenance yard and chemical storage areas;
- All spoils will be disposed of as desired and the site will be restored back to its original conditions before handing over;
- Non-bituminous wastes from construction activities will be dumped in approved sites, in line with the legal prescriptions for dumpsites;
- In areas with strong sheet flow, high embankments will be provided with chutes and drains/culverts to minimize soil erosion. Stone pitching and retaining walls will be made at high embankments in critical areas;
- Soil erosion checking measures such as the formation of sediment basins, slope drains, etc., will be carried out;
- Productive land or land adjacent to agricultural / irrigated land may not be preferred for excavation;
- Non-productive, barren lands in broken terrain, nullahs and publicly recognized waste lands should be given preference for borrowing materials; and
- Aggregate required for road construction procured from quarries and river beds will need approval from authorities.

**Residual Impact**

Residual impact will be negligible after adopting mitigation measures.

**7.9.3 Excavation of Earth**

**Impact analysis**

The excavation of earth from borrow areas for fill material for land reclamation will result in change of edaphic characteristics of soil. Loss of soil from borrow area may affect designated use of land in the area and leave the site aesthetically displeasing. This impact is permanent but major negative in nature.
Mitigation measures

478. Mitigation measures will include:

- Borrow pits will not be located on agricultural land unless completely unavoidable; and
- Contractor needs to obtain approval for excavation and submit the plan of rehabilitation of the site after excavation;
- The top 1 ft soil will be stored for future use in rehabilitation of the site; and
- The borrow area site shall be restored back for productive purpose;

Residual impact

479. Residual impact will be minor after restoration of the borrow area.

7.9.4 Construction Camp/Camp Site

Impact analysis

480. It is expected that the Contractor may establish one camp for its workers, machinery etc. Due to the proposed camp sites, loss of vegetation and assets on the selected land and dissatisfaction of rehabilitation measures during and after completion of construction phase may occur. However, it will be a temporary and minor negative impact. However, a range of impacts those either remain likely to occur or are unavoidable. For theses impacts, mitigation measures have been developed to minimize the likelihood, extent or duration of their occurrence, and any associated adverse effects.

Mitigation measures

481. Mitigation measures will include:

- Implement Waste Management Plan to ensure safe handling, storage, collection and disposal of wastes generated at camp sites and the training of employees who handle waste.
- Provision of the pit latrines, septic tanks for camps to treat the sanitary wastewater before its discharge into public sewer.
- All efforts during the design stage should be made to minimize the removal of existing macro-plants at camp sites;
- The contractor(s) shall ensure removal & rehabilitation of site upon completion; and
- Contractors camps should be placed at least 1Km away from population/residential area.

Residual impact

482. Residual impact will be negligible after adopting mitigation measures.

7.9.5 Health and Safety

a) Occupational Health and Safety
Impact analysis

483. Health risks and workers safety problems may result at the workplace if the working conditions provide unsafe and/or unfavorable working environment due to storage, handling and transport of hazardous construction material. Workers will be provided with safe and healthy working environment taking into account risks inherent to the particular sector and specific classes of hazards in project area.

Mitigation measures

484. Mitigation measures will include;

- Obligatory insurance against accidents for labourers/workers;
- Providing basic medical training to specified work staff and basic medical service and supplies to workers;
- Layout plan for camp site, indicating safety measures taken by the contractor, e.g. firefighting equipment, safe storage of hazardous material, first aid, security, fencing, and contingency measures in case of accidents;
- Work safety measures and good workmanship practices are to be followed by the contractor to ensure no health risks for labourers;
- Protection devices (ear muffs) will be provided to the workers doing job in the vicinity of high noise generating machines;
- Provision of adequate sanitation, washing, cooking and dormitory facilities including light up to satisfaction;
- Proper maintenance of facilities for workers will be monitored;
- Provision of protective clothing for labourers handling hazardous materials, e.g. helmet, adequate footwear for bituminous pavement works, protective goggles, gloves etc.;
- Ensure strict use of wearing these protective clothing during work activities;
- Elaboration of a contingency planning in case of major accidents;
- Instruct foremen to strictly enforce the keeping out of non-working persons, particularly children, off work sites;
- Adequate signage, lightning devices, barriers, yellow tape and persons with flags during construction to manage traffic at construction sites, haulage and access roads.

During Bridge Construction:

Elevated and Overhead Work:

- The area around which elevated work is taking place should be barricaded to prevent unauthorized access. Working under personnel on elevated structures should be avoided;
- Hoisting and lifting equipment should be rated and properly maintained, and operators trained in their use. Elevating platforms should be maintained and operated according to established safety procedures including use of fall protection measures (e.g. railings); equipment movement protocols (e.g. movement only
when the lift is in a retracted position); repair by qualified individuals; and installation of locks to avoid unauthorized use by untrained individuals;

- Ladders should be used according to pre-established safety procedures for proper placement, climbing, standing, as well as the use of extensions; and
- Provide appropriate personal protective equipment (PPE) in conjunction with training, use, and maintenance of the PPE.

**Fall Protection:**

- Implementation of a fall protection program that includes training in climbing techniques and use of fall protection measures; inspection, maintenance, and replacement of fall protection equipment; and rescue of fall-arrested workers, among others;
- Establishment of criteria for use of 100\(^{12}\) percent fall protection (typically when working over 2 meters above the working surface, but sometimes extended to 7 meters, depending on the activity). The fall protection system should be appropriate for the structure and necessary movements, including ascent, descent, and moving from point to point;
- Safety belts should be not less than 16 millimeters (mm) (5/8 inch) two-in-one nylon or material of equivalent strength. Rope safety belts should be replaced before signs of aging or fraying of fibers become evident; and
- When operating power tools at height, workers should use a second (backup) safety strap.

**Residual impact**

485. Residual impact will be negligible after adopting mitigation measures.

**b) Community Health and Safety**

**Impact analysis**

486. The construction activities and vehicular movement at construction sites and access service roads may result in road side accidents particularly inflicting local communities who are not familiar with presence of heavy equipment. This is a temporary and minor negative impact. Quality of groundwater and surface water resources available in the nearby local communities may be affected due to the construction activities, oil spillage and leakage, roadside accidents etc. The labour works with different transmittable diseases may cause spread out of those diseases in the local residents. The borrow pit areas located near the residential, settlements, may cause accident for the people moving near to those areas. The impact is moderate negative in nature.

**Mitigation measures**

487. Mitigation measures will include:

\[^{12}\) IFC Environmental, Health, and Safety Guidelines-TOLL ROADS
• There should be proper control on construction activities and Oil spillage leakage of vehicles;
• The Borrow areas should be fenced properly and banned for the movement of the residents;
• The labour works with different transmittable diseases should be restricted within the construction site;
• Efforts will be made to create awareness about road safety among the drivers operating construction vehicles;
• Timely public notification on planned construction works;
• Close consultation with local communities to identify optimal solutions for diversions to maintain community integrity & social links;
• Seeking cooperation with local educational facilities (school teachers) for road safety campaigns;
• Provision of proper safety and diversion signage, particularly at urban areas and accident-prone spots;
• Setting up speed limits in close consultation with the local stakeholders; and
• If identified, consider additional guard rails at accident-prone stretches and sensitive locations (schools);
• The communicable disease of most concern during construction phase, including Covid-19, should be prevented by successful initiative typically involving health awareness; education initiatives; training health workers in disease treatment; immunization program and providing health service. COVID-19 Management Plan is attached as Annex V;
• Reducing the impacts of vector borne diseases on long-term health effect of workers should be accomplished through implementation of diverse interventions aimed at eliminating the factors that lead to disease, which includes;
• Prevention of larval and adult propagation of vectors through sanitary improvements and elimination of breeding habitat close to human settlements;
• Eliminate any unusable impounding of water;
• During construction work, pedestrian and vehicular passages should be provided for crossing near settlement;
• Bridges and other structures have to be structurally stable enough to bear maximum ground acceleration recorded for the area in past;
• Fencing should be strong enough so that it cannot be broken easily by local people for making passages;
• Discharge of any wastewater at upstream of the point of public supply should be restricted;
• Batching plants should be installed away from settlements;
• Use of water should not disturb public water availability. Source of water should be selected carefully.

Residual impact
488. Residual impact will be minor after adopting mitigation measures.

c) Emergency Response

Impact Analysis
489. Natural Hazards i.e. earthquakes, flooding due to heavy rain and other manmade disasters such as fires may occur that must be considered for minimizing their
impacts. The impact is may vary from minor to high adverse.

Mitigation measures
490. Mitigation measures will include:

- An Emergency Response Plan for earthquakes and manmade disasters should be developed by the contractor. Emergency Response Plan should be implemented in close consultation with the Fire Fighting Department, bomb disposal squad and paramedics and Rescue Services; and
- Training of the staff/employees regarding the emergency procedures/plans should be regularly conducted.

491. Emergency Response Plan is attached as Annex-VI.

Residual Impact
492. Residual impact will be minor to moderate after adopting Emergency Response Plan.

7.9.6 Borrow / Open Pits

Impact analysis
493. Borrow/ open pits and its excavation activities may result in land disputes, soil erosion, and loss of potential cropland, loss of vegetation, landscape degradation, and damage to road embankments.

494. Borrow/ Open pits may also result in potential sources of mosquito breeding and may prove hazard to human beings, livestock and wildlife. This will also degrade hygienic condition of the project area. This impact is permanent and moderate negative in nature.

Mitigation measures
495. Mitigation measures will include:

- Conversion of borrow pits into other productive uses;
- Necessary permits must be obtained for any borrow pits from the competent authorities;
- In borrow pits, the depth of the pit will be regulated so that the sides of the excavation will have a slope not steeper than 1:4;
- Soil erosion along the borrow pit shall be regularly checked to prevent/mitigate impacts on adjacent lands; and
- In case borrow pits fill with water, measures have to be taken to prevent the creation of mosquito-breeding sites.

496. Quarry Management Plan is attached as Annex-VII.

Residual Impact
497. Residual impact will be minor after adopting mitigation Measures.

7.9.7 Air Quality
Impact analysis

498. Air quality will be affected by fugitive dust emissions from construction machinery, asphalt plants and vehicular traffic. Emissions may be carried over longer distances depending upon the wind speed, direction, temperature of surrounding air and atmospheric stability and negatively impact nearby environmental sensitive receptors (refer Figure 5.10). The critical sources of air pollution during the construction phase will be:

- Asphalt plants that generate toxic emissions which contain unburnt carbon particles, sulphur compounds and dust from batch preparation;
- Quarry areas that generate fugitive dust during crushing;
- Traffic diversion routes marked along dirt tracks that generate fugitive dust when in use by vehicular traffic; and
- Transportation of materials and other construction activities that create dust emissions.

499. During construction, the continuous operation of machinery and movement of heavy trucks and vehicles may generate gaseous emissions and have a moderate negative impact on the surrounding environment.

500. The overall impact on the quality of air during the construction phase will, however, be limited to the project’s implementation phase only.

Mitigation Measures

501. Mitigation measures will include:

- All vehicles, machinery, equipment and generators used during construction activities should be kept in good working condition and be properly tuned and maintained in order to minimize the exhaust emissions;
- Open burning of solid waste from the Contractor’s camps should be strictly banned;
- Preventive measures against dust should be adopted for on-site mixing and unloading operations.
- Regular water sprinkling of the site should be carried out to suppress excessive dust emission(s);
- Emissions from power generators and construction machinery are important point sources at the construction sites. Proper maintenance and repair is needed to minimize the hazardous emissions; and
- SEQS applicable to gaseous emissions generated by construction vehicles, equipment and machinery should be enforced during construction works.
- Service roads (used for earthmoving equipment and general transport) should be regularly sprayed with water during dry weather;
- All excavation work should be sprinkled with water;
- Construction workers should be provided with masks for protection against the inhalation of dust;
- Vehicles used for construction should be tuned properly and regularly to control
emission of exhaust gases.

- Ensure precautions to reduce the level of dust emissions from hot mix plants, crushers and batching plants should be taken up; e.g. providing them as applicable, with protection canvasses and dust extraction units. Mixing equipment should be well sealed and equipped as per existing standards; and
- Regular monitoring of air quality in accordance with SEQS.

**Residual Impact**
Residual impact will be minor after adopting mitigation Measures.

**7.9.8 Noise Quality**

**Impact Analysis**
502. Noise is most pervasive environmental problem in the urban areas especially on the road side. Noise is a by-product of human activity, and area of exposure increases as function of mobility and construction activities. Main sources are heavy machinery such as bulldozers, excavators, stabilizers, concrete mixing plant, pneumatic drills, stone crushers asphalt plants and other equipment. The above machinery is expected to generate noise levels that would be severe in the areas whereas previously no roadside construction is done as in the case of the proposed project. Noise generated by construction machinery is likely to affect sensitive receptors located near the proposed road (refer Figure 5.10). This impact is temporary and minor negative in nature.

**Mitigation Measures**
503. Mitigation measures include;

- Avoid using over powered equipment
- Use of damping materials and mufflers for equipment
- The noise barriers may be used to control noise during construction.
- Construction activities shall be scheduled keeping in view the peak hours of activities carried out in sensitive receptors of the project area.
- Regular maintenance of equipment shall be carried out.

**Residual Impact**
504. Residual impact will be minor after adopting mitigation Measures

**7.9.9 Waste and Hazardous Waste**

**Impact Analysis**
505. Due to construction activities, waste will be generated at construction and contractors camp site. The construction waste will include wastewater, oil spillage from machinery, domestic waste and construction waste etc. Use of oil, asphalt/bitumen and other hazardous material may generate hazardous waste. This will result in unhygienic conditions, health risk to work force and public at the camp site. This impact is temporary and moderate negative in nature.

**Mitigation Measures**
506. Mitigation measures will include:

- Wastewater effluent from contractor’s workshop and equipment washing yards should be treated before discharging it into natural streams;
- Training of work force in the storage and handling of materials and chemicals that can potentially cause soil contamination;
- Solid Waste generated during construction and camp sites shall be safely disposed in demarcated waste disposal sites and the contractor will provide a proper waste management plan;
- Proper labelling of containers, including the identification and quantity of the contents, hazard contact information etc.;
- Emergency Response plan should be prepared to address the accidental spillage of fuels and hazardous goods;
- Immediate collection of spilled oils/fuels/lubricants by collection of contaminated soils and skipping oils from surface water by applying appropriate technologies;
- Reusing bitumen spillage;
- Disposing non-useable bitumen spills in a deep trench providing clay linings at bottom and filled with soil at the top (for at-least 0.5 m);
- Used oil should be collected in separate containers stored on impervious platform with restricted access and must be sold to licensed contractor and the burning of waste oil should be strictly restricted;
- Segregating and stockpiling scarified/ milled bituminous material and reusing this material in sub grade/shoulders;
- Collecting and stockpiling excessive bituminous material for reuse or controlled disposal;
- Training of employees involved in the transportation of hazardous material regarding emergency procedures;
- Providing the necessary means for emergency response on call 24 hours/day;
- The sewage system for camps shall be properly designed (pit latrines or, as required, septic tanks) to receive all sanitary wastewaters; and
- Lined wash areas will be constructed within the camp site or at site, for the receipt of wash waters from construction machinery.

507. Construction Waste Management Plan is attached as Annex-VIII.

Residual Impact

508. Residual impact will be minor after adopting mitigation Measures

7.9.10 Resource Conservation

Impact Analysis

509. Almost all the materials to be used in the construction of proposed project are non-renewable and therefore their sustainable use is necessary for the future use. Large quantities of water are used in the construction of concrete structures and in watering the unfinished surfaces. Use of water is of major concern while developing resource conservation strategy. Use of excessive water may affect the community water consumption. Diesel and residual fuel oils will be used to operate construction
machinery and asphalt and batching plants. Sustainable use of energy resources is very important not to continue future use but it will also help to reduce air emissions. For conservation of energy, efficiency of the engines and burning processes is very important. Thus, sustainable use of fuel is necessary.

Mitigation Measures
510. Mitigation measures will include:

- Wastage of water should be reduced by training the workers involved in water use;
- Wastage of water should be controlled through providing proper valves and through controlling pressure of the water;
- Water jets and sprays should be used for watering surfaces rather than using overflow system;
- Source of water should be carefully selected. Water use should not disturb the existing community water supplies;
- Unnecessary equipment washings should be avoided;
- Use minimum amount of bitumen for road surfacing.
- Ensure adequate insulation to reduce heat loss through batching plants;
- Maintain clean heat transfer surfaces in asphalt batching plant;
- Regular service of the vehicles and bathing plants will reduce the mechanical losses of energy.

511. Resource Conservation Plan is attached as Annex-IX.

Residual Impact
512. Residual impact will be minor after adopting mitigation Measures

7.9.11 Surface and Groundwater

Impact Analysis
513. Surface water in the project area is Malir River, which carries mostly storm water and waste water from the area. The sediment loading of river will increase with the construction activities; earth and stone work activities, this contamination will jeopardize the designated use of water. There is a possibility that various materials like fuel, lubricant oil and other oily products, which are used during the construction phase may contaminate groundwater, if they are not handled properly. However, the groundwater in the area is brackish and thus not suitable for use. The impact is high negative in nature.

Mitigation measures
514. Mitigation measures will include:

- Protection of surface and groundwater reserves from any source of contamination such as the construction and oily waste that will degrade its potable quality;
- The solid waste will be disposed off in designated landfill sites to sustain the water quality for domestic requirements;
Water required for construction is obtained in such a way that the water availability and supply to nearby communities remain unaffected;

Regular water quality monitoring according to determined sampling schedule;

The contractor shall ensure that construction debris do not find their way into the estuary;

To maintain the surface water flow/drainage, proper mitigation measures shall be taken;

Prohibit washing of machinery and vehicles in surface waters, provide sealed washing basins and collect wastewater in sedimentation/retention pond;

Construction work shall be avoided, especially during monsoon period;

Wastes must be collected, stored and taken to approved disposal site; and

Maintenance workshop, material yard, crushers, asphalt plant and construction camps should not be sited within 1 km of water resources.

Septic tanks, settling ponds, washing yards shall be established to control the wastewater discharge and sediment loadings into the River.

Residual Impact
515. Residual impact will be minor after adopting mitigation measures.

7.9.12 Disposal of Mucking Material

Impact Analysis
516. Inevitable cut and fill earthwork operations will open up scars on the land around the project area. This impact is permanent and moderate negative in nature.

Mitigation Measures
517. Mitigation measure will include proper landscaping, which should be given due consideration along with reinstatement of the local/indigenous vegetation. The excavated materials that are unsuitable for use will need to be stored, transported and disposed of appropriately at designated sites.

Residual impact
518. Residual impact will be minor after adopting mitigation measures.

7.9.13 Traffic Management

Impact Analysis
519. Due to the proposed construction activities, proper traffic management may pose a challenge in the project area. This may result in traffic jams and cause inconvenience to the people passing through the project area due to movement of vehicles carrying construction materials. It will also increase the traffic load on the existing road network, thus deteriorating the existing condition of the road and generating dust and noise. This impact is temporary and minor negative in nature.

Mitigation measures
520. Mitigation measures will include:
• Proper traffic management plan should be implemented to avoid traffic jams/public inconvenience. A traffic management plan has been proposed and is attached as Annex-X;
• Movement of vehicles carrying construction materials should be restricted during the daytime to reduce traffic load and inconvenience to the local residents/business owners;
• Coordinate planning of traffic diversions with the traffic police and the Transport Department in accordance with the construction program with advance warnings to the affected residents and road users;
• Availability of continuous services of the traffic police in the diversion and control of traffic; and
• The executing agency is required to maintain liaison between the Highway/Traffic Police, local residents/travelers and the contractor to facilitate traffic movement during construction stage.

Residual Impacts
521. The impact will be negligible after implementing proper Traffic management Plan.

7.9.14 Flora

Impact analysis
522. The Proposed road alignment passes through mangrove area near Korangi of around 12.76 hectares land and involves cutting of trees in mangroves forest. It shall cause a major negative impact on flora. Other plant species than mangroves are Ber, Conocarpus and Neem which are 110 in number approximately and will be finalized during construction stage. Additional impacts on the Flora are:

• Establishment of contractors’ camps and warehouses for storage of equipment, material etc. shall also involve, clearing of vegetation from the area, resulting in another minor negative impact;
• During the entire construction period, dust laden polluted air will form a dust film on the leaves thus blocking sunshine and stomata, thereby hindering photosynthesis process and consequently causing detrimental effect on the plant health;
• Exhaust of noxious gases from movement of heavy machinery will further pollute the air, which will adversely affect the health and vigor of plants;

523. This impact will be of a temporary nature and moderate negative in nature. After implementation of the Tree Plantation Plan, loss of trees shall be compensated.

Mitigation Measures
524. Mitigation measures will include:

• The indigenous trees most suited to the tract should be re-planted;
• Mangroves will be compensated as per forest department approved/scheduled
rates.
- Trees other than mangroves will be compensated and enhancement of the project area shall be done by planting trees along both sides of the road.
- Flowering and ornamental shrubs should be planted along the road to beautify the landscape. Planting would however be done keeping in view the principles of landscape designing;
- Reasonable compensation should be provided to land holder for the loss of their standing trees at prevailing market rates to avoid financial losses;
- An awareness campaign targeted on the neighborhood local communities should be run to popularize the planting of trees;
- The contractor’s staff and labour should be strictly directed not to damage any vegetation such as trees or bushes. They should use the paths and tracks for movement and should not be allowed to trespass through farmlands;
- Construction vehicles, equipment and machinery should remain confined within their designated areas of movement;
- Contractor should supply gas cylinders at the camps for cooking purposes and cutting of trees/bushes for fuel should not be allowed;
- Camp sites and asphalt plants should be established on waste/barren land rather than on forested or agriculturally productive land. However, if such type of land is not available, it should be ensured that minimum clearing of the vegetation is carried out and minimum damage is caused to the trees;
- Construction of new tracts should be avoided and existing tracks should be used to access the proposed road;
- Construction vehicles, equipment and machinery will remain confined within their designated areas of movement; and
- A tree plantation program will be formulated by the Sindh Government, in the proposed RoW with the help of local Forest Department, or private contractor. Trees will be planted in the available space on both sides of the proposed road. Sindh Government shall execute the work through Forest Department or enter into an agreement with the/private contractor to implement the program under deposit work.

Residual Impact
525. The implementation of proposed plantation plan and consideration of other proposed mitigation measures the impact will be minor and limited/short time.

7.9.15 Fauna

Impact Analysis
526. During construction stage noise and movement of heavy machinery for road construction, shall disturb the fauna of the area as the reptiles like lizard and snakes may get killed or move to the adjoining areas. Trees provide resting and nesting places to the birds. Their removal shall have a negative effect on the fauna.

527. Construction activities involving excavation, access roads, movement of labour, carriage of goods and machinery shall have negative impacts on the mammals and reptiles of the area. Mammals, such as jungal cat, jackal, fox, etc. will avoid these
areas for fear of being persecuted. Same will be the case with reptiles; some reptiles might be killed during the digging and dragging operations. Movements of the mammals and reptiles will be restricted during the construction phase. Eatable and refuse goods of the Contractor's camps may attract wildlife that might be hunted by the workers. There is no major fish habitat in the immediate vicinity of the Project Area.

528. Also, due to the leakages/spills from the construction equipment/machinery the local ponds/water storages and surface water bodies, from where the animals/birds drink water may get contaminated; thus, affecting/endangering the fauna of the project area. This impact may be considered permanent and minor adverse in nature. The construction roads activities under the project will become a source of harassment to the wild animals, birds and fisheries dependent on the river-supported habitat.

Mitigation Measures
529. Mitigation measures will include:

- Plantation of large number of trees as proposed in plantation plan along the proposed project to regain the ecological habitat;
- New and good condition machinery with minimum noise should be used in construction;
- Noisy work should not be carried out in night time so that there should be no disturbance to local birds and animals;
- Contractor should ensure that the no hunting, trapping of animals should be carried out during construction;
- Borrow pits should be fenced so that no animal can fall into these;
- The camps should be properly fenced and gated to check the entry of wild animals in search of eatable goods. Similarly, waste of the camps should be properly disposed of to prevent the chances of eating by wild animals, which may prove hazardous to them; and
- Special measures (Utilization of modern technologies having low noise comparatively) should be adopted to minimize impacts on birds such as avoiding noise generating activities during the critical period of breeding.
- Shooting, hunting, trapping or poaching of animals and birds should totally be banned within the Study Area, so as to minimize loss of fauna ecosystem.
- Implementation of such a policy will be the sole responsibility of concerned Government Departments.
- Ban on fish catch by the residents as well as by surrounding inhabitants should be observed within the Study Area, aiming at rehabilitation of spawning process of various fish species.
- Periodic release of milk fish (chanos chanios) and other suitable fish species in the study area must be ensured for aiding nature enhancing, improving and maintaining a desirable level of aquatic life.

Residual Impact
530. Implementing and considering the above mitigation the site condition/fauna will be impacted mannerly.
7.9.16 Physical Cultural Resources

531. There are no physical cultural resources as listed in UNESCO World Heritage list of archeological sites coming in the ROW. During excavation, there is a chance of finding artifacts. In case of finding any artifact, the contractor shall immediately report through Supervision Consultant to Sindh Directorate of Archeology and Museums to take further suitable action to preserve those antiques or sensitive remains. Chance Find Procedure (attached as Annex-XI) shall be adopted in case of any accidental discover of cultural heritage.

7.9.17 Social Issues/Community Disturbance

Impact analysis

532. During construction there will be a number of activities which, if not mitigated, are likely to cause disturbance to communities in the project area; these are:

- Due to the proposed Project, entry/exit problems may occur for the residents. This will result in causing inconvenience to the residents/shopkeepers and affect their daily activities; also reducing the frequent interactions between families;
- Increased traffic on public routes; and
- Movement of vehicles throughout the project area, especially along haulage routes passing alongside private land during disrupting local movement and posing traffic safety issues.

533. The impacts on community are minor adverse in the short and long term.

Mitigation Measures

534. To mitigate this impact, it is suggested to install some kind of barriers for crossing the road in the median in the urban area and to restrict the pedestrians to use the overpasses. Other mitigation measures are:

- Maintaining regular communication with local communities and other stakeholders to minimize tensions arising from Project activities;
- Maintaining a grievance procedure to facilitate stakeholders in expressing concerns and suggestions;
- Proper traffic diversion plans before the start of the construction;
- Proposal of pedestrian underpass/bridge for the locals;
- Timely completion of the project; and

Residual Impact

535. Residual impacts will be negligible with adequate mitigation measures.

7.9.18 Blockage of Access
536. Blockage of access will be of moderate significance which may arise due to the movement of heavy vehicles from the communities.

**Mitigation Measures**

537. Mitigation measures will include

- A traffic diversion plan should be formulated by the contractor in consultation with Karachi Traffic Police and shall be approved by the Supervision Consultant.

**Residual Impacts**

538. Residual impact will be minor after implementing Traffic Management Plan.

7.9.19 **Gender Issues**

539. **Gender-based violence**: Construction workers are predominantly younger males. Those who are away from home on the construction job are typically separated from their family and act outside their normal sphere of social control. This can lead to inappropriate and criminal behavior, such as sexual harassment of women and girls, exploitative sexual relations, and illicit sexual relations with minors from the local community.

**Child labor and school dropout:**

540. There are two basic conventions on child labor adopted by the ILO, and one adopted by the United Nations. The ILO Minimum Age Convention, 1973 (No. 138) and its accompanying Recommendation (No. 146) set the goal of elimination of child labor, and the basic minimum age for employment or work (in developing countries at 14 years of age or the end of compulsory schooling, whichever is higher; and 15 or the end of compulsory schooling for developed countries). The Convention sets a minimum age of 2 years younger for “light work,” i.e., 12 and 13 years, respectively; and a higher minimum age for dangerous or hazardous work (basically 18 years of age, but 16 in certain circumstances). The Convention also has various other flexibility clauses.

541. **Minimum Age for Employment or Work (Convention 138)**

(i) Ensure that child labor contrary to the convention is not used in any ADB-funded project.

(ii) Define child labor as any work done by anyone under 14 years old, except for light work done by children 12 years and older.

(iii) Ensure that no work is done by anyone of less than the school-leaving age, at least if schooling is available.

(iv) Ensure that no work is likely to jeopardize the health, safety, or morals of young persons, either by its nature or the circumstances in which it is carried out, is done in the project by anyone under 18 years of age.

542. **Forms of Child Labor (Convention 182)**
(i) Ensure that “worst forms” of child labor—for anyone under 18 years of age are not used under any circumstances in an ADB-funded project.

(ii) Direct activities to take immediate and effective measures to eliminate these worst forms of child labor. Inhabitants of the project area have mix economic background and different sources of income. Children of low income groups mostly involve in different earning activities, as their parents prefer to get their children hired in small shops as helpers, and waiters in hotels for earning money, and supporting household livelihoods. However, the Sindh Restrictions on Employment of Children Act, 2017 prohibits the employment of child and restrict the employment of adolescents in certain occupations and processes such as construction industry, and whoever employs or permits a child (person under the age of 15 years) to work in an establishment shall be liable to punishment with imprisonment The child labor impact might arise during construction stage, as large number of skilled and unskilled labor will be required by the contractor for the construction activities of the proposed project.

Mitigation Measures

543. Mitigation measures will include:

544. The chance of hiring of underage worker for the project activities will be minimized by adopting the following mitigation measures:

- Awareness should be created among the local communities about the adverse impacts of child labor. For the public awareness, meetings should be held in the project area, and announcements should be made using the available local platforms with the involvement of all sectors of the society;
- Contractor through contractual agreement should be bound to follow the labor standards, rules and regulations during hiring the labor force and all activities should be monitored by the social and environmental staff of the implementing agency;
- Client and Supervision consultant should ensure that contractor shall have its employment policy in accordance with relevant act and labor policies in Sindh and Pakistan;
- Contractor should ensure the presence of all persons at site are adults and have their proper identity cards with them;
- Reduce or eliminate the worst forms of child labor and rescue and rehabilitate the children in the worst forms of child labor;
- Penalize contractors/employees using the worst forms of child labor and penalize adults who violate children's rights and who force children to enter child labor, especially in its worst forms; and
- Reduce the health hazards and dangers to young persons in the workplace.

Residual Impacts

545. Residual Impacts will be minor after adopting mitigation measures.

7.9.20 Loss of Income

Impact analysis

546. During the construction activities, people will suffer loss in their annual income due to the loss of business, land and land-based assets (if any). This impact can be categorized as indirect, minor, local, medium term and permanent.

Mitigation Measures
547. Mitigation measures will include

- Fair, prompt and negotiated compensation for the land & land based assets (if any in final design) and trees on private land will be provided to the affectees along with the land value;
- Business affectees should also compensated with some extra benefits (including business disturbance allowance); and
- Affectees will be involved in the valuation process of the Project.

Residual Impact
548. The residual impact will be negligible after adopting mitigation measures.

7.9.21 Temporary Acquisition of Land

Impact Analysis
549. The Contractors will require temporary land acquisition for:

- The development of Contractor camps and facilities i.e. storage, workshops, equipment parking and washing areas;
- Aggregate quarries; and
- Access roads/tracks for haulage, transportation etc.

550. The approximate area required for the establishment of one Contractor’s camp facilities will be around 10,000 m². Land utilization for Project activities and subsequent operation of Project may induce temporary as well as permanent changes in the existing land use pattern. This impact can be categorized as direct, low, site-specific, short term, temporary, medium probability and reversible.

Mitigation Measures
551. Mitigation measures will include

- It is the foremost option to establish the construction camps at the acquired land to eliminate the issues of land leased etc. however, if this option is not feasible than the land for above mentioned facilities should be selected and leased prior to the start of construction phase.
- Land for above mentioned facilities will be directly rented from the private landowners by the Contractors. The provisions of the Land Acquisition Act (LAA), 1894 will not be involved as the acquisition of the land will be temporary and will be covered by short-term lease agreements between the landowners and Contractor. Rental terms should be negotiated to the satisfaction of the concerned landowners and the agreement should be in local language to make the process clear.
In addition, these project facilities should be located at a minimum distance of 500 m away from the existing settlements, built-up areas, archaeological and cultural monuments (if any) as the case may be. Prior to the commencement of the construction activities, the Contractor should submit a construction camp development/management plan to the Engineer-in-charge and the SEPA (if required) for its scrutiny and approval. As far as possible, waste/barren land i.e. areas not under agricultural or residential use and natural areas located at high elevation should be used for setting up the contractor camps.

Residual Impacts
552. Residual impacts will be negligible after adopting mitigation measures.

7.10 ANTICIPATED IMPACTS DURING OPERATIONAL PHASE

553. The anticipated environmental impacts related to the proposed project have been studied for the operational stage of the project as discussed hereunder.

7.10.1 Air Quality

Impact Analysis
554. With improved road conditions and smooth flow of traffic, dust and vehicular emissions will decrease resulting in improved air quality of the project area.

Mitigation Measures
555. Mitigation measures include;
   - Roadside tree plantations as applicable and feasible should be selected in accordance to their ability to absorb vehicular emissions;
   - Regular road maintenance to ensure good surface condition that will help in avoiding air pollution;
   - Regulating speed limits by the executing agency;
   - Regular vehicle checkups to control/ensure compliance with SEQS; and
   - Enforcement and penalties by the concerned authorities against traffic rules violators.

Residual Impacts
556. Residual impacts will be negligible after adopting mitigation measures

7.10.2 Noise

Impact Analysis
557. During operation, noise will be generated however; the levels will be reduced due to improvement in road conditions and smooth flow of traffic.

Mitigation Measure
558. Mitigation measures include;
• Roadside tree plantations may act as noise barriers;
• Periodic road maintenance to regulate speed limits by the executing agency to control noise levels;
• Regular vehicle checkups to control/ensure compliance with SEQS; and
• Enforcement and penalties by the concerned authorities against traffic rules violators.

7.10.3 Social Benefits

559. Better communication and road infrastructure will facilitate transport of goods and services and will provide better trade and development opportunities to the locals resulting in uplift in economy. It will also result in social benefits like saving travelling fuel, time and lesser wear and tear of vehicles and reduction in conflicts/accidents. This is positive impact.

7.10.4 Improved Vehicle Condition

560. During the operation of the proposed project, lesser wear and tear of the vehicles will occur and it will also result in lesser fuel consumption and decrease in operating cost. This impact is permanent and has a major positive impact.

7.10.5 Traffic Safety

Impact Analysis
561. At operation stage, various safety issues may arise due to inadequate vehicle maintenance, untrained/distracted driving, fatigue, over speeding, reduced visibility due to fog/smog, slippery road due to rain etc. pedestrian trying to cross roads resulting in minor/major accidents. This will be high adverse and can be permanent in nature.

Mitigation Measures
562. Mitigation measures will include;

• Strict enforcement of traffic and road laws;
• Installation of adequate sign boards for safety and security;
• Ensure provision of crossings for pedestrians;
• Ensure provision of emergency and medical assistance;
• Ensure adequate lighting across the road

Residual Impact
563. Residual impact will be minor after adopting mitigation measures.

7.10.6 Drainage

Impact Analysis
564. During the operational phase, poor maintenance of the bridge and road drainage
system, particularly during the monsoon season can cause nuisance to the travelers and public due to flooding in the existing drainage line. In case of choking of bridge and road drainage, the road and bridge will deteriorate and public may also face nuisance. The impact may consider to be moderate adverse in nature.

**Mitigation Measures**

565. Mitigation measures include;

- The impact can be controlled/reduced by timely and continuous maintenance/cleaning of the drainage system; and
- Placement of sign boards instructing not to dispose of solid waste to avoid choking of drain along the alignment.

**Residual Impact**

566. Residual impact will be minor after adopting mitigation measures

### 7.10.7 Road Maintenance

**Impact analysis**

567. During the operation phase, maintenance works for bridge and link road will be conducted intermittently which may lead to social and environmental issues like traffic management, inconvenience to local residents, public safety, vehicular emissions, and generation of waste, dust and increase in noise. This is a temporary and moderate negative impact.

**Mitigation measures**

568. Mitigation measures include;

- Best Management Practices should be used for all the maintenance works;
- Timely completion of all the maintenance works according to the agreed schedule;
- Traffic management plan should be devised in consultation with Traffic Police and implemented; and
- HSE protocols should be strictly followed and implemented to avoid any incident/accident.
- Waste management and safe disposal shall be ensured during maintenance

**Residual Impact**

569. Residual impact will be minor after adopting mitigation measures

### 7.10.8 Environment Enhancement Measures

570. During operation certain recommendations are given as environmental enhancement measures e.g;

- Use of solar energy should be considered during the operation phase for the operation of traffic signals and light poles along the road; and
- Green areas shall be developed in and around the proposed project.
7.10.9 Flora

571. Since at this stage flora in the ROW would already be cleared. No negative impacts are envisaged on the flora of the tract during the operational phase. Moreover, massive plantation shall be raised on both sides of the road, which will not only compensate for the loss of trees from the project area, but will also improve the landscape of the area. During the operation, the trees and vegetation coming in the ROW of the proposed road is already removed. However, raising of new trees, on either side will have a positive impact of permanent nature.

7.10.10 Fauna

Impact analysis

- During the operation phase of the project, increased noise due to increased traffic will disturb the wildlife, especially the birds, which will avoid this area;
- Similarly, high speed of the vehicles will be a potential threat to the wildlife, especially reptiles, which might be crushed;
- The new road after coming into operation shall restrict the movement of animals, stray mammals and reptiles to only one side of the road and shall be a hindrance for their drinking water requirements; and
- New plantations will not only compensate for the loss of trees, but will also add to the aesthetics of the area. So resulting in healthy and positive impacts on flora and fauna during the operation stage.

Mitigations Measures.

- To safeguard and compensate the local birds plantation plan, as recommended in the report should be strictly followed, which will help to restore the ecosystem and provide alternate habitat to birds.
- Culverts and pathways should be considered for reptiles and other faunal movements in green/ potential areas especially in mangroves.
- Proper fencing of road should be considered to avoid wildlife and livestock injures and will also help to avoid crossing by local people but same should facilitated and identified.

Residual Impact

572. The implementation of Plantation plan and other mitigation measures is leading towards the restoration of local ecosystem so, the nature of the impacts at this particular stage will be insignificant.
8 ENVIRONMENTAL MANAGEMENT PLAN

8.1 GENERAL

573. This section provides an overall approach for managing and monitoring the potential environmental and social impacts and describes the institutional framework and resource allocations to implement these measures.

8.2 EMP OBJECTIVES

574. The main objectives of the Environmental Management Plan (EMP) are:

- Provide project impacts along with the proposed mitigation measures, and a corresponding implementation phase;
- To ensure that all necessary corrective actions are carried out in time to counter any adverse environmental impact;
- To ensure the regular monitoring of those factors which may affect the safety of the environment under a systematic monitoring approach;
- Define the roles and responsibilities of the Project Proponent and Contractor(s) in order to effectively communicate environmental issues among them;
- Provide a procedure for timely action in the face of unanticipated environmental situation;
- Identify training requirements at various levels including Project Proponent, Contractor(s) and Supervision Consultant (SC);
- Provide a monitoring mechanism in the form of an environmental monitoring program, which includes monitoring parameters, monitoring frequency to ensure that all the mitigation measures are completely and effectively implemented;
- Provides estimation of environmental cost for the implementation of EMP;
- Define the requirements necessary for documenting compliance with EMP and communicating it to all the concerned regulatory agencies; and
- Provide other plans considering the project specific requirements.

8.3 SCOPE OF THE EMP

575. The scope of the EMP includes the following phases of the proposed project:

- Pre-construction Phase;
- Construction Phase; and
- Operation and Maintenance Phase.

576. All the activities performed during these phases will be controlled and monitored according to this EMP.

8.4 ENVIRONMENTAL POLICY, LEGISLATION AND FRAMEWORK

577. The applicable polices, legislation, acts and guidelines are discussed in detail in Chapter 2 of EIA.
8.5 INTERNATIONAL FINANCIAL INSTITUTIONS (IFIS)

578. There are mandatory requirements of International Financial Institutions which need to be followed in the project. The major financing institutions which may be involved in the later stage of the project are Asian Development Bank (ADB) or World Bank (WB). As per the Environmental and Social Management System Arrangement (ESMS) prepared for Public–Private Partnership Investments projects in Sindh Province, the major requirements of Asian Development Bank (ADB) will be followed in case of their involvement.

8.5.1 ADB’s Safeguard Policy Statement (2009)

579. Environmental safeguards requirements, including EIA requirements, are defined in ADB’s SPS 2009. All projects funded by ADB must comply with SPS, 2009. The purpose of the SPS, 2009 is to establish an environmental review process to ensure that projects undertaken as part of programs funded under ADB loans are environmentally sound, are designed to operate in compliance with applicable regulatory requirements, and are not likely to cause significant environmental, health, or safety hazards.

8.6 INSTITUTIONAL SETUP FOR IMPLEMENTATION OF EMP

580. Local Government & HTP Department, Government of Sindh as Employer/Proponent with the support of PSF / ESMS are the main key players for the effective implementation, management and to control the supervisory affairs of EMP during design, construction and operation phases of the proposed project. The following staff will be involved in the implementation of EMP:

- Local Government & HTP Department / Proponent / Employer;
- PSF / ESMS;
- SC’s; and
- Contractor’s Environmental Manager.

581. The Local Government & HTP Department shall bind the contractor through contractual documents to implement the suggested mitigation measures in the EMP. The whole EMP will be included as a clause of the contract documents. Construction camps will be established after necessary approvals and submission of Site-Specific EMPs to be developed in the light of the relevant agencies requirements, before commencement of new works. The organizational setup for implementation of EMP is given below in Figure 8.1.
8.6.1 Roles and Responsibilities of the Functionaries involved in EMP Implementation

a) SEPA

582. As per Sindh Environmental Protection Act, 2014, SEPA responsible for environmental protection and pollution control. The SEPA is responsible for the approval of the EIA and IEE of all the developmental projects under their jurisdictions. SEPA will undertake audits (as and when required) of the proposed Project activities with respect to the protocols as defined in EMP.

b) Local Government & HTP Department

583. Local Government & HTP Department is directly in-charge for the financial and technical matters and directly reports to the Project Director Link Road for Korangi. The general monitoring responsibilities will consist of:

- Ensuring that the required environmental training is provided to the concerned staff;
- To carrying out random site visits to the construction sites to review the environmental performance of the Contractor;
- Review monitoring reports for the progress of environment related activities;
- Make sure that the Contractor is implementing the additional measures suggested by the SC in environmental monitoring reports;
- Assessment and valuation of property (if any) and negotiation with the affectees for fixation of compensation to be paid for temporary as well as permanent acquisition of the land;
- Assist in checking genuine ownerships of the claimants, in consultation with the Revenue staff for prompt payment to the affectees;
- Assist the Contractor for the timely payments of negotiated prices;
- To assist Contractor for obtaining necessary approvals from the concerned departments;
- Maintaining interface with the other lined departments/stakeholders; and
- Reporting to the SEPA on status of EMP implementation.

c) PSF / ESMS

584. The PSF / ESMS shall be responsible to:

- Make sure that all the contractual obligations related to the environmental and social compliance are met;
- Monitor the progress regarding implementation of environmental safeguard as provided in the EMP;
- Oversee the compliance of all the monitoring programs as given in EMP;
- Check randomly whether monitoring of the environmental aspects of the Project during construction phase is being properly carried out;
- Document and disclose monitoring results and identify necessary corrective and preventive actions in the periodic monitoring reports (bi-annual reporting), and make follow-up on these actions to ensure progress toward the desired outcomes;
- Make sure that the Contractor is implementing the additional measures suggested by the M&E Contractor; and
- Report the status of EMP compliance to Local Government & HTP Department and PPP Unit, Finance Department.

d) Supervision Consultant (SC)

585. Roles and responsibilities of SC will be:

- To oversee the performance of the Contractor to make sure that the Contractor is complying with EMP;
- Ensuring that the day-to-day construction activities are carried out in an environmentally and socially sound and sustainable manner;
- Strong coordination with the Contractor and Local Government & HTP Department;
- Preparing training materials and implementing programs;
- Ensure the implementation of the mitigation measures suggested in EMP;
- To supervise and monitor environmental activities being performed at site;
- To organize periodic environmental training programs and workshops for the consultant’s and contractor’s staff;
- Periodic reporting as mentioned in EMP; and
- Suggest any additional mitigation measures (if required).

e) Construction Contractor

586. Contractors will be bond to appoint site based Environmental Manager with relevant
educational background and experience for each construction camp. Contractors’ Environmental Manager will carry out following activities:

- Implementation of the mitigation measures at construction site;
- Contractor will be bond through contract to take actions against all the special and general provisions of the contract document;
- Contractor will make sure the compliance of EMP recommendations and will also be responsible for effective liaison with local heads of villages;
- Provision of proper Personal Protective Equipment (PPEs) to the workers and train them for their proper use;
- To conduct the environmental and health & safety trainings to the workers/labour; and
- Coordinate with Environmental Specialist of SC.

8.7 ENVIRONMENTAL MANAGEMENT AND MITIGATION MATRIX

587. The Environmental Management Matrix provides the framework for the implementation of the mitigating measures and environmental management and monitoring during the design, construction and operation phases of the proposed project. Tables 8.1 shows impacts, targets, mitigations and the responsible organizations for the implementation of the mitigation
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<tbody>
<tr>
<td>1.</td>
<td>Waste Management</td>
<td>To minimize waste and safe disposal of waste produced</td>
<td>• Planning for disposal sites with reasonable distance from the human settlements; • Disallow siting for work camps, including waste dump sites, in a distance closer than (0.5) kilometer to any inhabited areas; • Incorporate technical design features for refuse collection containers at sites that would minimize burning impacts; • Devise plan(s) for safe handling, storage and disposal of harmful materials; and • Burning of waste will not be allowed in any case.</td>
<td>DC and LG &amp; HTD Department</td>
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<tr>
<td>2.</td>
<td>Reclamation of Land</td>
<td>To minimize impacts related to land reclamation</td>
<td>If it is unavoidable, engineering solutions to ensure stability of the land shall be provided. • A comprehensive study shall be conducted to address all the above mentioned potential impacts with provision of adequate environmental solutions to avoid / reduce these impacts.</td>
<td>DC and LG &amp; HTD Department</td>
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<tr>
<td>3.</td>
<td>Route (Alignment) Optimization</td>
<td>To minimize impacts related to route / alignment</td>
<td>• The proposed Project should be carefully aligned to avoid social issues and ecological issues. The optimized alignment should strictly be followed to avoid social and ecological disturbances.</td>
<td>DC and LG &amp; HTD Department</td>
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<td>4.</td>
<td>Change in Hydrologic Regime</td>
<td>Minimize impact of alteration</td>
<td>• A detailed study has been</td>
<td>DC and LG &amp; HTD Department</td>
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<td></td>
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<td>of hydrological regime.</td>
<td>conducted to analyze the hydrological impacts due to the proposed Project. According to which analysis and selection of design discharge for a new structure along the stream has been conducted. It is considered necessary to get maximum discharge carrying capacity of existing structures located upstream/ downstream of newly proposed location. This information is required to avoid bottle necks corresponding to design flood magnitude in the stream. The design capacity of existing Jam Sadiq Bridge is 409,000 ft³/s (11,580 m³/s). This design capacity should be given due importance at the design phase of the proposed Project.</td>
<td>Department</td>
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<td>5.</td>
<td>Seismic Hazard</td>
<td>To minimize the structural damage</td>
<td>• The proposed project should be designed and constructed keeping in view low to moderate earthquakes. For seismic hazard analysis, updated structural and seismic evaluations should be conducted by the design engineer/consultant. Moreover, geo-technical investigations must be conducted prior to construction phase;  • Seismic Building Code of Pakistan 2007 (SBC-07) should be adopted.</td>
<td>DC and LG &amp; HTD Department</td>
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<td>6.</td>
<td>Drainage</td>
<td>To minimize the public inconvenience</td>
<td>Provision of adequate drainage structures to avoid flooding especially during the monsoon season.</td>
<td>DC and LG &amp; HTD Department</td>
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| 7.     | Flora      | To avoid the cutting of trees as less as possible and avoidance of Mangroves. | • Selection of temporary lands for labor camps and other purposes should be at least 500 m away from the water bodies, forests or vegetated areas, natural flow paths, agricultural lands & residential areas to avoid impacts in future.  
• Only barren lands or lands with minimum vegetation shall be selected for the above mentioned purposes.  
• Incorporate technical design measures to minimize removal of trees and loss of agricultural land. Road alignment shall be designed or changes made as far as possible in a way to keep the tree loss to its minimum level. | LG & HTD Department and Forest Department |
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<td>8.</td>
<td>Land Acquisition and resettlement</td>
<td>To minimize land acquisition</td>
<td>• Incorporate technical design measures to minimize removal of trees and loss of agricultural land. Road alignment shall be designed or changes made as far as possible in a way to keep the tree loss to its minimum level. • Effort has been and will be further made to avoid relocation of houses, religious structures, graves and protected areas while selecting the final alignment of the proposed project. • The process of land acquisition and compensation should be followed in a transparent manner to minimize the impacts to provide judicious compensation to the displaced by providing sufficient budget in the project cost. The Land Acquisition Act (LAA) of 1894 is the main law regulating land acquisition for public purpose. This impact can be mitigated by ensuring compliance of Land Acquisition Act, 1894, addressing community grievances on priority basis and timely compensation to affectees. LARP document will be prepared for the proposed project.</td>
<td>DC and LG &amp; HTD Department</td>
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<td>9.</td>
<td>Public Utilities</td>
<td>To avoid disturbance to the public.</td>
<td>Incorporate technical design features to minimize Mitigation measures during planning stage will include provision of adequate budget for rehabilitation of</td>
<td>DC and LG &amp; HTD Department</td>
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### Construction Phase

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| 1.      | Soil       | To minimize soil erosion and contamination. | - Low embankments will be protected by appropriate plantation;  
- High embankments will be protected by constructing stone pitching or riprap across embankments. This practice will also be applied across cross-drainage structures where embankments are more susceptible to erosion by water run-off;  
- Soil contamination by asphalt will be minimized by placing all containers in a bounded area away from water courses;  
- Provision of impervious platform with oil and grease trap for collection of spillage during equipment and vehicle maintenance;  
- Collection of oil and tube drips in container during repairing construction equipment vehicles;  
- Providing impervious platform and collection tank for spillage of liquid fuel and lubes at storage area; | CC & SC |
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<td> Decanting and or controlled disposal of oil and grease as collected at collection tanks of maintenance yard and chemical storage areas;</td>
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<td> All spoils will be disposed of as required and the site will be restored back to its original conditions before handing over;</td>
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<td> Non-bituminous wastes from construction activities will be dumped in approved sites, in line with the legal prescriptions for dumpsites;</td>
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<td> In areas with strong sheet flow, high embankments will be provided with chutes and drains/culverts to minimize soil erosion. Stone pitching and retaining walls will be made at high embankments in critical areas;</td>
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<td> Soil erosion checking measures such as the formation of sediment basins, slope drains, etc., will be carried out;</td>
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<td> Productive land or land adjacent to agricultural / irrigated land may not be preferred for excavation;</td>
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<td> Non-productive, barren lands in broken terrain, nullahs and publicly recognized waste lands should be given preference for borrowing materials; and</td>
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<td></td>
<td> Aggregate required for road</td>
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<td>construction procured from quarries for which necessary approval from authorities will be obtained</td>
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| 2.     | Excavation of Earth | The borrow pits shall be restored back to productive use                | ▪ Borrow pits will not be located on agricultural land unless completely unavoidable; and  
  ▪ Contractor needs to obtain approval for excavation and submit the plan of rehabilitation of the site after excavation;  
  ▪ The top 1 ft soil will be stored for future use in rehabilitation of the site; and  
  ▪ The borrow area site shall be restored back for productive purpose.                                                                                                      | CC & SC        |
| 3.     | Camps/Camp Sites  | To minimize the environmental and social disturbance                   | ▪ Implement Waste Management Plan to ensure safe handling, storage, collection and disposal of wastes generated at camp sites and the training of employees who handle waste.  
  ▪ Provision of the pit latrines, septic tanks for camps to treat the sanitary wastewater before its discharge into public sewer.  
  ▪ All efforts during the design stage should be made to minimize the removal of existing macro-plants at camp sites;  
  ▪ The contractor(s) shall ensure removal & rehabilitation of site upon completion; and  
  ▪ Contractors camps shall be                                                                                        | CC & SC        |
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| 4.     | Occupation Health and Safety    | To minimize health and accident risks related to the workers,          | ▪ Obligatory insurance against accidents for labourers/workers;  
▪ Providing basic medical training to specified work staff and basic medical service and supplies to workers;  
▪ Layout plan for camp site, indicating safety measures taken by the contractor, e.g. firefighting equipment, safe storage of hazardous material, first aid, security, fencing, and contingency measures in case of accidents;  
▪ Work safety measures and good workmanship practices are to be followed by the contractor to ensure no health risks for labourers;  
▪ Protection devices (ear muffs) will be provided to the workers doing job in the vicinity of high noise generating machines;  
▪ Provision of adequate sanitation, washing, cooking and dormitory facilities including light up to satisfaction;  
▪ Proper maintenance of facilities for workers will be monitored;  
▪ Provision of protective clothing for labourers handling hazardous materials, e.g. helmet, adequate footwear for bituminous | CC & SC         |
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<td>pavement works, protective goggles, gloves etc.;</td>
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<td>▪ Ensure strict use of wearing these protective clothing during work activities;</td>
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<td>▪ Elaboration of a contingency planning in case of major accidents;</td>
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<td>▪ Instruct foremen to strictly enforce the keeping out of non-working persons, particularly</td>
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<td>children, offfire sites;</td>
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<td></td>
<td>▪ Adequate signage, lightning devices, barriers, yellow tape and persons with flags during</td>
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<td>construction to manage traffic at construction sites, haulage and access roads; and</td>
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<td>▪ SOPs of Covid 19 shall be strictly adhered to.</td>
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<td>5.</td>
<td>Community Health and safety</td>
<td>To ensure community safety and minimize health risks</td>
<td>▪ There should be proper control on construction activities and Oil spillage leakage of</td>
<td>CC &amp; SC</td>
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<td>vehicles;</td>
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<td>▪ The Borrow areas should be fenced properly and banned for the movement of the residents;</td>
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<td>▪ The labour works with different transmittable diseases should be restricted within the</td>
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<td>construction site;</td>
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<td>▪ Efforts will be made to create awareness about road safety among the drivers operating</td>
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<td>construction vehicles;</td>
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<td>▪ Timely public notification on</td>
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<td>planned construction works;</td>
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<td></td>
<td>▪ Close consultation with local communities to identify optimal solutions for diversions to maintain community integrity &amp; social links;</td>
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<td>▪ Seeking cooperation with local educational facilities (school teachers) for road safety campaigns;</td>
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<td>▪ Provision of proper safety and diversion signage, particularly at urban areas and at sensitive/accident-prone spots;</td>
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<td>▪ Setting up speed limits in close consultation with the local stakeholders; and</td>
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<td>▪ If identified, consider additional guard rails at accident-prone stretches and sensitive locations (schools);</td>
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<td>▪ The communicable disease of most concern during construction phase, like sexually-transmitted disease (STDs) such as HIV/AIDS, should be prevented by successful initiative typically involving health awareness; education initiatives; training health workers in disease treatment; immunization program and providing health service;</td>
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<td>▪ Reducing the impacts of vector borne diseases on long-term health effect of workers should</td>
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|         |            |        | be accomplished through implementation of diverse interventions aimed at eliminating the factors that lead to disease, which includes;  
- Prevention of larval and adult propagation of vectors through sanitary improvements and elimination of breeding habitat close to human settlements;  
- Eliminate any unusable impounding of water;  
- During construction work, pedestrian and vehicular passages should be provided for crossing near settlement;  
- Bridges and other structures have to be structurally stable enough to bear maximum ground acceleration recorded for the area in past;  
- Fencing should be strong enough so that it cannot be broken easily by local people for making passages;  
- Discharge of any wastewater at upstream of the point of public supply should be restricted;  
- Batching plants should be installed away from settlements;  
- Use of water should not disturb public water availability. Source of water should be selected carefully. | CC & SC & Relevant |
| 6.     | Emergency Response | To ensure adequate and | An Emergency Response Plan |               |

Title of Document: Environmental Impact Assessment (EIA)

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<tr>
<td></td>
<td>quick response in case</td>
<td>for earthquakes and manmade disasters</td>
<td>for earthquakes and manmade disasters should be developed by the contractor. Emergency Response Plan should be implemented in close consultation with the Fire Fighting Department, bomb disposal squad and paramedics and Rescue Services; and • Training of the staff/employees regarding the emergency procedures/plans should be regularly conducted.</td>
<td>department</td>
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<td>of emergency situation</td>
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<td>7.</td>
<td>Borrow/Open pits</td>
<td>Restoration of the land into productive use</td>
<td>• Conversion of borrow pits into other productive uses; • Necessary permits must be obtained for any borrow pits from the competent authorities; • In borrow pits, the depth of the pit will be regulated so that the sides of the excavation will have a slope not steeper than 1:4; • Soil erosion along the borrow pit shall be regularly checked to prevent / mitigate impacts on adjacent lands; and • In case borrow pits fill with water, measures have to be taken to prevent the creation of mosquito-breeding sites.</td>
<td>CC &amp; SC</td>
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<tr>
<td>8.</td>
<td>Air Quality</td>
<td>To minimize air pollution</td>
<td>• All vehicles, machinery, equipment and generators used during construction activities should be kept in good working condition and be properly tuned</td>
<td>CC &amp; SC</td>
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<td>and maintained in order to minimize the exhaust emissions;</td>
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<td>▪ Open burning of solid waste from the Contractor’s camps should be strictly banned;</td>
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<td>▪ Preventive measures against dust should be adopted for on-site mixing and unloading operations.</td>
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<td>▪ Regular water sprinkling of the site should be carried out to suppress excessive dust emission(s);</td>
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<td>▪ Emissions from power generators and construction machinery are important point sources at the construction sites. Proper maintenance and repair is needed to minimize the hazardous emissions; and</td>
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<td>▪ SEQS applicable to gaseous emissions generated by construction vehicles, equipment and machinery should be enforced during construction works.</td>
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<td>▪ Service roads (used for earthmoving equipment and general transport) should be regularly sprayed with water during dry weather;</td>
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<td>▪ All excavation work should be sprinkled with water;</td>
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<td>▪ Construction workers should be provided with masks for</td>
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|        |                  |                                 | **protection against the inhalation of dust;**  
  ▪ Vehicles used for construction should be tuned properly and regularly to control emission of exhaust gases.  
  ▪ Ensure precautions to reduce the level of dust emissions from hot mix plants, crushers and batching plants should be taken up; e.g. providing them as applicable, with protection canvasses and dust extraction units. Mixing equipment should be well sealed and equipped as per existing standards; and  
  ▪ Regular monitoring of air quality in accordance with SEQS. |                |
| 9.     | Noise            | To minimize noise pollution     | **Avoid using over powered equipment**  
  ▪ Use of damping materials and mufflers for equipment  
  ▪ The noise barriers may be used to control noise during construction.  
  ▪ Construction activities shall be scheduled keeping in view the peak hours of activities carried out in sensitive receptors of the project area.  
  ▪ Regular maintenance of equipment shall be carried out. | CC & SC        |
<p>| 10.    | Waste and Hazardous Waste | To minimize waste               | <strong>Wastewater effluent from contractor’s workshop and equipment washing yards should</strong> | CC &amp; SC        |</p>
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<td>be treated before discharging it into natural streams;</td>
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<td>▪ Training of work force in the storage and handling of materials and chemicals that can potentially cause soil contamination;</td>
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<td>▪ Solid Waste generated during construction and camp sites shall be safely disposed in demarcated waste disposal sites and the contractor will provide a proper waste management plan;</td>
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<td>▪ Proper labelling of containers, including the identification and quantity of the contents, hazard contact information etc.;</td>
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<td>▪ Emergency Response plan should be prepared to address the accidental spillage of fuels and hazardous goods;</td>
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<td>▪ Immediate collection of spilled oils/fuels/lubricants by collection of contaminated soils and skipping oils from surface water by applying appropriate technologies;</td>
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<td>▪ Reusing bitumen spillage;</td>
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<td>▪ Disposing non-usable bitumen spills in a deep trench providing clay linings at bottom and filled with soil at the top (for at-least 0.5 m);</td>
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<td>▪ Used oil should be collected in separate containers stored on</td>
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<td>impervious platform with restricted access and must be sold to licensed contractor and the burning of waste oil should be strictly restricted;</td>
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<td>▪ Segregating and stockpiling scarified/ milled bituminous material and reusing this material in sub grade/shoulders;</td>
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<td></td>
<td>▪ Collecting and stockpiling excessive bituminous material for reuse or controlled disposal;</td>
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<td>▪ Training of employees involved in the transportation of hazardous material regarding emergency procedures;</td>
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<td>▪ Providing the necessary means for emergency response on call 24 hours/day;</td>
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<td>▪ The sewage system for camps shall be properly designed (pit latrines or, as required, septic tanks) to receive all sanitary wastewaters; and</td>
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<td>▪ Lined wash areas will be constructed within the camp site or at site, for the receipt of wash waters from construction machinery.</td>
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<td>11.</td>
<td>Resource Conservation</td>
<td>To minimize wastage of natural resources</td>
<td>▪ Wastage of water should be reduced by training the workers involved in water use;</td>
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<td>▪ Wastage of water should be controlled through providing proper valves and through CC &amp; SC.</td>
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|        |                    | controlling pressure of the water;      | ▪ Water jets and sprays should be used for watering surfaces rather than using overflow system;  
▪ Source of water should be carefully selected. Water use should not disturb the existing community water supplies;  
▪ Unnecessary equipment washings should be avoided;  
▪ Use minimum amount of bitumen for road surfacing.  
▪ Ensure adequate insulation to reduce heat loss through batching plants;  
▪ Maintain clean heat transfer surfaces in asphalt batching plant;  
▪ Regular service of the vehicles and bathing plants will reduce the mechanical losses of energy. |                 |
|        |                    | To avoid contamination of surface and ground water | ▪ Protection of surface and groundwater reserves from any source of contamination such as the construction and oily waste that will degrade its potable quality;  
▪ The solid waste will be disposed off in designated landfill sites to sustain the water quality for domestic requirements;  
▪ Water required for construction is obtained in such a way that the water availability and supply to nearby communities remain | CC & SC          |
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<td>• Unaffected;</td>
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<td>• Regular water quality monitoring according to determined sampling schedule;</td>
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<td>• The contractor shall ensure that construction debris do not find their way into the estuary;</td>
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<td>• To maintain the surface water flow/drainage, proper mitigation measures shall be taken;</td>
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<td>• Prohibit washing of machinery and vehicles in surface waters, provide sealed washing basins and collect wastewater in sedimentation/retention pond;</td>
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<td>• Construction work shall be avoided, especially during monsoon period;</td>
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<td>• Wastes must be collected, stored and taken to approved disposal site; and</td>
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<td>• Maintenance workshop, material yard, crushers, asphalt plant and construction camps should not be sited within 1 km of water resources.</td>
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<td>• Septic tanks, settling ponds, washing yards shall be established to control the wastewater discharge and sediment loadings into the River.</td>
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<td>13.</td>
<td>Traffic Management</td>
<td>To minimize traffic problems in the project area</td>
<td>• Proper traffic management plan should be implemented to avoid traffic jams/public inconvenience;</td>
<td>CC &amp; SC and traffic police</td>
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<td>▪ Movement of vehicles carrying construction materials should be restricted during the daytime to reduce traffic load and inconvenience to the local residents/business owners;</td>
<td>GG &amp; SC and Forest Department</td>
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<td>▪ Coordinate planning of traffic diversions with the traffic police and the Transport Department in accordance with the construction program with advance warnings to the affected residents and road users;</td>
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<td>▪ Availability of continuous services of the traffic police in the diversion and control of traffic; and</td>
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<td>▪ The executing agency is required to maintain liaison between the Highway/Traffic Police, local residents/travelers and the contractor to facilitate traffic movement during construction stage.</td>
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<td>14.</td>
<td>Flora</td>
<td>To minimize the impact on flora</td>
<td>▪ The indigenous trees most suited to the tract should be re-planted; ▪ Mangroves will be compensated as per forest department approved/scheduled rates. ▪ Trees other than mangroves will be compensated and enhancement of the project area shall be done by planting trees along both sides of the road. ▪ Flowering and ornamental shrubs</td>
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<td>Planting would however be done keeping in view the principles of landscape designing;</td>
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<td>▪ Reasonable compensation should be provided to land holder for the loss of their standing trees at prevailing market rates to avoid financial losses;</td>
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<td>▪ An awareness campaign targeted on the neighborhood local communities should be run to popularize the planting of trees;</td>
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<td>▪ The contractor’s staff and labour should be strictly directed not to damage any vegetation such as trees or bushes. They should use the paths and tracks for movement and should not be allowed to trespass through farmlands;</td>
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<td>▪ Construction vehicles, equipment and machinery should remain confined within their designated areas of movement;</td>
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<td>▪ Contractor should supply gas cylinders at the camps for cooking purposes and cutting of trees/bushes for fuel should not be allowed;</td>
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<td>▪ Camp sites and asphalt plants should be established on waste/barren land rather than on</td>
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|        |            |        | forested or agriculturally productive land. However, if such type of land is not available, it should be ensured that minimum clearing of the vegetation is carried out and minimum damage is caused to the trees;  
- Construction of new tracts should be avoided and existing tracks should be used to access the proposed road;  
- Construction vehicles, equipment and machinery will remain confined within their designated areas of movement; and  
- A tree plantation program will be formulated by the Sindh Government, in the proposed RoW with the help of local Forest Department, or private contractor. Trees will be planted in the available space on both sides of the proposed road. Sindh Government shall execute the work through Forest Department or enter into an agreement with the/private contractor to implement the program under deposit work. |        |                      |
| 15.    | Fauna      | To minimize the impact on fauna of the project area |  
- Plantation of large number of trees as proposed in plantation plan along the proposed project to regain the ecological habitat;  
- New and good condition machinery with minimum noise | CC & SC |

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<td>should be used in construction;</td>
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<td>- Noisy work should not be carried out in night time so that there should be no disturbance to local birds and animals;</td>
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<td>- Contractor should ensure that the no hunting, trapping of animals should be carried out during construction;</td>
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<td>- Borrow pits should be fenced so that no animal can fell into these;</td>
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<td>- The camps should be properly fenced and gated to check the entry of wild animals in search of eatable goods. Similarly, waste of the camps should be properly disposed off to prevent the chances of eating by wild animals, which may prove hazardous to them; and</td>
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<td>- Special measures (Utilization of modern technologies having low noise comparatively) should be adopted to minimize impacts on birds such as avoiding noise generating activities during the critical period of breeding.</td>
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<td>- Increased water pollution from the construction activates areas will add adverse impacts to the foraging grounds of fish and other aquatic life still present in the balance river body and nearby forest vegetation.</td>
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<td>- Shooting, hunting, trapping or</td>
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<td>poaching of animals and birds should totally be banned within the Study Area, so as to minimize loss of fauna ecosystem.</td>
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<td>▪ Implementation of such a policy will be the sole responsibility of concerned Government Departments.</td>
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<td>▪ Ban on fish catch by the residents as well as by surrounding inhabitants should be observed within the Study Area, aiming at rehabilitation of spawning process of various fish species.</td>
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<td>▪ Periodic release of milk fish (chanos chanios) and other suitable fish species in the study area must be ensured for aiding nature enhancing, improving and maintaining a desirable level of aquatic life.</td>
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<td>▪ Maintaining regular communication with local communities and other stakeholders to minimize tensions arising from Project activities;</td>
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<td>▪ Maintaining a grievance procedure to facilitate stakeholders in expressing concerns and suggestions;</td>
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<td>16.</td>
<td>Disturbance to public</td>
<td>To minimize the impact on community in the project area.</td>
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<td>• Proper traffic diversion plans before the start of the construction; • Proposal of pedestrian underpass/bridge for the locals; • Timely completion of the project; and • Maximum the labour force and where possible skilled persons should be hired locally.</td>
<td>CC &amp; SC</td>
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<td>17.</td>
<td>Gender Issues</td>
<td>To minimize gender-based violence and child labour</td>
<td>• The chance of hiring of underage worker for the project activities will be minimized by adopting the following mitigation measures: • Awareness should be created among the local communities about the adverse impacts of child labor. For the public awareness, meetings should be held in the project area, and announcements should be made using the available local platforms with the involvement of all sectors of the society; • Contractor through contractual agreement should be bound to follow the labor standards, rules and regulations during hiring the labor force and all activities should be monitored by the social and environmental staff of the implementing agency; • Client and Supervision consultant should ensure that contractor shall have its employment policy</td>
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<td>in accordance with relevant act and labor policies in Sindh and Pakistan; and</td>
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<td>• Contractor should ensure the presence of all persons at site are adults and have their proper identity cards with them.</td>
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<td>• Reduce or eliminate the worst forms of child labor and rescue and rehabilitate the children in the worst forms of child labor.</td>
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<td>• Penalize contractors/employees using the worst forms of child labor and penalize adults who violate children’s rights and who force children to enter child labor, especially in its worst forms.</td>
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<td>• Reduce the health hazards and dangers to young persons in the workplace.</td>
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**Operation Phase**

| 1. | Air Quality | To minimize air pollution due to project operation | Roadside tree plantations as applicable and feasible should be selected in accordance to their ability to absorb vehicular emissions; |
|    |            |        | • Regular road maintenance to ensure good surface condition that will help in avoiding air pollution; |
|    |            |        | • Regulating speed limits by the executing agency; |
|    |            |        | • Regular vehicle checkups to control/ensure compliance with SEQS; and |

LG & HTD Department
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| 2. | Noise | To minimize air pollution due to project operation | - Roadside tree plantations may act as noise barriers;  
- Periodic road maintenance to regulate speed limits by the executing agency to control noise levels;  
- Regular vehicle checkups to control/ensure compliance with SEQS; and  
- Enforcement and penalties by the concerned authorities against traffic rules violators. | LG & HTD Department |
| 3. | Traffic safety | To ensure safety of commuters | - Strict enforcement of traffic and road laws;  
- Adequate sign boards for safety and security;  
- Ensure provision of crossings for pedestrians;  
- Ensure provision of emergency and medical assistance;  
- Ensure adequate lighting across the road | LG & HTD Department & Traffic Police |
| 4. | Drainage | To ensure adequate drainage | - The impact can be controlled/reduced by timely and continuous maintenance/cleaning of the drainage system; and  
- Placement of sign boards instructing not to dispose of solid waste to avoid choking of drain along the alignment. | LG & HTD Department |
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| 5.      | Fauna      | To ensure the local fauna is not disturbed due to operation | ▪ To safeguard and compensate the local birds plantation plan, as recommended in the report should be strictly followed, which will help to restore the ecosystem and provide alternate habitat to birds.  
▪ Culverts and pathways should be considered for reptiles and other faunal movements in green/potential areas especially in mangroves.  
▪ Proper fencing of road should be considered to avoid wildlife and livestock injuries and will also help to avoid crossing by local people but same should facilitated and identified. | LG & HTD Department and Wildlife Department |

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<th>CC</th>
<th>Construction Contractor</th>
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<td>SC</td>
<td>Supervision Consultant</td>
<td>LG &amp; HTD Department</td>
<td>Local government and HTD Department</td>
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8.8 ENVIRONMENTAL MONITORING PLAN

588. Environmental Monitoring is undertaken during both the construction and operational phases to ensure the effectiveness of the proposed mitigation measures. The objectives of environmental monitoring plan during the construction and operational phases will be as follows:

- Monitor the actual project impacts on physical, ecological and socio-economic receptors;
- Recommend mitigation measures for any unforeseen impact or where the impact level exceeds the anticipated level in the EIA;
- Ensure compliance with legal and community obligations including safety during construction and operation phases;
- Ensure the safe disposal of excess construction materials, solid waste, water and wastewater and gaseous emissions;
- Appraise the adequacy of the EIA with respect to the project's predicted long-term impacts on the area's physical, ecological and socio-economic environment;
- Evaluate the effectiveness of the mitigation measures proposed in the EMP and recommend improvements in EMP, if required; and
- Compile periodic incidents/accidents data to support analyses that will help to minimize future risks.

589. Certain environmental parameters are selected and quantitative analysis is carried out. The results of analysis are compared with the guidelines; standards and pre-project condition to investigate whether the EMP and its implementation are effective for the mitigation of impacts or not. Parameters to be analyzed during construction and operation of the project and responsibilities for monitoring and reporting have been discussed below. A cost estimate for this measurement of parameters is given in Table 8.2.

8.4.1. Responsibilities for Monitoring and Reporting

590. Local Government & HTP Department and Construction Contractor will be responsible for environmental monitoring and reporting throughout the construction and operation phases. A monitoring report will be prepared on biannual basis and one comprehensive report will be prepared at the end of project and submitted to SEPA. Contents of the report will include results of environmental monitoring in comparison to the standards for the various parameters, location and sampling time along with recommendations.

8.4.2. Planning for EMP Implementation

8.4.2.1. NOC and Other Approvals

EPA Approval Process

591. The EIA report is to be submitted to SEPA for obtaining NOC. A demand draft of
required EIA review fee has to be deposited along with the report by the Proponent to SEPA for initiating the review and EIA approval process. The approval from SEPA is the mandatory requirement before commencement of the proposed Project activities.

**Provincial Departments of Wildlife, Forest and Archaeology**

592. At the feasibility stage of the Project as per the requirement of SEPA guidelines for the Sensitive and Critical Areas, concerned provincial forest and wildlife departments are informed through letters for the proposed project.

593. The proposed Link Road for Korangi involves the clearing of mangroves and trees which belongs to the forest or wildlife department. The Project Proponent will be responsible for acquiring a No Objection Certificate (NOC) from the provincial forest department. The application for an NOC will need to be endorsed by Local Government & HTP Department.

594. Where construction is to be carried out in the close proximity of the any archaeology sites (if identified during construction stage), the Local Government & HTP Department is required to coordinate with the concerned departments to ensure that the impacts are minimized. The Contractor is also required to contact with concerned department before the start of the construction work.

**Provincial Revenue Departments**

595. Under the national law, matters relating to the land-use and ownership are the provincial subjects and the revenue department of the concerned province is empowered to carry out the acquisition of private land or built-up property for public purposes, including on behalf of other provinces. For this purpose, the Revenue Department of GoS must lodge an application with the Sindh Government to depute a Land Acquisition Collector (LAC) and other revenue staff, who will be responsible for handling the matters related to the acquisition and disbursement of compensation.
## Table 8.2: Budget Estimate for Environmental Monitoring During the Construction and Operation Phases

<table>
<thead>
<tr>
<th>Components</th>
<th>Parameters</th>
<th>No. of Samples</th>
<th>Frequency</th>
<th>Responsibility</th>
<th>Duration</th>
<th>Unit Rate (Rs.)</th>
<th>Cost (Rs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Construction Phase (24 Month)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air Quality</td>
<td>CO, NOx, SOx, PM$_{10}$</td>
<td>2</td>
<td>Quarterly</td>
<td>Contractor/ EE</td>
<td>24 hours</td>
<td>30,000/-</td>
<td>480,000/-</td>
</tr>
<tr>
<td>Ground Water Quality</td>
<td>Total Coliforms, Fecal E. Coli, Total Colonial Count, Fecal Enterococci, pH, TDS, Total Hardness, Nitrate, Chloride, Sodium</td>
<td>2</td>
<td>Quarterly</td>
<td>Contractor/ EE</td>
<td>-</td>
<td>25,000/-</td>
<td>400,000/-</td>
</tr>
<tr>
<td>Surface Water/Waste Water Quality</td>
<td>pH, Dissolved Oxygen, TSS, TDS, Alkalinity, BOD$_5$, COD, Turbidity</td>
<td>2</td>
<td>Quarterly</td>
<td>Contractor/EE</td>
<td>-</td>
<td>40,000/-</td>
<td>640,000/-</td>
</tr>
<tr>
<td>Noise Level</td>
<td>-</td>
<td>2</td>
<td>Quarterly</td>
<td>Contractor/EE</td>
<td>24 hours</td>
<td>5,000/-</td>
<td>80,000/-</td>
</tr>
<tr>
<td><strong>SUB-TOTAL</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1600,000/-</td>
</tr>
<tr>
<td><strong>Operation Phase (For 1st Year)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air Quality</td>
<td>CO, NOx, SOx, PM$_{10}$</td>
<td>2</td>
<td>Biannual</td>
<td>LG &amp; HTD Department</td>
<td>24 hours</td>
<td>30,000/-</td>
<td>120,000/-</td>
</tr>
<tr>
<td>Ground Water Quality</td>
<td>Total Coliforms, Fecal E. Coli, Total Colonial Count, Fecal Enterococci, pH, TDS, Total Hardness, Nitrate, Chloride, Sodium</td>
<td>2</td>
<td>Biannual</td>
<td>LG &amp; HTD Department</td>
<td>-</td>
<td>25,000/-</td>
<td>100,000/-</td>
</tr>
<tr>
<td>Surface Water Quality</td>
<td>pH, Dissolved Oxygen, TSS, Alkalinity, BOD$_5$, COD, Turbidity</td>
<td>2</td>
<td>Biannual</td>
<td>LG &amp; HTD Department</td>
<td>-</td>
<td>40,000/-</td>
<td>160,000/-</td>
</tr>
<tr>
<td>Noise Level</td>
<td>-</td>
<td>2</td>
<td>Biannual</td>
<td>LG &amp; HTD Department</td>
<td>24 hours</td>
<td>5,000/-</td>
<td>20,000/-</td>
</tr>
<tr>
<td><strong>SUB-TOTAL</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>400,000/-</td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2,000,000/-</td>
</tr>
</tbody>
</table>
8.8.1 Tree Plantation

To minimize the negative impacts arising due to affected trees and increased vehicular activity on the Korangi Link Road and to enhance the landscape of the project area, plantation will be carried out at available spaces.

Plantation Plan shall be carried out by the Client in coordination with Forest Department, which has the requisite expertise and experience for such tasks.

Trees recommended for planting are 3000. The tentative cost for implementation of plantation plan is about Rs. 5.8 Millions.

Cost for mangrove compensation is around Rs. 85,747,200. Detailed Tree Plantation Plan is attached as Annex-XII.

8.8.2 Environmental Technical Assistance and Training Plan

In order to raise the level of professional and managerial staff, there is a need to upgrade their knowledge in the related areas. Environmental Engineer (EE) should play a key role in this respect and arrange the trainings.

An environmental and social training and Technical Assistance (TA) program is to be carried out before the implementation of the project. Contractor’s environmental awareness and appropriate knowledge of environmental protection is critical to the successful implementation of the EMP because without appropriate environmental awareness, knowledge and skills required for the implementation of the mitigation measures, it would be difficult for the Contractor(s) workforce to implement effective environmental protection measures. A suitable training program is proposed to train the Contractor(s) staff who will be involved in the Construction Phase and the professional staff from the client involved at the operational stage of the project.

The proponent will engage TA consultant to manage the environmental training program. The objective of the TA will be, to help in establishment of appropriate systems, and to train proponent senior staff and Environmental Engineer (EE) responsible for managing environment, operations, and planning, who can then impart training at a broader level within and outside the Proponent (i.e., the training of trainers). The TA consultant will organize training courses for Proponent and contractor staff to train them in specialized areas such as air and noise pollution monitoring; develop environment operation manuals in consultation with the EPA. The details of this training program are presented in Table 8.3.
### Table 8.3: Personnel Training Program/ TA Services

<table>
<thead>
<tr>
<th>Provided by</th>
<th>Contents</th>
<th>Trainees/Events</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>TA consultants/ organizations specializing in social management and monitoring</td>
<td>Short seminars and courses on: <em>Social awareness</em></td>
<td>Three seminars for project staff dealing in social</td>
<td>1 day</td>
</tr>
<tr>
<td>Environmental Management</td>
<td>Environmental Parameters</td>
<td>For contractor staff and HTP</td>
<td>1 day</td>
</tr>
<tr>
<td>TA consultants/ organizations specializing in occupational, health and safety issues</td>
<td>Short lectures relating to <em>Occupational Safety and Health (OSH)</em></td>
<td>Two seminars for contractor's staff</td>
<td>1 day</td>
</tr>
</tbody>
</table>

#### 8.8.3 ENVIRONMENTAL MONITORING, MITIGATION AND TRAINING COST

603. The cost required to effectively implement the mitigation measures is important for the sustainability of the project both in the construction and operation stages of the project. The estimated cost for Environmental Monitoring, Mitigation and Training Cost is Rs. 0.5 million. These costs are summarized in Table 8.4:

### Table 8.4: Environmental Mitigation & Monitoring Cost

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Description</th>
<th>Unit Price</th>
<th>Total Qty.</th>
<th>Amount (Rs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Medical Screening of workers</td>
<td>1400</td>
<td>100</td>
<td>140,000</td>
</tr>
<tr>
<td>2</td>
<td>Water Sprinkling @1500/ twice a day for peak dust days = 300 days</td>
<td>1500</td>
<td>Twice a day (300 days)</td>
<td>900,000</td>
</tr>
<tr>
<td>3</td>
<td>First Aid Kit</td>
<td>3500</td>
<td>4</td>
<td>14,000</td>
</tr>
<tr>
<td>4</td>
<td>Traffic diversions</td>
<td>Lump sum</td>
<td></td>
<td>500,000</td>
</tr>
<tr>
<td>5</td>
<td>Workers health and safety*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>i)</td>
<td>Ear plugs</td>
<td>70</td>
<td>200</td>
<td>14,000</td>
</tr>
<tr>
<td>ii)</td>
<td>Helmets</td>
<td>1000</td>
<td>100</td>
<td>100,000</td>
</tr>
<tr>
<td>iii)</td>
<td>Safety shoes</td>
<td>2000</td>
<td>110</td>
<td>220,000</td>
</tr>
<tr>
<td>iv)</td>
<td>Safety goggles</td>
<td>200</td>
<td>100</td>
<td>20,000</td>
</tr>
<tr>
<td>v)</td>
<td>Gloves</td>
<td>200</td>
<td>200</td>
<td>40,000</td>
</tr>
<tr>
<td>vi)</td>
<td>Dust masks</td>
<td>100</td>
<td>5000</td>
<td>500,000</td>
</tr>
<tr>
<td>6</td>
<td>COVID-19 Measures</td>
<td>Lump sum</td>
<td></td>
<td>500,000</td>
</tr>
<tr>
<td>7</td>
<td>Waste management at camps</td>
<td>10,000</td>
<td>24 months</td>
<td>480,000</td>
</tr>
<tr>
<td>8</td>
<td>Plastic and tarpaulin sheets</td>
<td>30,0</td>
<td>2</td>
<td>60,000</td>
</tr>
</tbody>
</table>
### Environmental Impact Assessment (EIA)

#### for covering material stock piles

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Fire/emergency equipment</td>
<td></td>
</tr>
<tr>
<td>i).</td>
<td>Dry Chemical Powder fire extinguishers</td>
<td>0</td>
</tr>
<tr>
<td>ii).</td>
<td>CO2 fire extinguishers</td>
<td>0</td>
</tr>
<tr>
<td>iii).</td>
<td>Emergency sirens</td>
<td>00</td>
</tr>
<tr>
<td>iv).</td>
<td>Demarcation tapes (reels)</td>
<td>0</td>
</tr>
</tbody>
</table>

**Sub Total** 3,716,000

#### Environmental Monitoring

**Construction Stage**

As per monitoring plan 1,600,000

(24 months) From Table 8.2

**Operation Stage**

As per monitoring plan 400,000

(For 1st Year) From Table 8.2

#### Environmental and Safety Training Cost

Lump sum 500,000

#### Trees Compensation Cost (Annex-XI)

As per plantation plan 5,800,000

#### Mangroves Compensation Cost

85,747,200

#### Land Acquisition Cost

- Grand Total 94,047,200

*Note: Land acquisition and resettlement related cost is not included in this cost.*

*Detail of Personal Protective Equipment PPE during Construction Phase*

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ear Plug</td>
<td>1 set of ear plug to be used for the labourers / staff working at noisy areas</td>
</tr>
<tr>
<td>Safety Helmet</td>
<td>1 safety helmet for each labourer / staff</td>
</tr>
<tr>
<td>Safety Shoes</td>
<td>1 pair of safety shoe for two year for each labourer / staff plus 10% additional</td>
</tr>
<tr>
<td>Safety Goggles</td>
<td>1 safety goggles for two years for the labourer / staff working at risky sites</td>
</tr>
<tr>
<td>Gloves</td>
<td>1 pair of gloves for the labourer working at hazardous sites</td>
</tr>
<tr>
<td>Dust mask</td>
<td>1 dust mask to be used in a week by each labourer / staff</td>
</tr>
</tbody>
</table>
9 GRIEVANCE REDRESS MECHANISM

9.1 GRIEVANCE REDRESS MECHANISM (GRM)

604. A Grievances Redress Mechanism (GRM) provides a way to reduce risk for the proposed project, offers communities an effective system for expressing concerns and achieving remedies, and promotes a mutually constructive relationship. Moreover, it provides the structure, roles and functions of the GRM, to address the grievances arising due to execution of the project works. It provides a predictable, transparent, and credible process to all parties, resulting in outcomes that are seen fair, effective, and lasting.

605. The Grievance Redress Mechanism GRM is proposed to address any complaints or grievances arising during the implementation period of the projects undertaken by Project Authority such as (Local Government Department) which is responsible for executing the Project. Members of the public may perceive risks to themselves or their property or their legal rights or have concerns about the possible adverse environmental and social impact that a project may have. Any concerns or grievances should be addressed quickly and transparently, and without retribution to the affected person or complainant.

606. The primary principle is that any complaints or grievances are resolved as quickly as possible in a fair and transparent manner. However, the project based GRM will not bar aggrieved persons to avail remedies available under the court of law and they will be at liberty to approach the court of law as and when they wish to do so.

607. The Grievance redress mechanism available under LAA 1894 to address the concerns of legal title holders about matters related to assessment and valuation of land asset, land ownership and payment of compensation for acquired ROW land and it will not be available to the encroachers/non-title holders in the sub-project corridor. Thus, the mechanism does not enable the project executors and the DPs to resolve their grievances except those related to land acquisition matters only. So, to address the gaps a mechanism will be established in light of ESMS provided by Client to address/resolve the project related grievances including the DPs concerns or grievances related to impact assessment, valuation and compensation to eligible DPs resettlement and relocation related grievances as well as social and environmental grievances encountered during execution of the project works. Accordingly, the GRM proposed in the LARP is tasked to address any grievances raised by DPs on LAR implementation grievances and their concerns related to social and environmental grievances that could arise during execution of project work.

608. At first instance, the efforts will be made to avoid grievances through strong consultations participation and information disclosure strategy and the LAR activities will be conducted in accordance with the LARP provisions. Nevertheless, it may be
expected that some problems cannot be resolved through Consultation, Participation and Information Disclosure Strategy (CPID) actions and, therefore, DPs require an accessible and effective GRM. The Project (Korangi Link Road) will put in place its GRM structures from the beginning, i.e., as soon as activities for project design and preparation or implementation of LARP and from the commencement of the construction activities. The GRM will remain intact throughout project implementation period to address the community concerns and grievances arising during execution of project works.

609. The formal GRM will be set up with a three-tiered structure including: first at site/village level set-up through community involvement; second at Project Implementation Unit (PIU) level and third at Project Management Unit (PMU) level enabling immediate local recourse to address grievances and higher-level review for addressing more difficult cases not resolved at the PIU or local level. To ensure that all geographic reaches and relevant administrative units involved in the project are covered, the GRM will set up (i) a local mechanism in each affected site with grievance redress focal points and; (ii) a grievance redress committees (GRC) at PIU and PMU levels.

610. A three tier GRM system will deal with all cases of grievances arising out of project implementation, particularly focusing on social/resettlement and environmental management and implementation of the Project. The functions and responsibilities for each level of GRM are explained below.

611. Grievance Redress Mechanism (GRM) is important for developmental projects where ongoing risks or adverse impacts are anticipated. This mechanism serves as a way to meet requirements, prevent and address community concerns, reduce risks, and assist larger processes that create positive social change. The major objective of GRM is to implement and maintain a procedure for handling environmental and social concerns of the project stakeholders. This procedure will include a redress mechanism scaled to the project’s identified risks and adverse impacts, focusing on stakeholders.

9.2 FIRST LEVEL OF GRM

612. The first level of grievance redress system includes the Site/village level displaced person committee (DPC) selected and nominated by the displaced persons from each affected settlement located along the project road alignment. The DPC will be presided by its president who will be selected by the committee members nominated by the displaced persons. These DPCs will be a formal node for coordination and communication with the project execution authorities and are required to act as local node for recording and redress of grievances as per their local customs and practices. The technical staff will maintain a close liaison with the DPCs to guide and assist them in recording and resolution of grievances. In this regards, the resettlement/environmental specialist and social mobilizers will closely coordinate and work together with the DPC members and the local community to ensure
grievances are recorded, investigated and discussed during DPC’s meetings and guide them to explore and recommend remedial measures at their level. They will also liaise with the counterpart engineering staff, and contractors to ensure implementation of the DPC’s recommendations and/or raising the complaint to second level of GRM/GRC for review and redress if the grievances are not resolved at DPC level.

9.3 SECOND LEVEL OF GRM

613. If the grievance is not resolved at site DPC level, it shall be raised to formal grievance redress mechanism which is second level of GRM. A formal complaint will be tendered with the PIU GRC by the aggrieved DPs or through the social mobilizers. A complaint register will be maintained by the GRC through Assistant Director Environment & Social Safeguards (land management, implementation and social) to record the complaints received covering complaint receipt date, name and address of the complainant, gist of complaint, gist of field report, decision of GRC with its communication date to the DPs and decision implementation status or elevating the complaint to next level of GRM in case of disagreement by the aggrieved DPs.

614. Once the complaint is submitted with the PIU GRC, it shall be recorded in complaint register and send acknowledgement to the DP without delay; and initiate the process of investigation within 5 business days through its technical and resettlement field teams. After receipt of directions of GRC, the field teams including resettlement specialist and Land Staff will coordinate with complainant and complete its investigation of facts in consultation with aggrieved person, DPC representatives and local community and submit its fact-finding report and recommendations to the GRC within 15 business days from the receipt of complaint. Upon receipt of the fact-finding report, the GRC will summon and hear the aggrieved person and decide the complaint based on ground facts but in accordance with the agreed entitlements and provisions in the LARP/entitlement matrix and communicate its decision to the PMU and DPs within next 15 days. On an overall basis, the GRC will decide the grievances within 30 business days of receipt of complaint in GRC. If the final decision made by GRC is not acceptable to the DPs, they may advise GRC for elevation of their grievance to next higher level of GRM.

9.4 THIRD LEVEL OF GRM

615. In case the Displaced Person (DP) is unsatisfied with GRC decision, he himself or through GRC can elevate his complaint to third level of GRM i.e. at Environmental and Social Safeguards Unit (ESSU) in Project Management Unit (PMU) within 5 business days after GRC decision on complaint. Once the complaint is received at PMU along with GRC proceedings, it will be registered in PMU and the complainant will be informed by PMU staff accordingly. The GRC record and complainants’ claim will be scrutinized and the complainant will be advised to produce any additional record in favor of his claim. After thorough review and scrutiny of the available record ESSU/PMU can visit the field to meet the complainant, collect additional information
and evidence if required. Once the investigations are completed the PMU/ESSU shall get its recommendations approved by member committee and forward these to the Project Director of Korangi Link Road and the complainant accordingly within 30 days of receipt of the complaint. If still the grievance remains unaddressed, the complainant may directly approach the Court of Law as and when desired.

9.5 CONSTITUTION AND FUNCTION OF THE GRC

616. The primary objective of the Project based GRC is to provide a mechanism for mediating grievances and cutting down on lengthy litigation. It will be a public forum for raising concerns and invoking conflict resolution system available within the project for addressing LAR related and other social or environmental grievances adequately. The GRCs will continue to function, for the benefit of the DPs, during and after implementation of LARP till completion of the project.

617. The GRC will be headed by the Project Director, with members mentioned in the composition of the GRC. The member of the GRC could be increased, decreased and replaced at the time of the notification of GRC, according to the requirement and nature of grievances.

618. For redressal of grievances, the GRC will meet at least once in a month. For the purpose of social safeguards, the GRC will review grievances involving all resettlement grievances including, compensation, relocation, and other assistance. GRC will perform following functions:

619. Record grievances of DPs; categorize and acknowledge the DPs about receipt of grievances; investigate the issue and summon aggrieved persons/parties to produce the evidence and explain their claims; and resolve the grievances within stipulated time frame preferably in 30 days;

620. Communicate its decisions and recommendations on all resolved disputes to Project executors and the aggrieved persons for implementation and follow the implementation progress; Develop an information dissemination system and acknowledge the aggrieved parties about the development regarding their grievance and decision of PIU and PMU level;

621. Maintain a complaint register accessible to the all stakeholders with brief information about complaints and GRC decision with status report; and Maintain complete record of all complaints received by the GRC with actions taken.

622. The GRC at PMU level will be composed following key members, but not limited to:

- Project Director/ Representative (PMU); Chairman/Convener
- Director Technical (PMU); Member
- Environmental/ Social Safeguards Expert (PMU); Member
- Representative of Deputy Commissioner Office; Member
623. The 50% quorum of the finalized GRC will have authority to conduct the meeting and take decisions accordingly.

9.6 INFORMATION DISSEMINATION AND COMMUNITY OUTREACH

624. In synchronization with on-going consultative process the grievance redress mechanism will also develop an information dissemination system to inform the DPs about their rights under the notational statutes and Environmental Social Management System (ESMS) provisions, ADB’s SPS 2009, and approved LARP for the project. The DPs will be informed about the GRM, its functioning, complaint process to GRC and Environment Social Safeguards Unit (ESSU) at PMU, contact details of the focal members of the GRC at both levels. The GRC will send acknowledgement to complainants about receipt of complaint and to inform him about its site visit plan to ensure complainant is present during site visit, and provide update on the progress made to resolve his complaint/ grievance. Besides this formal communication, the Resettlement Specialist, Land staff and the social mobilizers of PMU in the field will maintain a close liaison with the complainants through DPCs at Site level and provide them the requisite information on the GRM and updates about the status of complaints under process with GRC or the ESSU whatsoever the case may be.

625. The aggrieved DP(s) will be kept informed about the actions on his/her complaint throughout the grievance resolution process and the aggrieved persons will be facilitated to attend and participate in the proceedings at different levels of grievance resolution process. Grievance flow mechanism and resolution process is summarized in the Table 8.1 and Figure 8.1.

626. The typical grievances associated with the environmental and social aspects of the proposed project are likely to include but not limited the following:

- Land Acquisition and Resettlement;
- Dust, noise and air pollution from construction activities;
- Intensive schedule of construction activities;
- Traffic movement;
- Water pollution;
- Waste (Construction & Municipal) disposal;
- Mangroves and Tree cutting; and
- Open dumping of construction material

<table>
<thead>
<tr>
<th>Land/Crop Compensation Grievances</th>
<th>Project/ Other Grievances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table 9.1: Grievance Redressal Process</td>
<td></td>
</tr>
<tr>
<td>Land/Crop Compensation Grievances</td>
<td>Project/ Other Grievances</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>First, complaint resolution will be attempted at site (field level) through the involvement of the PIU/informal committee.</td>
<td>First, complaints resolution will be attempted at site (field level) through the involvement of the PMU/informal committee.</td>
</tr>
<tr>
<td>If unsettled, grievance can be lodged to the GRC or DO (Revenue)/LAC to proceed under law and communicate decision in least possible time.</td>
<td>If unresolved, a grievance will be lodged to the GRC, which will acknowledge receipt of the complaint within 5 days.</td>
</tr>
<tr>
<td>GRC will acknowledge the complaint within 5 days of complaint and after initial review and consultation with the LAC, within 15 days of receipt of complaint, the GRC will clarify the legal course of action and guide aggrieved persons to approach appropriate legal forum. PIU will coordinate with the land administration authorities including District Collector and LAC to request early resolution of the issue/complaint.</td>
<td>The GRC will conduct fact finding in 15 days of receipt of complaint and after review of fact findings reports and hearing the DPs in person will conclude its recommendations in 30 days of receipt of complaint. In case GRC could not decide in stipulated time, the reasons if any will be recorded and the grievance will be resolved in next 30 days.</td>
</tr>
<tr>
<td>In case grievance pertains to awarded compensation, the complainant will be clarified on the process set out in Section 18 to 22 of the LAA 1894.</td>
<td>If the complainant is not satisfied, he can pursue further by submitting to the appropriate court of law.</td>
</tr>
</tbody>
</table>
Figure 9.1 : Grievance Resolution Flow Mechanism with Time Frame
10 CONCLUSIONS AND RECOMMENDATIONS

10.1 CONCLUSION

627. Korangi Crossing Road is the main entrance to Korangi Creek Road and the adjoining residential and industrial areas for the traffic from Qayyumabad, DHA and beyond. Currently, an Irish causeway across Malir River serves the traffic to/from this densely populated area. During rainy season, the existing causeway gets under water and the traffic across the river gets disrupted and rerouted to other longer routes causing inconvenience and traffic congestion on the other exits from Main Korangi Industrial Area Road. Unnecessary delays and travel cost is incurred by the road users and industrial supply and products are affected. An increase in traffic volumes is also expected due to construction of Malir Expressway project which will start near the existing causeway (KPT interchange) and will thus link these areas directly with the Karachi Hyderabad Motorway i.e. M9. Thus, proposed link road to Korangi and the new bridge on Malir River will be an alternate direct access route serving the industrial and commercial traffic to/from these areas.

628. The proposed project requires an EIA in accordance with the Sindh Environmental Protection Act, 2014, Review of IEE/EIA Regulation, 2014 and also to fulfil requirements of international financial institutions. Various options have been considered during the desk study for proposed project;

Alternative 1: No Project Alternative/Do Nothing Option
Alternative 2: Demolition of Existing Flyover on Korangi Road
Alternative 3: Widening of Korangi Road along with 4-lane Flyover
Alternative 4: Alternate Access to Korangi Road (Existing Embankment)
Alternative 5: Alternate Access to Korangi Road (New Embankment)

629. After analysis of different options, Alternative 5 is considered as selected option due to its long term benefits of reducing traffic load and consequently reducing emissions, dust and noise from these vehicles. It will also save time and fuel and reduce any conflicts due to traffic jam/car accidents. There will be ease in commuting to important destinations like hospitals, industries and educational institutes. It will also help in improving trade and development. Furthermore, due to availability of land, future development is expected.

630. Stakeholder consultations were carried out in order to record the concerns and observations of the stakeholders, especially the affected people.

631. The major positive impacts of the project include the following:

- Reduced Travelling Time: The commuters of project area observes severe traffic blocks which will be resolved with the project and the commute at this
intersection will become easier, time saving and comfortable.

- **Employment Opportunities:** Construction of project will generate employment opportunities for skilled and unskilled labour.
- **Increased Accessibility:** Resolving the traffic issues at project location will increase accessibility to residential colonies, health care facilities, educational institutes and commercial facilities in the vicinity of the area.

632. Social Benefit: Increased accessibility of areas will increase land value in the area and people will save time and fuel for travelling in the area. Moreover, lesser wear and tear of vehicles and lesser stress due to conflicts/accidents are the social benefits expected as result of this project.

- The major adverse environmental impacts and mitigations drawn from the environmental assessment are given below:
  - The project will require land acquisition of 5.53 acres for the proposed project;
  - The proposed alignment will pass through mangrove forests and will approximately impact 12.76 hectares' area which directly involves cutting of trees in mangroves forest. It shall cause a major negative impact on flora. Other than mangroves there are other plant species which will be affected.
  - Land reclamation may result in risks of soil liquefaction during earthquake and subsidence resulting in damage of infrastructure, losses of lives.
  - Public utilities may be affected and will create disruption of public services and economics;
  - Generation of solid waste including construction and hazardous waste during construction phase will cause nuisance to the residents if not properly managed;
  - Soil erosion and soil contamination may result during construction activities.
  - Surface runoff may contaminate surface water due to chemical and oil spills which can be avoided by channeling it towards septic tanks and soakage pits.
  - During construction stage operating construction equipment, movement of vehicles will result in gaseous/fugitive dust emissions deteriorating air quality, generation of noise and vibration.
  - Generation of solid waste including construction and hazardous waste during construction phase.
  - Social issues during construction phase will be difficulty of access and adopting alternative routes result in longer travelling time and more fuel consumption; and
  - Traffic management will be another issue during construction of the project
  - Health risks and work safety problems may result at the workplace/camps if the working conditions provide unsafe and/or unfavorable working environment due to storage, handling and transport of construction materials and malfunctioning in operation of construction machinery and equipment;
  - Air quality will be deteriorated during construction phase due to construction activities (operation of construction machinery, dust emissions, vehicular movement, etc.) which results in increase air and noise pollution along with associated health risks. During construction, the continuous operation of machinery and movement of heavy trucks/vehicles and construction activities may generate gaseous emissions, dust, noise/vibration which may severely affect the health of local residents, businessmen and the students during the study hours;

**10.2 MITIGATION MEASURES**
- Compensation cost for Land acquisition shall be detailed in LARP.
- Mangroves forest area should be avoided and alternate route for the proposed road must be considered.
- Soil contamination can be controlled by proper storage of chemicals
- Loss of trees should be mitigated by transplant of affected trees and compensatory plantation and enhancement shall be done along both sides of road.
- Surface runoff and wastewater shall be controlled and collected in septic tanks and soakage pits.
- Dust, fugitive emissions shall be controlled by maintenance of equipment, fine tuning of the vehicles, regular sprinkling of water on soil.
- Noise and vibration can be controlled by equipment maintenance and providing noise barrier and by scheduling the construction activities to avoid peak activity hours in the area.
- Solid waste including construction and hazardous waste should be managed by adopting a solid waste management plan for the collection and disposal of all types of wastes and site shall be restored back.
- Health and safety plan for the workers must be strictly followed and implemented during the construction phase;
- A proper traffic management/diversion plan must be formulated by contractor in consultation with Karachi Traffic Police Department and conveyed to the road users;
- Use of horn should be strictly prohibited in the close proximity of sensitive receptors;
- Tree plantation/Land scape must be planned and implemented during operational phase by Local Government & HTP Department and Directorate of Parks and Horticulture-KMC;
- Monitoring of air, noise and water quality should be done according to the devised schedule in the EMP and compared with the SEQS; and
- Operation and maintenance of the drainage structures and road wear and tear must be done periodically with respect to best management practices.

633. Proper implementation of EMP should be ensured during all phases of the proposed project. All personnel staff, employees and contractors/s should undertake appropriate training prior to construction to ensure they are aware of the on-site responsibilities in respect of all environmental and social issues. In addition, EMP should be a part of contract document of Contractor/s. Moreover, the cost for environmental management, monitoring and training has been estimated which should be included in the overall Project Cost.

634. During the construction phase, the Monitoring plan shall be implemented by the Construction Contractor and LG & HTD Department. Environmental monitoring will be conducted by construction contractor during construction whereas during operation phase monitoring will be conducted by LG & HTD Department.

635. A comprehensive tree plantation plan is also recommended which shall be
implemented by Forest Department.

636. The total cost for environmental mitigation and enhancement is estimated to be Rs. 97.07 Million which does not include Land acquisition cost. Cost of mitigation measures is estimated to be Rs. 3.026 Million. The cost for monitoring at construction and operation phase is Rs. 1.6 Million and 0.4 Million for each stage respectively. The cost for safety trainings will be Rs. 0.5 Million whereas Plantation cost is estimated to be Rs. 5.8 Million. Compensation for mangroves is estimated to be Rs. 85.7 Million.

637. The cost for environmental management, monitoring and training will be included in the PC-I and EMP shall be part of bidding documents of the Project.
ANNEXES
ANNEX-I: MONITORING RESULTS
ANALYTICAL REPORT

KH20-03653 R0

Prepared for

NATIONAL ENGINEERING SERVICES PAKISTAN (PVT) LIMITED
The lab is accredited in accordance with ISO 17025 with accreditation number LAB 023.

This report is not valid for any negotiation. The remaining portion of the sample(s) will be disposed after one week unless otherwise instructed (Condition Apply).

Uncertainty of measurement can be provided upon request.
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Legend ........................................................................................................................................................... 6
## Sample List

| Sample ID | Location Description                  | % | CaO | Fe2O3 | TiO2 | CO2 | CO2 (% of Fe2O3) | AOV | TSS | COD | BOD5 | Oil & Grease | Odor | Suspended solids | Turbidity | Temperature | pH | Salinity | Nitrates | Phosphates | Nitrites | Ammonia | Phenols | Radioactive Ions | Heavy Metals | Organic Chlorine | Total Dissolved Solids | Total Suspended Solids | Total Evaporable Solids | Total Soluble Solids | Total Soluble Solids | Total Soluble Solids |
|-----------|---------------------------------------|---|-----|-------|------|-----|------------------|-----|-----|-----|------|-------------|------|------------------|------------|-------------|----|---------|---------|-----------|----------|---------|---------|-----------------|---------------------|----------------------|---------------------|---------------------|---------------------|
| 001       | Korangi Link Road Point 01 (Waste Water) | X |     |       |      |     |                  |     |     |     |      |             |      |                  |            |             |    |         |          |           |          |         |         |                |                     |                      |                     |                     |                     |
| 002       | Korangi Link Road Point 02 (Drinking Water) | X | X   | X     | X    | X   |                  | X   |     |     |      |             |      |                  |            |             |    |         |          |           |          |         |         |                |                     |                      |                     |                     |                     |
| 003       | Korangi Link Road Point 03 (Surface Water) | X | X   | X     | X    | X   |                  | X   |     |     |      |             |      |                  |            |             |    |         |          |           |          |         |         |                |                     |                      |                     |                     |                     |
## RESULTS

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Ambient Air Quality Monitoring Report

NESPAK

Point # 01, Near Attock Petrol Pump Korangi Crossing
## Meteorological Data

- **Client / Account**: Nespak
- **Location**: Korangi, Karachi.
- **Sampling Point ID**: Near Attock Petrol Pump Korangi Crossing
- **Date of Intervention**: 18 - 19 Nov, 2020

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# Ambient Air Quality Data

**Client / Account:** Nespak  
**Location:** Korangi, Karachi.  
**Sampling Point ID:** Near Attock Petrol Pump Korangi Crossing  
**Date of Intervention:** 18 - 19 Nov, 2020

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<th>PM₁₀ (µg/m³)</th>
<th>PM₂.₅ (µg/m³)</th>
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| 24 Hours Average | 210.7 | 616.9 | 465.4 | 181.9 |
### Average Results

**Client / Account**: Nespak  
**Location**: Korangi, Karachi.  
**Sampling Point ID**: Near Attock Petrol Pump Korangi Crossing  
**Date of Intervention**: 18 - 19 Nov, 2020

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<th>Unit</th>
<th>Duration</th>
<th>Average Concentration</th>
<th>SEQs Limits</th>
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<td>Nitrogen Oxide (NO)</td>
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<td>Sulfur Dioxide (SO₃)</td>
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<td>Total Suspended Particulate (TSP)</td>
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<td>Lead (Pb)</td>
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SEQs = South Environmental Quality Standards  
µg/m³ = micrograms per cubic meter  
mg/m³ = milligrams per meter cube  
ppm = parts per million  
ND = Not Detected  
* SEQs limit of CO as per 8 hours  
** SEQs limit for 24 hours  
*** SEQs limit of Ozone as per 1 hour measurement  

---

**Ambient Air Quality Monitoring**
Ambient Air Quality Monitoring Report

NESPAK

Point # 02, Near Jam Sadiq Bridge, Korangi
## Meteorological Data

**Client / Account:** Nespak  
**Location:** Korangi, Karachi.  
**Sampling Point ID:** Near Jam Sadiq Bridge, Korangi  
**Date of Intervention:** 19 - 20 Nov, 2020

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## Ambient Air Quality Data

**Client / Account**: Nespak  
**Location**: Korangi, Karachi.  
**Sampling Point ID**: Near Jam Sadiq Bridge, Korangi  
**Date of Intervention**: 19 - 20 NOV, 2020

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<th>NO₂ (µg/m³)</th>
<th>NOₓ (µg/m³)</th>
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# Ambient Air Quality Data

**Client / Account:** Nespak  
**Location:** Korangi, Karachi.  
**Sampling Point ID:** Near Jam Sadiq Bridge, Korangi  
**Date of Intervention:** 19 - 20 Nov, 2020

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<th>$PM_{10}$ ($\mu$g/m$^3$)</th>
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**24 Hours Average:** 19.3  
**$O_3$:** 510.5  
**PM$_{10}$:** 378.3  
**PM$_{2.5}$:** 81.3
Nespak

Graphical Representation

Ambient Air Quality Monitoring: Graphical Representation of NO\textsubscript{2} (ppm)

Ambient Air Quality Monitoring: Graphical Representation of SO\textsubscript{2} (ppm)

Ambient Air Quality Monitoring: Graphical Representation of O\textsubscript{3} (ppb)
Nespak

Graphical Representation

Ambient Air Quality Monitoring

Graphical Representation of CO (mg/m³)

Graphical Representation of NO (µg/m³)

Graphical Representation of NO₂ (µg/m³)

Ambient Air Quality Monitoring
### Average Results

**Client / Account**: Nespak  
**Location**: Korangi, Karachi  
**Sampling Point ID**: Near Jam Sadiq Bridge, Korangi  
**Date of Intervention**: 19 - 20 Nov, 2020

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Unit</th>
<th>Duration</th>
<th>Average Concentration</th>
<th>SEQS Limits</th>
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<td>Carbon Monoxide (CO)</td>
<td>mg/m³</td>
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<td>Nitrogen Dioxide (NO₂)</td>
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<td>Nitrogen Oxide (NO)</td>
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<td>Sulfur Dioxide (SO₂)</td>
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<td>Total Suspended Particulate (TSP)</td>
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<td>Particulate Matter (PM₂₅)</td>
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SEQS: Sindhi Environmental Quality Standards  
mg/m³: milligram per cubic meter  
µg/m³: microgram per cubic meter  
ppb: part per billion  
ND: Not Detected  
* SEQS limit of CO as per 8 hours  
** SEQS limit for 24 hours  
*** SEQS Limit of Ozone as per 1 hour measurement
Ambient Air Quality Monitoring Report

NESPAK

Point # 03, Infront of Barett Hudson University
### Meteorological Data

**Client / Account:** Nespak  
**Location:** Korangi, Karachi.  
**Sampling Point ID:** Infront of Barett Hudson University  
**Date of Intervention:** 25-26 Nov, 2020

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### Ambient Air Quality Data

**Client / Account**: Nespak  
**Location**: Korangi, Karachi.  
**Sampling Point ID**: Infront of Barrant Hudson University  
**Date of Intervention**: 25-26 Nov, 2020

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### Ambient Air Quality Data

**Client / Account** : Nespak  
**Location** : Korangi, Karachi.  
**Sampling Point ID** : Infront of Barett Hudson University  
**Date of Intervention** : 25-26 Nov, 2020

<table>
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<th>Sr. #</th>
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<th>PM₁₀ (µg/m³)</th>
<th>PM₂.₅ (µg/m³)</th>
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<td>145.6</td>
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</table>

24 Hours Average: 39.1 (ppb)  287.0 (µg/m³)  210.1 (µg/m³)  73.6
Ambient Air Quality Monitoring

Graphical Representation

1. Graph showing the concentration of NO\textsubscript{2} (ppm) over time (hours).
2. Graph showing the concentration of SO\textsubscript{2} (ppm) over time (hours).
3. Graph showing the concentration of O\textsubscript{3} (ppm) over time (hours).
### Average Results

**Client / Account**: Nespaq  
**Location**: Korangi, Karachi.  
**Sampling Point ID**: Infront of Barett Husband University  
**Date of Intervention**: 25-26 Nov, 2020

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Unit</th>
<th>Duration</th>
<th>Average Concentration</th>
<th>SEQs Limits</th>
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<tr>
<td>Carbon Monoxide (CO)</td>
<td>mg/m³</td>
<td>24 Hours</td>
<td>3.1</td>
<td>5.0*</td>
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<td>Nitrogen Dioxide (NO₂)</td>
<td>µg/m³</td>
<td>24 Hours</td>
<td>0.1</td>
<td>80**</td>
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<td>Nitrogen Oxide (NO)</td>
<td>µg/m³</td>
<td>24 Hours</td>
<td>8.2</td>
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<td>Sulfur Dioxide (SO₂)</td>
<td>µg/m³</td>
<td>24 Hours</td>
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<td>Total Suspended Particulate (TSP)</td>
<td>µg/m³</td>
<td>24 Hours</td>
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<td>500**</td>
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<td>Particulate Matter (PM₁₀)</td>
<td>µg/m³</td>
<td>24 Hours</td>
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<td>Particulate Matter (PM₂.₅)</td>
<td>µg/m³</td>
<td>24 Hours</td>
<td>73.6</td>
<td>75**</td>
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<tr>
<td>Ozone (O₃)</td>
<td>ppb</td>
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<td>39.1</td>
<td>130***</td>
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<tr>
<td>Lead (Pb)</td>
<td>µg/m³</td>
<td>24 Hours</td>
<td>&lt;1.0</td>
<td>1.5**</td>
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</table>

SEQs: South Environmental Quality Standards  
mg/m³: micro gram per cubic meter  
µg/m³: microgram per meter cube  
ppm: part per million  
ND: Not Detected  
* SEQs limit of CO as per 8 hours  
** SEQs limit for 24 hours  
*** SEQs Limit of Ozone as per 1 hour measurement
CLIENT NAME: NESPAK
DATE OF INTERVENTION: 18 TO 26-NOV-2020
MONITORING LOCATION: KORANGI, KARACHI

<table>
<thead>
<tr>
<th>Sr. #</th>
<th>Points</th>
<th>Day Time Average</th>
<th>Night Time Average</th>
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<tbody>
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<td>71.72</td>
<td>64.30</td>
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<td>2</td>
<td>Point # 02 Near Jam Sadiq Bridge, Korangi</td>
<td>60.04</td>
<td>57.56</td>
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<td>3</td>
<td>Point # 03 Infront of Barrett Hudson University</td>
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Limits as per SBQS (Sindh Environmental Quality Standards)
75 (Day Time)
65 (Night Time)

SEQS Limits: 
Actual Readings:
- ISSUED WITHOUT PREJUDICE,
- OUR SERVICES CARRIED OUT IN ACCORDANCE TO THE GENERAL CONDITIONS OF SERVICES.
MONITORING PICTURES

Near Attock Petrol Pump, Korangi Crossing

Near Jam Sadiq Bridge, Korangi.

Barrett Hadgosan University.
SAMPLING PICTURES

Korangi Link Road
ANNEX-II: DETAILED MAPS OF LANDUSE
ANNEX-III: IBAT ASSESSMENT REPORTS
Integrated Biodiversity Assessment Tool

PROXIMITY REPORT
LINK ROAD TO KORANGI 1

Country: Pakistan
Location: [24.8, 67.1]
Date of analysis: 15 April 2021 (GMT)
Buffers applied: 1 km | 3 km | 5 km
Generated by: Shazia Shahid
Organisation: ADB

Overlaps with:

| Protected Areas | 0 |
| Key Biodiversity Areas | 0 |
| IUCN Red List | 111 |

Displaying project location and buffers: 1 km, 3 km, 5 km

About this report
This report presents the results of [1400-15691] proximity analysis to identify the biodiversity features and species which are located within the following buffers: 1 km, 3 km, 5 km.

This report is one part of a package generated by IBAT on 15 April 2021 (GMT) that includes full list of...
all species, protected areas, Key Biodiversity Areas in CSV format, maps showing the area of interest in relation to these features, and a ‘How to read IBAT reports’ document.

WARNING: IBAT aims to provide the most up-to-date and accurate information available at the time of analysis. There is however a possibility of incomplete, incorrect or out-of-date information. All findings in this report must be supported by further desktop review, consultation with experts and/or on-the-ground field assessment. Please consult IBAT for any additional disclaimers or recommendations applicable to the information used to generate this report.

Please note, sensitive species data are currently not included in IBAT reports in line with the Sensitive Data Access Restrictions Policy for the IUCN Red List. This relates to sensitive Threatened species and KBAs triggered by sensitive species.

Data used to generate this report

• BirdLife International (on behalf of the KBA Partnership), 2021. Key Biodiversity Areas - April 2021.

Protected Areas
The following protected areas are found within 1 km, 3 km, 5 km of the area of interest. For further details please refer to the associated csv file in the report folder.

No protected areas within buffer distance

Key Biodiversity Areas
The following key biodiversity areas are found within 1 km, 3 km, 5 km of the area of interest. For further details please refer to the associated csv file in the report folder.

No KBAs within buffer distance

IUCN Red List of Threatened Species
The following threatened species are potentially found within 50km of the area of interest.

For the full IUCN Red List please refer to the associated csv in the report folder.
<table>
<thead>
<tr>
<th>Species Name</th>
<th>Common Name</th>
<th>Taxonomic Group</th>
<th>IUCN Category</th>
<th>Population Trend</th>
<th>Biome</th>
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<td>CR</td>
<td>Decreasing</td>
<td>Marine, Freshwater</td>
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**Aetomylaus nicho i**
Banded Eagle Ray
CHORDICHTHYES
VU
Decreasing
Marine

**Lissemys punctata**
Indian Flapshell Turtle
REPTILIA
VU
Decreasing
Terrestrial, Freshwater

**Recommended citation**

**How to use this report**
This report provides an indication of the potential biodiversity-related features - protected areas, key biodiversity areas and species - close to the specified location. It provides an early indication of potential biodiversity concerns, and can provide valuable guidance in making decisions. For example, this information can be helpful when assessing the potential environmental risk and impact of a site, categorising investments/projects, preparing the terms of reference for an impact assessment, focusing attention on key species of conservation concern and sites of known conservation value, and reviewing the results of an impact assessment.

The report does not provide details of potential indirect, downstream or cumulative impacts. Furthermore, the report should be regarded as a "first step", providing a set of conservation values sourced from global data sets, and is not a substitute for further investigation and due diligence, especially concerning national and/or local conservation priorities.
Integrated Biodiversity Assessment Tool

PROXIMITY REPORT
LINK RD TO KORANGI 2

Country: Pakistan
Location: [ 24.8, 67.1 ]
Date of analysis: 15 April 2021 (GMT)
Buffers applied: 1 km | 3 km | 5 km
Generated by: Shazia Shahid
Organisation: ADB

Overlaps with:

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Displaying project location and buffers: 1 km, 3 km, 5 km

About this report
This report presents the results of [1400-15692] proximity analysis to identify the biodiversity features and species which are located within the following buffers: 1 km, 3 km, 5 km.

This report is one part of a package generated by IBAT on 15 April 2021 (GMT) that includes full list of
all species, protected areas, Key Biodiversity Areas in CSV format, maps showing the area of interest in relation to these features, and a ‘How to read IBAT reports’ document.

WARNING: IBAT aims to provide the most up-to-date and accurate information available at the time of analysis. There is however a possibility of incomplete, incorrect or out-of-date information. All findings in this report must be supported by further desktop review, consultation with experts and/or on-the-ground assessment. Please consult IBAT for any additional disclaimers or recommendations applicable to the information used to generate this report.

Please note, sensitive species data are currently not included in IBAT reports in line with the Sensitive Data Access Restrictions Policy for the IUCN Red List. This relates to sensitive Threatened species and KBAs triggered by sensitive species.

Data used to generate this report

Protected Areas
The following protected areas are found within 1 km, 3 km, 5 km of the area of interest. For further details please refer to the associated csv file in the report folder.

No protected areas within buffer distance

Key Biodiversity Areas
The following key biodiversity areas are found within 1 km, 3 km, 5 km of the area of interest. For further details please refer to the associated csv file in the report folder.

No KBAs within buffer distance

IUCN Red List of Threatened Species
The following threatened species are potentially found within 50km of the area of interest.

For the full IUCN Red List please refer to the associated csv file in the report folder.

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<tr>
<th>Species Name</th>
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How to use this report
This report provides an indication of the potential biodiversity-related features - protected areas, key biodiversity areas and species - close to the specified location. It provides an early indication of potential biodiversity concerns, and can provide valuable guidance in making decisions. For example, this information can be helpful when assessing the potential environmental risk and impact of a site, categorising investments/projects, preparing the terms of reference for an impact assessment, focusing attention on key species of conservation concern and sites of known conservation value, and reviewing the results of an impact assessment.

The report does not provide details of potential indirect, downstream or cumulative impacts. Furthermore, the report should be regarded as a “first-step”, providing a set of conservation values sourced from global data sets, and is not a substitute for further investigation and due diligence, especially concerning national and/or local conservation priorities.
Integrated Biodiversity Assessment Tool

PROXIMITY REPORT
LINK RD TO KORANGI 3

Country: Pakistan
Location: [ 24.8, 67.1 ]
Date of analysis: 15 April 2021 (GMT)
Buffers applied: 1 km | 3 km | 5 km
Generated by: Shazia Shahid
Organisation: ADB

Overlaps with:

<table>
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Displaying project location and buffers: 1 km, 3 km, 5 km

About this report
This report presents the results of [1400-15693] proximity analysis to identify the biodiversity features and species which are located within the following buffers: 1 km, 3 km, 5 km.

This report is one part of a package generated by IBAT on 15 April 2021 (GMT) that includes full list of...
all species, protected areas, Key Biodiversity Areas in CSV format, maps showing the area of interest in relation to these features, and a ‘How to read IBAT reports’ document.

WARNING: IBAT aims to provide the most up-to-date and accurate information available at the time of analysis. There is however a possibility of incomplete, incorrect or out-of-date information. All findings in this report must be supported by further desktop review, consultation with experts and/or on-the-ground field assessment. Please consult IBAT for any additional disclaimers or recommendations applicable to the information used to generate this report.

Please note, sensitive species data are currently not included in IBAT reports in line with the Sensitive Data Access Restrictions Policy for the IUCN Red List. This relates to sensitive Threatened species and KBAs triggered by sensitive species.

Data used to generate this report
• BirdLife International (on behalf of the KBA Partnership), 2021. Key Biodiversity Areas - April 2021.

Protected Areas
The following protected areas are found within 1 km, 3 km, 5 km of the area of interest. For further details please refer to the associated csv file in the report folder.

No protected areas within buffer distance

Key Biodiversity Areas
The following key biodiversity areas are found within 1 km, 3 km, 5 km of the area of interest. For further details please refer to the associated csv file in the report folder.

No KBAs within buffer distance

IUCN Red List of Threatened Species
The following threatened species are potentially found within 50km of the area of interest.

For the full IUCN Red List please refer to the associated csv in the report folder.
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<thead>
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**Recommended citation**

**How to use this report**
This report provides an indication of the potential biodiversity-related features - protected areas, key biodiversity areas and species - close to the specified location. It provides an early indication of potential biodiversity concerns, and can provide valuable guidance in making decisions. For example, this information can be helpful when assessing the potential environmental risk and impact of a site, categorising investments/projects, preparing the terms of reference for an impact assessment, focusing attention on key species of conservation concern and sites of known conservation value, and reviewing the results of an impact assessment.

The report does not provide details of potential indirect, downstream or cumulative impacts. Furthermore, the report should be regarded as a “first-step”, providing a set of conservation values sourced from global data sets, and is not a substitute for further investigation and due diligence, especially concerning national and/or local conservation priorities.
ANNEX-IV QUESTIONNAIRE FOR SOCIO-ECONOMIC SURVEY
Project: ________________________________________________

Questionnaire

Baseline Socio-economic Survey

Date. ------------ Photo No.------ ID No.--------------

Contact No ____________________________________________

1. IDENTIFICATION

1.1 Name of Respondent __________________________________

1.2 Father’s Name _______________________________________

1.3 NIC No: ___________________________________________

1.4 Permanent Address of the Respondent:
Village: _______________ Town _______________ Tehsil ______________ District: ___________

1.5 Located __________________________ Caste _______________

1.6 Category of Respondent: (Tick relevant) AP (Yes_________ No______________)

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<td>Business Tenant Operator</td>
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<td>6</td>
<td>Encroacher</td>
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<td>Squatter</td>
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<td>Resident</td>
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1.7 Demographic Profile of Respondent (Children up to 10 yrs (#): M___, FM ____=T______)

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<th>Relationship with Respondent (See codes)</th>
<th>Sex Male=1 Female=2</th>
<th>Age (Yrs.)</th>
<th>Education (See Codes)</th>
<th>Name of Business/Occupation (See Codes)</th>
<th>Income from Business/Occupation (Rs. / Annum)</th>
<th>Health Condition</th>
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*Other: Rent from property, remittances, net sale of items during a year, net income from agriculture etc.

Demographic Codes:
a) Relationship: 1=Self, 2=Wife, 3=Son, 4=Daughter, 5=Father, 6=Mother, 7=Brother, 8=Sister, 9=Grand Father, 10=Grand Mother, 11=Sister in Law, 12=Nephew, 13=Father-in-Law, 14=Mother-in-Law, 15=Niece, 16=Uncle, 17=Aunty, 18= Son-in-law, 19= Daughter, 20= S. in Law,21=D. in Law, 22= Other_______________________
b) Sex: 1=Male, 2=Female
c) Education: 1= Primary 2= Middle 3= Metric, 4= Intermediate, 5= Graduate, 6= Post Graduate, 7=Law, 8=Engineer, 9=MBBS, 10=Technical Diploma, 11=Dars-e-Nizami, 12=Can Read Quran, 13= Can Insert Signatures, 14= Illiterate
d) Occupations: 1=Agriculturist, 2=Shopkeeper, 3=Hotel, 4=Mechanic, 5=Barber, 6= Butcher, 7=Cobbler, 8= Business, 9= Govt. Servant,10=Private Servant, 11=Labor, 12=Student, 13=House-Maid, 14= House Wife, 15=Advocate, 16=Livestock/Dairy, 17=Fishing, 18=Driver, 19=Health Related, 20=Teaching, 21=Entertainer, 22=Gone Abroad, 23=Retired/Old, 24=Other_______________________
e) Health: 1= Good, 2= Average, 3= Poor
f) Language Spoken ________________________Religion__________________
g) Type of family system 1. Joint: _______ 2. Nuclear___________

2. SOCIO-ECONOMIC DATA

2.1 Land holding: Yes__________ No.________________ If Yes ____________________

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<td>b. Total Cultivated Area</td>
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<td>c. Uncultivated Area</td>
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<td>• Area Under Trees</td>
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<td>• Waste land</td>
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2.2 Agricultural Implements (if applicable)

2.3 Cropping Pattern, Yield and Cost

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</tr>
<tr>
<td></td>
<td>Barley</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2.4 Source of Irrigation (if applicable): ________________________________

2.5 Land Rent (Rs./Year) __________________

2.6 Tube well Water (Rs./Hr.) __________________

3. POSSESSION OF HOUSEHOLD ITEMS

<table>
<thead>
<tr>
<th>Item</th>
<th>No.</th>
<th>Item</th>
<th>No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refrigerator</td>
<td></td>
<td>Van/Pickup</td>
<td></td>
</tr>
<tr>
<td>Deep Freezer</td>
<td></td>
<td>Gas Cylinder</td>
<td></td>
</tr>
<tr>
<td>Television</td>
<td></td>
<td>DVD</td>
<td></td>
</tr>
<tr>
<td>Washing Machine</td>
<td></td>
<td>Dish Antenna</td>
<td></td>
</tr>
<tr>
<td>Electric Fan</td>
<td></td>
<td>Telephone/PTCL</td>
<td></td>
</tr>
<tr>
<td>Electric Iron</td>
<td></td>
<td>Mobile</td>
<td></td>
</tr>
<tr>
<td>Sewing Machine</td>
<td></td>
<td>Geyser</td>
<td></td>
</tr>
<tr>
<td>Motor Cycle/Scooter</td>
<td></td>
<td>Air Conditioner</td>
<td></td>
</tr>
<tr>
<td>Bicycle</td>
<td></td>
<td>Electric Water Pump</td>
<td></td>
</tr>
<tr>
<td>Car</td>
<td></td>
<td>Computer</td>
<td></td>
</tr>
<tr>
<td>Riksha</td>
<td></td>
<td>Air Cooler</td>
<td></td>
</tr>
<tr>
<td>Air Conditioner</td>
<td></td>
<td>Other</td>
<td></td>
</tr>
</tbody>
</table>

4. AVERAGE MONTHLY EXPENDITURE ON FOOD AND NON-FOOD ITEMS (RS.)

<table>
<thead>
<tr>
<th>Items</th>
<th>Expenses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food</td>
<td></td>
</tr>
<tr>
<td>Nonfood</td>
<td></td>
</tr>
<tr>
<td>Utilities</td>
<td></td>
</tr>
<tr>
<td>Health</td>
<td></td>
</tr>
<tr>
<td>Education Care</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
</tr>
</tbody>
</table>

5. HOUSING CONDITIONS

5.1 Personal ________ Rented ________ Other ________ Encroacher ________

5.2 Year of Construction __________

5.3 Type of Structure a) Kacha ________ b) Pacca ________ c) Semi-Pacca ________ Straw

5.4 Structure Details

<table>
<thead>
<tr>
<th>Type of Structure</th>
<th>No. of Rooms</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Living rooms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bathroom</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Latrine</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

6. ACCESS TO SOCIAL AMENITIES (TICK)

<table>
<thead>
<tr>
<th>Social Amenities</th>
<th>Available (Yes-No)</th>
<th>Satisfactory (Yes-No)</th>
<th>Reasons for Not satisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gas</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water Supply</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water Filtration plant</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Telephone</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sewerage/Drainage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hospital</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>School (Boys-Girls)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
College (Boys-Girls)
University (Boys-Girls)
Religious Institution
Road
Other

Source of Cooking if Sui Gas is not available

7. LIVESTOCK INVENTORY

<table>
<thead>
<tr>
<th>Livestock</th>
<th>No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buffaloes</td>
<td></td>
</tr>
<tr>
<td>Cows</td>
<td></td>
</tr>
<tr>
<td>Horse</td>
<td></td>
</tr>
<tr>
<td>Donkey</td>
<td></td>
</tr>
<tr>
<td>Camel</td>
<td></td>
</tr>
<tr>
<td>Sheep/Goat</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
</tr>
</tbody>
</table>

8. Credit Utilization
8.1 Have you obtained credit during last year? Yes___ No_____ if yes, source of credit:
    Formal
    Informal
8.2 Please write the name of relevant source
    Formal source (s) _____________________________________________
    Informal source (s) ____________________________________________
    Purpose of Loan______________________________________________

9. WOMEN’S PARTICIPATION AND ROLE IN DIFFERENT HOUSEHOLD ACTIVITIES
9.1 Participation and Decision Making (Tick):

<table>
<thead>
<tr>
<th>Activities</th>
<th>Participation Extent (%)</th>
<th>Decision Making Extent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Household activities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child caring</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Farm/Crop activities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Livestock rearing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sale &amp; Purchase of properties</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social obligations (marriage, birthday &amp; other functions)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local representation (councilor/political gathering)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

10. Source of Drinking Water:

3. Borehole 4. Tanker 6 Any other ___________Quality:

Good_________ Poor: ____ If Poor (Reason)___________________________________________

11. Does any NGO Exist in your Area?
Yes_________ No________________ If yes,
Name of NGO -: ____________________________________________
Are you member of NGO ? Yes-------- No------------- if yes,
Role of NGO:-________________________________________

12. PERCEPTIONS OF RESPONDENTS FOR ACTION ASSOCIATED WITH THE PROJECT

<table>
<thead>
<tr>
<th>Possible impacts/effects of the Project</th>
<th>Increase</th>
<th>Decrease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employment opportunities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industrial Development Opportunities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Living standard</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------------</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>Unemployment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income generating activities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improvement in transport</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mobility (Access to Resources)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical Displacement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other specify</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

13 Any Historical /Archeological monument in or nearby the proposed project area

1. Yes 2. No  
If yes, please specify
Name __________________ Type ____________________________
Distance from the proposed project ___________

14 Major diseases common in the proposed project area: ____________________

15 In your opinion, should this Project be implemented?

1. Yes 2. No
If yes, please give reasons  
If no, please give reasons

__________________________  __________________________

16 In your opinion, what will be the possible impacts of this proposed project on your house / business / shop?

During Construction  
During Operation

17 What protective measures do you suggest to safeguard your interests?

18 In your opinion, what are some pressing needs of this area?

19 General Remarks of the Respondents

20. General Observations of Interviewers

Name of Interviewer: __________________ Date: ____________
Annex-V: LOCATION MAP OF THE COMMUNITY CONSULTATIONS

Public Consultation
Gender Consultation
ANNEX-VI: COVID-19 MANAGEMENT PLAN
COVID-19 MANAGEMENT PLAN

On February 11, 2020 the World Health Organization announced an official name for the disease that is causing the 2019 novel coronavirus outbreak, first identified in Wuhan China. The new name of this is coronavirus disease 2019, abbreviated as COVID-19. In COVID-19, ‘CO’ stands for ‘corona,’ ‘VI’ for ‘virus,’ and ‘D’ for disease. Formerly, this disease was referred to as “2019 novel coronavirus” or “2019-nCoV”.

Coronaviruses are a large family of viruses. Some cause illness in people, and others, such as canine and feline coronaviruses, only infect animals. Rarely, animal coronaviruses that infect animals have emerged to infect people and can spread between people. This is suspected to have occurred for the virus that causes Coronavirus Disease 2019 (COVID-19). Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS) are two other examples of coronaviruses that originated from animals and then spread to people.

The risk of exposure to COVID-19 is no different for employees of Employer, Engineer, Contractor, and suppliers than for the general population. Contractor, therefore, must consider the physical well-being and safety of all the persons entitled to be on the Site and follow reasonable guidelines and recommendations of Government authorities and healthcare professionals. As experience has shown in other countries, confirmed cases of COVID-19 expand exponentially if health and safety controls are left unheeded.

Contractor should enforce all health and safety procedures at Site including sanitary protocols, proper hygiene, social distancing, use of personal protective equipment (PPE), toolbox talks on special COVID-19 requirements, and prompt reporting of health issues related to COVID-19. Contractors must put safeguards in place to keep workers exposed to COVID-19 away from Site for at least 14 days after the last potential exposure.

WHO declared the COVID-19 as a Public Health Emergency of International Concern (PHEIC) in January 2020 and afterwards announced the COVID-19 outbreak as pandemic on 11th March 2020 due to the widespread of the disease in 114 countries at that time. WHO Director General urged the countries to take action now to stop the disease.

The rapid spread of COVID-19 hits all the provinces of Pakistan Sindh, Balochistan, Punjab & Khyber Pakhtunkhwa including the Gilgit Baltistan and Azad Jammu & Kashmir. The prevailing virus creates the menacing and distressing situation when it arrived around the closed proximities of the Project Area.


All the stakeholders are on board to jointly prevent/ limit/ control the spread of COVID-19. All of the staff is required to take precautionary measures as well as maintain social distances. The use of thermal guns for checking every single person body temperature, placement of relevant flyers and disinfection spray inside of all the containers are few of the measures to combat COVID-19.

OBJECTIVE

Following are the objectives of this report to jointly prevent / limit/ control the spread of COVID-19 at Site that can hamper the progress of proposed Project:
1. To enhance understanding of the evolving COVID-19;
2. To share knowledge on COVID-19 and preparedness measures being implemented at Site;
3. To generate recommendations for adjusting COVID-19 containment and response measures; and
4. Outline the measures taken at Site. The advised measures will help all the stakeholders to plan their work continuity in response to the COVID-19.

Due to the evolving situation of the COVID-19, this document should be read in conjunction with the latest relevant advisories issued by WHO (especially “Getting your workplace ready for COVID-19, 3 March 2020”) and Government of Pakistan.

WHAT IS CORONA VIRUS (COVID-19)
The COVID-19 belongs to a family of viruses known as the Coronaviruses, which can cause illnesses ranging from the common cold to more severe diseases, such as the Severe Acute Respiratory Syndrome (SARS) and Middle East Respiratory Syndrome (MERS)\(^\text{14}\).

SYMPTOMS
The symptoms of the COVID-19 are similar to that of regular pneumonia. Typical symptoms include;

- Fever;
- Cough;
- Difficulty in breathing;
- Pneumonia;
- Runny nose;
- Sore throat; and
- Feeling of being unwell.

MODE OF SPREAD
Infected person – person transmission; Infected people can spread COVID-19 through their respiratory secretions via droplets produced when an infected person coughs or sneezes, similar to how influenza and other respiratory pathogens spread. The spread from person-to-person is most likely among close contacts (about 6 feet);

- Infected animals’ dead or Alive;
- Air by coughing and sneezing;
- Close personal contact, such as touching or shaking hands;
- Touching an object or surface with a virus on it; and
- Touching your mouth nose or eyes before washing your hands.

GENERAL STANDARDIZED PRECAUTIONARY MEASURES
Following measures/recommendations are suggested as a general guidance to be followed for the protection of potential impacts of COVID-19:

Since, there is no vaccine available to protect against human Coronavirus infections. Therefore, transmission can be prevented through following measures:

- Cover your mouth while cough or sneeze;
- Avoid close contact with people who are sick;
- Avoid the use of hard soap;
- Wash your hands often with liquid soap and water for at least 20 seconds;
- All the employees should ensure sanitization of hands at appropriate time;
- Avoid touching your eyes, nose, and mouth with unwashed hands;

\(^{14}\) Source: World Health Organization
• If you are concerned about your symptoms you should see your health care provider at site or in office;
• Use of Personal Protective Equipment (PPE) according to risk (a surgical or N95 mask);
• Do not spit, wrap your oral and nasal secretion with tissue and throw it in a covered dustbin;
• Balance your nutrition and exercise moderately;
• Sterilization / disinfection of medical devices at Site dispensaries; and
• Do not touch, buy or eat wild animals (gamey). Try to avoid visiting markets that sell such animals.

PROJECT SITE SPECIFIC PRECAUTIONARY MEASURES
Measures for protecting staff and labour from exposure to, and infection with, the COVID-19 depend on the type of work being performed and exposure risk, including potential for interaction with infectious people and contamination of the work environment. Regardless of specific exposure risks, following are the main actions that have been jointly taken at Site to combat the COVID-19:

Employer’s Side
Employer should issue the notification containing the precautionary measures in the light of GoS guidelines to be implemented at Site. Upon receiving the Employer notification all the mentioned precautionary measures will be communicated to Engineer staff for compliance. Employer technical staff is also complying with the GoS guidelines and Contractor suggestion to control the spread of COVID-19 at Site in the best interest of the Project and country.

Consultant’s Side
Consultant’s top management will issue the orders in the light of GoS guidelines containing the precautionary measures to control the spread of COVID-19 for the staff working at Site. Consultant staff at Site will fully complying with the orders including photographic evidence. Considering the severity of the prevailing virus Engineer devised the SOP containing precautionary action against the potential risk of novel corona virus. Besides, above Consultant will ensure the following precautionary measures at Site.

• Adequate signage and information at all entrances and exits showing what is Corona Virus, how it spreads, what are the symptoms, standard precautions;
• The awareness session for the Contractor staff is equally important as of Consultant staff to combat the COVID-19 at Site. The Consultant will ensuring that Contractor is arranging such session at Site from time to time to reduce the potential risk of COVID-19. Further, all the newly inducted and existing staff have been given HSE training by the Consultant & Contractor.

Contractor’s Side
Contractor will communicate various precautionary measures to Employer and Engineer through letters to control the spread of COVID-19 at Site. Following are the major steps to be taken by the Contractor:

• Contractor will convey the instructions and requirements of its superior unit for the prevention and control of COVID-19 epidemic at Site.
• Contractor will establish a special organization for epidemic prevention and control on the Project Site that is responsible for arranging, implementing, publicizing and supervising the epidemic prevention and control measures.
• Launch the plan for epidemic prevention and control on the project Site that includes:
  o All personnel in temporary camp are required to wear masks;
  o Contractor personnel incharge of Site to wear masks;
o Arranged special personnel to measure and record the temperature of all personnel when entering or leaving the temporary camp;
o If any person with fever, cold and other symptoms are found, they will be admonished to go home for isolation and asked about the development of the disease every day; and
o Propagate and implement the epidemic prevention measures for the staffs and labours and warn them not to go outside and home as much as possible.

• All these meetings should carried out through video conference.

Contractor is not limited to the above precautionary measures but practicing and implementing the following;

• Contractor will prepare a pamphlet for the awareness of Site staff to combat the COVID-19. It will also place/posted at strategic points at Site.
• Launch awareness campaign to inform all the staff and labour about the coronavirus, to use facemask, hand hygiene, cough etiquette, and avoidance of close contact with animals and consumption of their raw products.
• Everyday awareness speech in English and Urdu in the temporary camp.
• All the employees are not allowed to go outside of the Project Area or on vacation to their homes and on daily basis visit to sites;
• Contractor will provide medical masks and antibacterial liquid hand wash to all personnel.
• Contractor will prepare the isolation facility at Site and provided three isolated rooms for such patients inside the temporary camp. Each room have three beds, oxygen cylinder, sanitizers, isolation kit, hand wash.
• Thermal scanning will be carried out continuously in the morning for everybody at the main gate of temporary camp.
• Record will be maintained for everyone that includes the temperature value of each person with their names, every morning and afternoon go to each department for scanning separately and noted down their name with temperature values.
• Contractor carry out disinfectant spray on daily basis morning and afternoon in each office and rooms and all the area of the camp.
• SSWMB and Consultant staff will also requested by Contractor to do not interact physically rather through electronically by emails or video conferencing.

RECOMMENDATIONS FOR THE CONTROL OF COVID-19 AT SITE

To Avoid Transmission
For all personnel at Site, it is always a good to practice the following precautionary measures:

• Workers to remain at least two meters apart from each other at all times (social distancing) – i.e. spread out and reduce the number of people working together in one area of the site;
• Avoid eating lunch in the form of group in available mess/canteens at Site;
• Close site canteens/ food preparation and eating areas (avoid gatherings) – workers to bring their own prepared lunch to site and eat alone e.g. in their van, car, or in an open space;
• Avoid in-person meetings if possible. In the case that an in-person meeting is unavoidable, make sure to have it in a well-ventilated area with sufficient space for attendees to distance themselves from one another. For meetings such as toolbox talks, consider breaking them up into smaller group meetings versus one large meeting;
• Introduce enhanced cleaning procedures across the Site and touch points e.g. office equipment, plant and machinery controls, taps/toilet/washing facilities, handrails;
- Stagger start times on site to avoid congestion in entrance areas;
- Reduce the number of people on site inductions at any one time and hold them outdoors if possible;
- Stop workers moving across various sites (potential for cross contamination);
- No outsiders should be at the Project Site;
- Contractor, Consultant and Employer personnel are advised to avoid travelling and in case traveling is unavoidable, prior approval from the management should be essential. In case of travelling, the above mentioned measures need to be strictly followed by the traveller;
- Prompt identification and isolation of potentially infectious individuals is a critical first step in protecting workers and other Site staff. An isolated area should be available at Site to immediately isolate suspected person, as it is most important to stop its spread at Site.
- Rapid Response Team should be formed and be informed immediately in case of suspect and confirmed case of COVID-19.
- Medical team at Site should separate the suspected person displaying fever, cough or difficulty breathing from other personnel; and
- If a person has had close contact with an individual that has confirmed COVID-19, that person will not be allowed to return to the Site until he/she has been symptom free for 14 days.
- Clean and fumigate all the workplaces at Site on daily basis;
- Ask people to stay at home if they have fever, cough, difficulty in breathing, runny nose, sore throat as per organizational rules;
- An immediate replacement of solid soap with liquid anti-bacterial soap bottles may be appropriate.
- Provision of alcohol-based hand sanitizer need to available for all staff;
- Clean the religious places carpets and rugs. Have them washed in place over the weekend and then do regular cleaning;
- Have the cleaners/ maintenance crews regularly clean surfaces that are touched frequently by personnel with disinfectants such as in and out doors;
- Fresh medical tests of staff working should be carried out at Site;
- Dispose of all contaminated waste (gloves, paper, swab handles, etc.) into biohazard waste bags for disposal;
- Ensure that panic is not created. In fact the posters should start with statements such as do not panic and fear the virus but know and prevent; and
- Ensure proper ventilation system for all the personnel at Site.

Use of Personal Protective Equipment (PPEs)
- Necessary PPE should be available at Site all the times and are being issued to each personnel at Site;
- Practice of using masks is also being ensured by all parties at Site (a surgical or N95 masks);
- Re-usable PPE should be thoroughly cleaned after use and not shared between workers. Single use PPE should be disposed of so that it cannot be reused;

Outside Visitors
- Visitors should enter with strictly wearing visitors card;
- Ensure sanitization of hands;
- All parties should ensure that the sick persons should be wearing a surgical or N95 masks;
- Note down the complete information of outsiders before entrance;
- Proper screening should be carried out before entering the Site;
• Refrain from handshakes. Rather than shaking hands, visitors may explain why handshakes can contribute to the risk of spread;
• Attempt to maintain a general six (6) feet distance between themselves. This will be challenging to follow at all times but it is Engineer recommendation to follow;
• Refrain from and/or limit touching of workplace surfaces; and
• In addition to these on-site procedures, it is advised to follow their respective organizational instructions related to Site visits.
ANNEX-VII: EMERGENCY RESPONSE PLAN
EMERGENCY RESPONSE PLAN

INTRODUCTION
Emergency management can be defined as the organization, coordination and implementation of a range of measures to prevent, mitigate, respond to, overcome and recover from the consequences of emergency events affecting the community, its assets and the environment.

PURPOSE OF PLAN
This plan intends to provide a framework for safety and security to infrastructure, people and vehicles. It assigns responsibility to organizations and individuals for carrying out specific actions at projected times and places in an emergency situation that exceeds the capability or routine responsibility of any one agency.

The emergency response plan provides guidance to:

- Prevent any potential sources causing hazard to the resources during all stages of the project;
- Coordinate between various organizations to take actions in case of emergencies;
- Protect people and property in emergencies and disasters;
- Develop procedures to respond to the emergencies efficiently;
- Identify and ensure availability of personnel, equipment, facilities, supplies, and other resources for use in order to provide timely and efficient response and recovery operations; and
- Confirm that measures taken in an incident are adequate to recover the affected resources or further improvements are needed.

PLANNING
I. Emergency Response Team

A team shall be dedicated to identify and control potential emergencies during the construction and operation of the project. The roles and responsibilities of the group members shall be clearly defined.

The primary responsibilities of the team are described below:

- Identify the potential hazard or risk sources that can lead to emergency situations;
- Ensure availability of adequate resources, procedures and communication system to deal with the identified emergency situations;
- Ensure awareness and training of the staff to facilitate implementation of the emergency response plan;
- Maintaining the records of any previous incidents; and
- Post-event analysis to bridge the gaps of the existing risk prevention procedures.

The emergency response team shall include but not limited to the following:

- Team Leader
- Safety Engineer
- Reporting Officer / Inspector

a) Team Leader
- Approve and modify devised measures to prevent or mitigate the risks associated with the identified risk sources;
- Arrange resources for dealing with potential emergencies including financial, equipment and personnel required to deal with emergencies; and
- Assure that the Emergency Response Plan is adequate, effective and can be implemented practically.

b) Safety Engineer
- Analyze the identified risk sources and devise measures to prevent or mitigate the risks in close consultation with the Team Leader;
- Develop and implement the Emergency Response Procedures, in case of the possible emergencies arise;
- Ensure effective internal and external communication; and
- Provide regular trainings and arrange drills to make people aware of dealing with emergencies.

c) Reporting Officer/Inspector
- Regular inspections of the site, to identify potential risks associated with equipment, materials and work practices;
- Anybody from the site can notify the reporting officer about potential risk and/or near misses on the site;
- Record any identified risks and mitigation measures to control the identified risk; and
- Notify the issue and control measures taken thereby to the safety engineer.

The designation, roles and responsibilities of each member shall be clearly defined and communicated to the employees. An outline of the framework of responsibilities is presented in Figure 1.

II. Hazard Identification
A comprehensive identification and evaluation of the hazards and risks likely to cause an emergency shall be done by Emergency Response Team (ERT). Major potential emergencies identified in the proposed projects are as follows:

- Structural failure;
- Disruption of Utility (Power, Water, Telecommunications and Gas);
- Accidents;
- Vehicle accident;
- Fog and Smog;
- Power equipment failure or vandalism;
- Fire explosion;
- Earthquake;
- Terrorism including bombing; and
- Disease Outbreak.
III. Prevention and Mitigation
The ERT shall work to eliminate or reduce the impact of identified emergencies and increasing the resilience of an affected community to recover from the consequences of such events. These activities include:

- Design considerations to control flooding, earthquakes and adequate lightening for fog and smog;
- Regular inspection and maintenance of construction machinery and the structural integrity;
- Review of work schedules based on weather updates; and
- Security controls based on political situations.

**EMERGENCY PREPAREDNESS**
The ERT shall be prepared with all necessary resources and the personnel’s shall be trained regularly.

IV. Resources
a) Finance and Administration
The financial resources shall be reserved for dealing with any emergencies arising on site
during construction and operation. Responsibilities of the person managing the resources in
case of emergencies shall be clearly defined, and the required resources shall be adequate
and updated regularly.

b) Equipment’s
All the necessary equipment’s needed in an event of emergencies shall be made available,
as a minimum. The equipment’s needed include:
- Personal protective equipment’s (PPEs);
- Alarms;
- Fire extinguishers;
- Crowd control, flashlights, signs, and barricades;
- First aid facility;
- Detection instruments, e.g.; personal alarm kits and smoke detection instruments; and
- Tools to fix minor vandalism.

c) Communication
All external and internal communication systems shall be made available. Local emergency
numbers shall be clearly posted and communicated to the personnel involved in construction
and operation activities.

d) Trainings
Personnel shall be made aware of the importance of safety, potential emergencies and how
to respond in case of emergencies. One day training and mock exercise shall be done to
prepare, the personnel to deal with emergencies.

EMERGENCY RESPONSE
Response includes actions taken to reduce the impacts of an emergency event, and to limit
the threat to life, property and the environment.

The emergencies can be dealt with:

- On-Site Management of the situation;
- Off-site coordination to arrange necessary resources to support the on-site management;
  and
- Providing advice and reports of the situation to stakeholders.

V. Emergency Response Procedure
Any person can report about an emergency, an on-site worker, an outside agency, or the
public. Circumstances change during the course of an emergency in different events, thus,
the procedure will vary as per the specific situation on ground. However, a basic action plan
to be followed in an emergency is discussed below. This order of response is applicable to
almost any emergency and should be followed in sequence.

a) Assess the Situation
The most important thing to do in case of emergency is to stay calm and avoid panic. Assess
the situation, the cause and most immediate requirement to control, limit and/or manage the
immediate, ongoing, or further damage.
b) **Immediate Control**

The most senior person on the scene should take control and contact, or delegate someone to contact emergency services as posted and communicated by ERT and inform the reporting officer of ERT and explain the situation. The area of emergency shall be restricted by barricades, tapes and adequate signage, if and as required.

c) **Protection from Further Losses**

- Once the site is restricted, to provide protection and reduce further losses, the source causing the emergency shall be controlled including equipment’s, materials, environment and accident scene from continuing damage or further hazards to the area and people.
  - For example: suppress fire, prevent objects from falling, shut down equipment or utilities, and take other necessary measures as required depending upon the type of emergency;
- Provide first aid if required;
- Designate people to emergency duties such as assign personnel to guide emergency services on arrival;
- Headcount personnel to identify any missing persons;
- Personnel shall be directed to safe locations;
- Arrange diversions for the traffic to reduce disturbance to the flow of traffic, if and as far as possible; and
- Preserve the accident scene until experts mark it safe; only disturb what is essential to maintain life or relieve human suffering, and prevent immediate or further losses.

VI. **Communication**

a) **Emergency Service Providers**

The emergency service providers’ needs to be kept informed of the situation. On site, personnel from the emergency services shall be guided towards the emergency scene, brief about the event, ongoing and potential hazards and cause(s), if known.

b) **Emergency Response Team and Management**

Members of ERT shall be immediately informed and the management shall also be kept informed.

c) **Public**

Timely notifications to public shall be disseminated through electronic and print media depending upon the requirement and urgency of the emergency, so that they can adopt alternate routes, and avoid the hazards associated with the emergency encountered.

d) **Utilities**

In case of disruption of utilities, the utility control authorities shall be immediately contacted to control the situation.

**RECOVERY**

Emergency affected individuals, communities and infrastructure shall be restored in terms of emotional, economic, and physical wellbeing including the following as a minimum:

- A detailed analysis and assessment of causes of emergency, extent of damage, and gaps if any, in managing the emergency;
- Recovery and replacement of the assets and infrastructure;
- Reinstatement of disrupted services;
- Road and bridge repairs; and
- Updation of safety arrangements and emergency response procedures to ensure better safety and security in any other arising emergencies.
ANNEX-VIII: QUARRY MANAGEMENT PLAN
1.0 Introduction
After the completion of construction phase of the proposed project, it is the responsibility of the contractor to restore the site that has been disturbed due to construction activities. Karachi Metropolitan Corporation (KMC) should ensure that the environmental value of the project area is maintained for future generations to appreciate.

2.0 General Quarry Planning and Progressive Rehabilitation
A well-considered quarry development plan prior to starting work, or when opening up new areas will greatly reduce the effort required to achieve appropriate leading practice environmental and safety outcomes for quarry rehabilitation and closure.

The selection of a site, sequencing of quarrying and rehabilitation and final land-use should all be carefully planned prior to commencement of work at a quarry or borrow pit.

2.1 Progressive Rehabilitation
Progressive rehabilitation refers to the rehabilitation of completed parts of a quarry while extractive operations continue in other parts of the quarry. As new quarry sections are opened, worked out areas should be progressively rehabilitated to avoid increasing the total disturbed area of a quarry. Overburden and topsoil can be stripped from areas being opened up and placed directly onto worked out areas which are being rehabilitated. This will avoid double handling of materials and prevent degradation of the topsoil.

Progressive rehabilitation helps to minimize the visual impact of a quarry, control dust and erosion. It also assists in fostering good landowner and community relations.

Recommended progressive rehabilitation practices are:

- Agree on the final land form and use of a site with the relevant landowner.
- Rehabilitate in accordance with the intended final use of the land.
- Plan and develop the quarry in stages towards terminal areas so that progressive rehabilitation works can commence as soon as possible).
- Once the final landform is established, re-vegetate areas to stabilize the landform and to give the vegetation maximum time to establish while the quarry is still in operation.

2.2 Re-vegetation
Establishing a self-sustaining cover of vegetation is the best way to stabilize disturbed sites in the long term. Re-vegetation also minimizes the visual impact of quarries. Generally, the vegetation type which existed before the disturbance, or a similar vegetation type will regenerate most successfully.

Prior to the commencement of a quarrying activity the type of re-vegetation should be agreed with the landowner, and should be consistent with the proposed final land-use.

Some indigenous plant species may not thrive in areas where soil conditions are
substantially different after quarrying. If this is the case, and the objective is to re-establish vegetation, which fulfills the function of the original native vegetation, then some species from outside the quarry area, may have to be introduced. Care must be taken to avoid introducing a species, which could become an unacceptable fire hazard, invade surrounding areas of native vegetation or become agricultural weeds.

Where agriculture is the planned land-use then the species planted should be those commonly used for pasture or crops known to be successful on soils of similar texture, drainage status, pH and fertility. Suitable legumes should always be considered for their ability to improve soil fertility.

3.0 Rehabilitation of Borrow Pits

Borrow pits are areas either in a road reserve or adjacent land holdings that have been used to extract materials such as gravels and soils. They can vary considerably in size, depending on the quantity of material taken and the borrow pits’ reserve body of remaining material. The variable size, shape and nature of borrow pits preclude very specific recommendations; however the following general conditions apply:

- Before extraction commences, licenses and permits should be checked and limits of disturbance and/or clearing must be clearly marked out on the site before any ground disturbing activity takes place; and
- At the completion of extraction, the former borrow pit must be made stable and safe. This usually requires the sides of the pit to be reshaped with gentle safe grades. All disturbed areas associated with borrow pits must be retopsoiled, seeded, fertilized and mulched (if appropriate) as part of the restoration plan. Main Roads has been discouraging the conversion of borrow pits to stock watering points.

Reinstatement of Borrow Pits

- Reinstatement will be completed prior to handover of the completed road section. This may include the following:
  - Fill excavated site with overburden stockpiles and perimeter berms, and graded to the desired slope and drainage path;
  - Spread topsoil on top of the overburden;
  - Develop/construct suitable surface slopes, drainage ditches and conduits to prevent water from collecting at the sites;
  - Establish a vegetation cover corresponding to at least 75% of the cover present prior to excavation (supporting photographs) and maintain following the first rains after reinstatement;
  - Minimize erosion by focusing vegetation cover on side slopes of the excavated area; and
  - Any required seeding will make use of local plant varieties

All the above mentioned measures need to be followed by the Contractor before handing over the site(s) back to the owner.

\[15\] RAPID PROGRAM BORROW PIT MANAGEMENT GUIDELINES, USAID
ANNEX-IX: CONSTRUCTION WASTE MANAGEMENT PLAN
CONSTRUCTION WASTE MANAGEMENT PLAN

GENERAL INTRODUCTION

Construction work refers to a wide range of materials depending on their origin; they are categorized as excavation material, demolition materials and worksite waste material. Construction waste material of the proposed project consists mainly of concrete, bentonite, masonry, limestone, sandstone, metal, and wood. In addition to this, significant amount of municipal waste will also generates from the construction camps. The solid waste generation estimated to be 650 kilogram per day for 1,000 construction workers during construction phase of the proposed project.

ORIGINS AND CAUSES OF CONSTRUCTION WASTE

<table>
<thead>
<tr>
<th>Origins of Waste</th>
<th>Causes of Waste</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contractual</td>
<td>▪ Errors in contract documents; and</td>
</tr>
<tr>
<td></td>
<td>▪ Contract documents incomplete at commencement of construction.</td>
</tr>
<tr>
<td>Design</td>
<td>▪ Design changes;</td>
</tr>
<tr>
<td></td>
<td>▪ Design and detailing complexity;</td>
</tr>
<tr>
<td></td>
<td>▪ Design and construction detail errors;</td>
</tr>
<tr>
<td></td>
<td>▪ Unclear and unsuitable specifications; and</td>
</tr>
<tr>
<td></td>
<td>▪ Poor coordination and communication (late information, last minute client</td>
</tr>
<tr>
<td></td>
<td>requirements, slow drawing revision and distribution).</td>
</tr>
<tr>
<td>Procurement</td>
<td>▪ Ordering errors (i.e. ordering items not in compliance with specification);</td>
</tr>
<tr>
<td></td>
<td>▪ Over allowances (i.e. difficulties to order small quantities); and</td>
</tr>
<tr>
<td></td>
<td>▪ Supplier errors.</td>
</tr>
<tr>
<td>Transportation</td>
<td>▪ Damage during transportation;</td>
</tr>
<tr>
<td></td>
<td>▪ Difficulties for delivery vehicles accessing construction sites;</td>
</tr>
<tr>
<td></td>
<td>▪ Insufficient protection during unloading; and</td>
</tr>
<tr>
<td></td>
<td>▪ Inefficient methods of unloading</td>
</tr>
<tr>
<td>On-Site Management and</td>
<td>▪ Lack of on-site waste management plans;</td>
</tr>
<tr>
<td>Planning</td>
<td>▪ Improper planning for required quantities;</td>
</tr>
<tr>
<td></td>
<td>▪ Delays in passing information on types and sizes of materials and</td>
</tr>
<tr>
<td></td>
<td>components to be used;</td>
</tr>
<tr>
<td></td>
<td>▪ Lack of on-site material control; and</td>
</tr>
<tr>
<td></td>
<td>▪ Lack of supervision.</td>
</tr>
<tr>
<td>Material Storage</td>
<td>▪ Inappropriate site storage space leading to damage or deterioration;</td>
</tr>
<tr>
<td></td>
<td>▪ Improper storing methods; and</td>
</tr>
<tr>
<td></td>
<td>▪ Materials stored far away from point of application.</td>
</tr>
<tr>
<td>Material Handling</td>
<td>▪ Materials supplied in loose form;</td>
</tr>
<tr>
<td></td>
<td>▪ On-site transportation methods from storage to the point of application;</td>
</tr>
<tr>
<td></td>
<td>▪ Inadequate material handling.</td>
</tr>
<tr>
<td>Site Operation</td>
<td>▪ Accidents due to negligence;</td>
</tr>
<tr>
<td></td>
<td>▪ Unused materials and products;</td>
</tr>
<tr>
<td></td>
<td>▪ Equipment malfunction;</td>
</tr>
<tr>
<td></td>
<td>▪ Poor craftsmanship;</td>
</tr>
<tr>
<td></td>
<td>▪ Use of wrong materials resulting in their disposal;</td>
</tr>
<tr>
<td></td>
<td>▪ Time pressure; and</td>
</tr>
</tbody>
</table>
CONSTRUCTION WASTE MANAGEMENT PLAN

I. Waste Management Goals
The contractor established goal that this project will generate at least 50 percent less waste into landfills and the processes shall be employed to ensure that this goal is met. These shall include prevention of damage to materials to be incorporated into the work due to mishandling, improper storage, contamination, inadequate protection, minimizing poor quantity estimation, and through design.

II. Responsibility
a) The Contractor shall be responsible for the implementation of the administrative portions of this program, including the notification of subcontractor management, the training of the site supervisor and the onsite posting of this plan.
b) The site supervisor shall be responsible for the implementation of the onsite portions of this program including the training of subcontractor personnel.

III. Waste Prevention Planning
a) In addition to other requirements specified herein it is a requirement for the work of this project that the contractor comply with the applicable city waste disposal requirements.
b) Of the inevitable waste that is generated, the waste materials designated in this specification shall be salvaged for reuse and or recycling where practical and possible. Waste disposal in landfills shall be minimized as much as possible.
c) Project Construction Documents: The Contractor will contractually require all subcontractors to comply with the Construction Waste Management Plan (WMP)”. A copy of the WMP will accompany all subcontractor agreements and require subcontractor participation.
d) The “Construction Waste Management Plan” shall be implemented and executed as follows and as on the chart:
   i) Salvageable materials will be diverted from disposal where feasible;
   ii) There will be a designated area on the construction site reserved for materials that can be recycled;
   iii) Areas shall be marked to designate what recycle materials are to be stored there; and
   iv) Hazardous waste shall be managed by a licensed hazardous waste vendor.

IV. Communication and Education Plan
a) This Waste Management Plan will be posted onsite;
b) Each subcontractor will be made aware of the intent of this project with respect to reduction of waste and recycling. Onsite recycling containers and/or areas will be plainly marked;

c) The subcontractor will be expected to make sure all their crews comply with the Waste Management Plan;

d) All recycling containers and areas will be clearly marked;

e) Lists of acceptable and unacceptable materials will be posted at the site; and

f) All subcontractors will be informed in writing of the importance of non-contamination with other materials or trash.

V. Motivation Plan
The Contractor will conduct a pre-award meeting for subcontractors. Subcontractors under consideration will be required to attend the meeting to review project goals and requirements with the project team. Attendance will be a prerequisite for award of subcontracts. This document will be an attachment to every subcontract. Copies of the attachment will be posted prominently at the job site.

VI. Expected Project Waste, Disposal, and Handling
The following chart identifies waste materials expected on the proposed project, their expected disposal methods and handling procedures. New items may be added as needed.
<table>
<thead>
<tr>
<th>Material</th>
<th>Disposal Method</th>
<th>Handling Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land Clearing Debris and Mangroves</td>
<td>Keep separate for reuse and or wood sale. Suitable materials may be delivered to a composting site. Separate topsoil and rock for future landscaping use.</td>
<td>Keep separated in designated areas onsite.</td>
</tr>
<tr>
<td>Clean Dimensional Wood and Palette Wood</td>
<td>Keep separate for reuse by on-site construction or by site employees for either heating stoves or reuse in home projects. May be offered to public.</td>
<td>Keep separated in designated areas onsite.</td>
</tr>
<tr>
<td>Painted or Treated Wood</td>
<td>Reuse, off site recycle, and landfill.</td>
<td>Keep separated in designated areas onsite.</td>
</tr>
<tr>
<td>Concrete</td>
<td>Recycle when possible.</td>
<td>Keep separated in designated areas onsite.</td>
</tr>
<tr>
<td>Concrete Masonry Units</td>
<td>Keep separate for re-use by on-site construction or by site employees</td>
<td>Keep separated in designated areas onsite</td>
</tr>
<tr>
<td>Metals</td>
<td>Recycle off site when possible. Separate copper wire when possible.</td>
<td>Keep separated in designated areas onsite.</td>
</tr>
<tr>
<td>Gypsum drywall (unpainted)</td>
<td>Recycle with supplier when possible.</td>
<td>Keep scraps separate for recycling – stack on pallets in provided onsite. All scrap drywall should be taken back by contractor to drywall supplier</td>
</tr>
<tr>
<td>Paint</td>
<td>Reuse onsite; donate to Habitat for Humanity Restore.</td>
<td>Keep separated in designated areas onsite.</td>
</tr>
<tr>
<td>Insulation</td>
<td>Reuse and landfill.</td>
<td>Keep separated in designated areas onsite.</td>
</tr>
<tr>
<td>Glass</td>
<td>Recycle locally.</td>
<td>Keep separated in designated areas onsite.</td>
</tr>
<tr>
<td>Plastics</td>
<td>Plastic Bottles: recycle locally; be aware of plastics that are acceptable to recycle facility.</td>
<td>Keep separated in designated areas onsite.</td>
</tr>
</tbody>
</table>
ANNEX X: RESOURCE CONSERVATION PLAN
RESOURCES CONSERVATION PLAN

INTRODUCTION
The most of the resources in this world are finite and non-renewable in nature. We are completely dependent on these resources to fulfill all our daily requirements. Therefore, sustainable development calls for the need to conserve resources in a way that meet our needs of present generation as well as future generation, especially the non-renewable resources.

OBJECTIVE OF THE PLAN
The Resources Conservation Plan is intended to make an effort towards achieving sustainable development. The objective of the resources conservation plan is to:

- Minimize the use of natural resources; and
- Mitigate and prevent pollution contaminating the natural resources.

PLANNING
Careful estimations of quantities of material, fuel, water and energy required directly or indirectly shall be done to avoid excessive or unnecessary wastage of these materials. In addition to this, pollution prevention strategies shall also be devised to prevent contamination of resources.

- The estimations include the following:
  - Estimation of construction material required for the project;
  - Estimation of fuel consumption for construction machinery, construction vehicles and generators;
  - Estimations of the energy requirements during all the stages of the project; and
  - Estimations of water consumption for construction activities and construction camp sites.
- Strategies shall be planned to reduce loads on the identified resources to be consumed;
- Best management practices shall be devised to control or reduce pollution resulting from the activities during different stages of the project; and
- An inspector shall be assigned responsibility to oversee the ongoing activities to check the compliance of the planned strategies.

EXECUTION OF THE PLAN
The planned strategies shall be implemented to conserve the natural resources including but not limited to the following:

Material
- Material supplied shall be in conformance with the estimated quantities and excess material shall be returned to the supplier;
- Material wastage shall be avoided by using best management practices;
- Waste produced during the project execution shall be disposed off safely to the designated disposal sites through approved contractors; and
- Reuse of the materials shall be appreciated.
Energy
- Reduce trips and optimize routes to and from the construction site for all kinds of activities;
- Regular maintenance of equipment and vehicles to avoid leaks and sustain efficient fuel consumption;
- Switch off idle equipment and vehicles to avoid wastage of fuel;
- Minimize warm up time, unnecessary acceleration and deceleration of the construction equipment and vehicles;
- Avoid unnecessary burning of fuel for cooking in construction camps;
- Avoid unnecessary use of heating and cooling systems during extreme weather events;
- Construction shall start in early hours of the day to avoid heat in summers and utilization of day light; and
- Alternate energy sources shall be considered for electricity generations during construction and operation to conserve fossil fuel as it is non-renewable resource.

Water
- Avoid using potable water for sprinkling, curing and washing of equipment and vehicles. Surface water or treated effluent can be used instead;
- Wastage of water should be controlled through providing proper valves and through controlling pressure of the water;
- Unnecessary equipment washings should be avoided;
- Awareness amongst workers shall be raised to conserve water and immediately report for any leaks detected; and
- Ensure protection of canal water from contamination resulting from construction activities.

Pollution
- Emissions shall be reduced and controlled as far as possible and direct discharges to air shall be avoided by strictly adhering to the mitigation measures outlined in EIA report;
- Waste water shall not be discharged directly and must be managed as per the recommendations presented in EIA; and
- Construction and demolition waste, and municipal solid waste shall not be dumped and burnt openly, and shall be handled according to the preventative measure given in EIA study.

CHECKING AND CORRECTIVE ACTIONS
The Local Government & HTP Department shall bind the construction contractor through contract agreement to comply with the strategies outlined in the Resources Conservation Plan. The Environmental Committee shall also appoint an Inspector who shall monitor the daily onsite activities and shall report any issues and concerns raised in relation to Resources Conservation Plan. The inspector shall recommend adequate corrective actions to mitigate the issues raised.
ANNEX XI: TRAFFIC MANAGEMENT PLAN
GUIDELINE TRAFFIC MANAGEMENT PLAN

Need for Plan

During the construction period of the project, considerable vehicular movement carrying large amounts of material and machinery is expected. This will definitely interrupt the local traffic and is therefore important to manage the traffic to avoid the nuisance to local residents in terms of noise, dust, congestion and inconvenience.

The plan

The objective of Traffic Management Plan (TMP) is to define the requirements that should be implemented to mitigate any potential negative risks to the environment, workers or the community resulting from construction traffic.

The TMP will advise and inform site Contractors and external suppliers of equipment and materials of access and entry points along with other key information such tipping areas and wash-out areas. It is intended to compliment and work alongside relevant EMP. The TMP will be classed as “live” and therefore be subjected to updates as required.

The Contractor, at the time of the execution of the project, will prepare a comprehensive TMP in coordination with local traffic police department, WSD, emergency services and local administrative department. WSD and CSC will review and approve the Contractor’s TMP. The Contractor’s TMP shall include following mitigation measures during its preparation:

- Undertake a road conditions assessment prior to and following the peak construction period, to assess any damage to road infrastructure that can be attributed to Project development.
- Repair damage as appropriate or enter into a voluntary agreement with the relevant roads authority to reimburse the cost of any repairs required to the public road network as a result of the Project.
- Spoil dumpsites located close to project site to minimize journey distance and limit movements to site access roads.
- Construction of worker accommodation on site to reduce light vehicle movements relating to travel to/from the site.
- Provision of bus/minibus services for personnel living in nearby settlements.
- Movements of construction workers will be planned to avoid the busiest roads and times of day when traffic is at its greatest.
- Schedule deliveries and road movements to avoid peak periods.
- Driver training for HGV drivers and refresher course every six months for project drivers.
- Speed restrictions for project traffic travelling through communities (to be agreed with National Highway Authority).
- Run a safety campaign to improve the people’s knowledge of the traffic hazard on their roads, public information and other activities to address the issues.
- Run a pedestrian awareness programme.
- Temporary signage

The traffic management plan for the project corridor is provided below.

Other Recommendations
It is important to manage public access routes during construction because it can cause delay to local traffic and create a safety hazard both on and offsite. People working and living near the tower sites would be annoyed by the emissions, noise and visual intrusion of queuing vehicles. Some important factors involved in access routes and site traffic are as follows:

**Public Access Routes**

The use of public road for site access may be restricted in terms of:

- Vehicle size, width and type of load
- Time limits
- Parking
- Pedestrian conflicts

Contractor should have consultation with the local police or local authority to address these issues and to effectively manage them before the beginning of the construction.

**Site Workers Traffic**

Site personnel should not be permitted to park vehicles right on the road; this will lead to disruption in material deliveries. Designated parking areas with appropriate parking space will be needed for this purpose; any plain area near construction site can be used for this purpose.

**Site Rules**

- Access to and from the site must be only via the specified entrance.
- On leaving the site, vehicles must be directed to follow the directions given.
- Drivers must adhere to the site speed limits.
- All material deliveries to site must keep allocated time limits.
- No material or rubbish should be left in the loading-unloading area.
- Develop a map for alternate routes showing material delivery services.
- Assign designated personnel on site to receive deliveries and to direct the vehicles.
- Monitor vehicle movement to reduce the likelihood of queuing or causing congestion in and around the area.
- Project vehicles should have a unanimous badge or logo on windscreen displaying that they belong to the project.

**Contractor’s Obligation**

The traffic management plan of the Contractor should be safe enough and widening of any access roads and construction of the detours (as applicable and practical) must be completed prior to start of project construction activities so that heavy vehicular transportation for construction activities do not hinder the normal course of traffic lanes.
Contractor must ensure that road closures are carried out by a competent person. The Contractor obligation must include the display of traffic signs according to the need to divert the traffic volume and to guide the road users in advance. The traffic sign, traffic light should be placed from any diverting route or road marking.

The Contractor should consider the environmental and social impacts of the traffic during construction. It will be sole responsibility of the Contractor to implement a plan which produces minimum nuisance to the local people and to the environment. Safety of the people should be given due importance. It will be under Contractor obligation to notify the traffic management plan and its later changes to CSC, WSD, emergency services and Traffic Police, and also publish weekly programme in the local newspaper.
ANNEX-XII CHANCE FIND PROCEDURE
CHANCE FIND PROCEDURES

Project may involve excavation. Therefore, the possibility of chance find is not ignorable. In case of any chance find, the contractor will immediately report through Supervision Consultant to Directorate General (DG) of Archeological Department, Government of Pakistan to take further suitable action to preserve those antique or sensitive remains. Representative of the DG will visit the site and observed the significance of the antique, artifact and cultural (religious) properties and significance of the project. The report will be prepared by representative and will be given to the DG. The documentation will be completed and if required suitable action will be taken to preserve those antiques and sensitive remains.

In case any artifact, antiques and sensitive remains are discovered, chance find procedures should be adopted by contractor workers as follows:

- Stop the construction activities in the areas of chance find;
- Delineate the discovered site or area;
- Consult with the local community and provincial Archeological Department i.e. Department of Culture, Tourism, Antiquities and Archives, Sindh.
- The suggestion of the local communities and the concerned authorities will be suitably incorporated during taking the preventive measures to conserve the antique, artifact and cultural (religious) properties;
- Secure the site to prevent any damage or loss of removable objects. In case of removable antiquities or sensitive remain, a night guard shall be arranged until the responsible local authorities take over; and
- After stopping work, the contractor must immediately report the discovery to the Supervision Engineer.

The contact Address of Culture, Tourism, Antiquities and Archives Department is given below:

Department of Culture, Tourism, Antiquities and Archives
Antiquities House. C/82, Block-2, Near Bilal Masjid,
Clifton, Karachi
Tel: 021-99212126 / 99212127
ANNEX-XIII: TREE PLANTATION PLAN
Plantation Plan for Korangi Link Road

Two rows of plants will be raised along the proposed Korangi Link Road, one on either side of the road. Distance from the outer boundary of the ROW and between two plants will be kept as 4 meters. Thus in one kilometer, 250 number of plants are to be raised (1 Avenue Km = 250 Plants). Total number of plants, along, 06-kilometer-long road only, as the other areas is falling under elevated bridges and under mangroves (additional/separate compensation will be paid), on both sides will be 1500 x 2= 3000 Number. Thus a total of 3000 trees shall be planted in lieu of expected 110 effected plants, which is more than 10 times of the effected plants.

Mangroves Compensation:
The compensation for the mangroves will be as under, as per the recommendations of CCF and DFO mangroves, Sindh Forest Department.

<table>
<thead>
<tr>
<th>Mangroves Projects</th>
<th>Sub Project (SP-1)</th>
<th>Area (Hectare)</th>
<th>Unit Rate Compensation</th>
<th>Rate/Year</th>
<th>Rate/10 Years</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Per Ha/Year (US $)</td>
<td>US $</td>
<td>US $</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12.76</td>
<td>4,200</td>
<td>53,592</td>
<td>535,920</td>
</tr>
</tbody>
</table>

Note: All the Calculations provided for Mangroves area including costing are approximate and tentative, which will be finalized/authenticated after final design and during construction phase of the projects, with the consultation of Sindh Forest Department, Client, Consultant and other relevant Stakeholders/Departments please. During the consultative meeting the CCF mangroves recommended Compensation for 10 years.

Trees Recommended
Following trees are recommended for plantation, along this portion of the proposed road on both sides.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Local Name</th>
<th>Scientific Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Neem</td>
<td><em>Azadirachata indica</em></td>
</tr>
<tr>
<td>2.</td>
<td>Jungle jalebi</td>
<td><em>Pithecellobium dulce</em></td>
</tr>
<tr>
<td>3.</td>
<td>Sirris</td>
<td><em>Acacia lebbek</em></td>
</tr>
<tr>
<td>4.</td>
<td>Jacarnda</td>
<td><em>Jacaranda moniosifolia</em></td>
</tr>
<tr>
<td>7.</td>
<td>Silver Oak</td>
<td><em>Grevillea robusta</em></td>
</tr>
<tr>
<td>8.</td>
<td>Pilkhan (white Fig)</td>
<td><em>Ficus virens</em></td>
</tr>
<tr>
<td>9.</td>
<td>Jaman</td>
<td><em>Eugenia jambolina</em></td>
</tr>
<tr>
<td>10.</td>
<td>Kachnar</td>
<td><em>Bauhinia variegate</em></td>
</tr>
</tbody>
</table>
Cost
Break-up of Expenditure per Avenue Kilometer or for 250 plants is given below:

**FIRST YEAR**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Item</th>
<th>Quantity</th>
<th>Rate</th>
<th>Amount for 1 Ave. Km (Rs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Layout</td>
<td>1 Av.km</td>
<td>2 MD*/Av.km</td>
<td>3,000.00</td>
</tr>
<tr>
<td>2.</td>
<td>Digging of Pits 1.5<em>1.5</em>1.0 ft. each (average size) 2.5x250= 625 cft.</td>
<td>625 cft.</td>
<td>5 MD/Av.km</td>
<td>7,500.00</td>
</tr>
<tr>
<td>3.</td>
<td>Cost of Plants</td>
<td>250 No.</td>
<td>Rs100/- plant</td>
<td>25,000.00</td>
</tr>
<tr>
<td>4.</td>
<td>Cost of planting of plants</td>
<td>250 No.</td>
<td>Rs. 25/- plant</td>
<td>6,250.00</td>
</tr>
<tr>
<td>5.</td>
<td>Carriage of plants from private nursery to site including loading/unloading</td>
<td>250 No.</td>
<td>Rs. 10/- plant</td>
<td>2,500.00</td>
</tr>
<tr>
<td>6.</td>
<td>Cost of Manure and Bhall (compost) including carriage</td>
<td>1 Av. Km</td>
<td>Rs. 20,000</td>
<td>20,000.00</td>
</tr>
<tr>
<td>7.</td>
<td>Watering 50 times 250x50 with water bowser, one driver and one coolie (Once a week)</td>
<td>12500 no.</td>
<td>5MD/per %0</td>
<td>100,000.00</td>
</tr>
<tr>
<td>8.</td>
<td>Weeding twice 250x2</td>
<td>500 no.</td>
<td>2 MD/per %</td>
<td>15,000.00</td>
</tr>
<tr>
<td>9.</td>
<td>Reopening/Turn Over of Pits twice (250x2)/cft/pit</td>
<td>500 cft.</td>
<td>2 MD/per %</td>
<td>15,000.00</td>
</tr>
<tr>
<td>10.</td>
<td>Unforeseen/contingencies</td>
<td></td>
<td></td>
<td>5,750.00</td>
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<tr>
<td></td>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td>200,000.00</td>
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- Labour for one Man Day @ Rs.1500

**SECOND YEAR**

<table>
<thead>
<tr>
<th>Sr. No.</th>
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<th>Quantity</th>
<th>Rate</th>
<th>Amount for 1 Ave. Km (Rs.)</th>
</tr>
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<tbody>
<tr>
<td>1.</td>
<td>Cost of Plants 20% Restocking</td>
<td>50 No.</td>
<td>Rs.100/- plant</td>
<td>5,000.00</td>
</tr>
<tr>
<td>2.</td>
<td>Cost of planting</td>
<td>50 No.</td>
<td>Rs. 25/- plant</td>
<td>1,250.00</td>
</tr>
<tr>
<td>3.</td>
<td>Carriage of plants</td>
<td>50 No.</td>
<td>Rs. 10/- plant</td>
<td>500.00</td>
</tr>
<tr>
<td>4.</td>
<td>watering 50 times with water bowser, one driver and one coolie</td>
<td>12500 no.</td>
<td>5MD/per %0</td>
<td>100,000.00</td>
</tr>
<tr>
<td>5.</td>
<td>Reopening of Pits twice (250x2)</td>
<td>500 cft.</td>
<td>2 MD/per %</td>
<td>15,000.00</td>
</tr>
<tr>
<td>6.</td>
<td>Weeding twice 250x2</td>
<td>500 no.</td>
<td>2 MD/per %</td>
<td>15,000.00</td>
</tr>
<tr>
<td>7.</td>
<td>Unforeseen</td>
<td></td>
<td></td>
<td>1,250.00</td>
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<tr>
<td></td>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td>138,000.00</td>
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**THIRD YEAR**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Item</th>
<th>Quantity</th>
<th>Rate</th>
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</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Cost of Plants 10% Restocking</td>
<td>25 No.</td>
<td>Rs.100/- plant</td>
<td>2,500.00</td>
</tr>
<tr>
<td>2.</td>
<td>Cost of planting</td>
<td>25 No.</td>
<td>Rs. 25/-</td>
<td>625.00</td>
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</table>
### FOURTH YEAR

<table>
<thead>
<tr>
<th>Sr. No.</th>
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<th>Quantity</th>
<th>Rate</th>
<th>Amount for 1 Ave. Km (Rs.)</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>watering 30 times</td>
<td>7500</td>
<td>5MD/per %0</td>
<td>56,250.00</td>
</tr>
<tr>
<td>5.</td>
<td>Pruning and cleaning of plants</td>
<td>250 no.</td>
<td>5MD/per %0</td>
<td>1,875.00</td>
</tr>
<tr>
<td>6.</td>
<td>Unforeseen</td>
<td></td>
<td></td>
<td>1,875.00</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td>60,000.00</td>
</tr>
</tbody>
</table>

Cost for raising and Maintenance 250 plants for 4 years (1 Av. Km) = Rs. 483,000/-

Total cost for 3000 plants and their maintenance for 4 years ((12 Av.Km) = Rs 5,796,000/-

OR Say

Total Cost = 5.8 Millions
Feasibility Study and Transaction Advisory Services, 'Urban Road Initiatives in Karachi'
Sub Project 1: Link Road for Korangi

Hydrology and Hydraulic Study Report for Realignment of Existing Left Bank of Malir River at Korangi Causeway

January 2021

National Engineering Services Pakistan (Pvt.) Ltd.
13th Floor, N.I.C. Building, Abbasi Shaheed Road, Off. Shahrah-e-Faisal, Karachi
Phone: (0092 21) 99207277-84
Fax: (0092 21) 35651994
E-mail: nespakkh@khi.wol.net.pk
Web: http://www.nespak.com.pk
# PRELIMINARY DESIGN REPORT
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1. INTRODUCTION

1.1 GENERAL

Karachi is the largest city in Pakistan, capital of the Province of Sindh and seventh largest city in the world. The city is Pakistan's premier industrial and financial center. With its location on the Arabian Sea, Karachi serves as a transport hub, and is home to Pakistan's two largest seaports, the Port of Karachi and Port Bin Qasim. Imported goods are transferred from these ports to all other cities of the country. Karachi Metropolitan, being a mega city of Pakistan has potential to absorb people from all over the country in providing jobs, business opportunities, and housing facilities. The population of the city as reported has now reached to the figure of 14.91 million (PBS 2017). Due to this phenomenal population growth, increase in vehicular traffic, congestion and traffic jam issues arise on major roads of city. This adds an extra volume of heavy traffic on city roads up to super highway (Motorway M9) and National Highway N-5. Consequently, road users are facing inconvenience/hazards like wastage of time/fuel, environmental pollution (noise, smoke etc.) and accidents etc.

In order to combat traffic issues Local Government Department, Government of Sindh has decided to provide the direct route to connect Karachi Port Trust (KPT) Interchange to PAF Airmen Academy, National Industrial Park (NIP) and Korangi Industrial Area. The proposed intervention will be achieved by constructing a new bridge on Malir River.

1.1 BACKGROUND

Jam Sadiq Bridge (JS Bridge) is the only bridge, connecting both banks of the Malir River in the vicinity of Korangi Industrial Area. The bridge observes heavy traffic jams during flood season as both causeways (English Biscuit Manufacturers (EMB) & Korangi) upstream and downstream of Jam Sadiq Bridge submerge due to high flood depths in Malir river. Local Government Department, Government of Sindh intends to reduce traffic load on the existing JS Bridge by constructing a new bridge on Malir River, approximately 600 m downstream of the existing bridge. For the newly proposed bridge, reduced waterway / length of bridge, almost similar to JS Bridge, has been adopted. The proposed bridge will run parallel to the existing JS Bridge as it traverse the shortest route to connect both banks of the river. Existing left bund downstream of JS Bridge will be extended up to the newly proposed bridge. Thereafter, the left bund will be re-aligned through the flood plain area up to the existing PARCO Elevated Oil Pipeline. Location Map of the project area is shown in Figure 1.1.

1.2 OBJECTIVE OF THE STUDY

In order to ensure safety of the built-up areas along both banks of river, it is essential to study the impact of proposed project components (Korangi Bridge, u/s and d/s guide banks, and realignment of left flood protection bund) on the existing infrastructure (JS Bridge and river banks) with in the study reach. After discussion with Project Management Team, objectives of the project may be outlined as follows:

i) Determine the hydraulic parameters of proposed bridge downstream of JS Bridge.

ii) Determine backwater effect at Jam Sadiq Bridge.
iii) Estimate increase in water level for the reach between English Biscuit Manufacturers (EBM) Causeway and PARCO Elevated Oil Pipeline.

iv) Design of relocated left flood protection bund and propose guide banks of bridge.

v) With relocation of the existing left bund part of flood plain on left bank of the Malir River can be reclaimed.
Figure 1.1: Location Map of Project Area
2. DATA COLLECTION AND FIELD VISIT

2.1 DATA COLLECTION

Following data/information was provided by the Project Management, NESPAK Karachi Office:

i) Satellite Imagery showing proposed layout of relocated flood protection bund on left side.
ii) Drawing showing proposed bridge location and relocated left flood protection bund.

2.2 ADDITIONAL DATA

Following additional data was required for the completion of above mentioned tasks (Chapter-1):

- Hydrologic Studies: - Updated flood discharge of Malir River for design return period, i.e., 100-year.
- Topographic Survey: Latest river cross sections, starting from upstream of EBM Causeway to PARCO Elevated Oil Pipeline, covering high banks.
- River geometry, existing bridge details for mathematical Model (HEC-RAS):
- Geotechnical data including D50 of river bed material and saturated angle of repose.
- Tidal data.

Multidisciplinary team of experts was deputed with the consent of Project Management team to acquire additional data pertaining to topographic survey, hydrology, hydraulics and geotechnical studies.

Out of the mentioned additional data following has been received at the time of writing this report:

- Topographical survey report
- Hydrological study report

This information was used for the development of HEC-RAS Model. For carrying out the initial scour analysis, value of \(d_{50}\) has been taken from the previous report. For updated geotechnical parameters, geotechnical investigations are in progress at site. After completion of latest geotechnical investigations, scour analysis and design of stone protection works will be revised accordingly.
2.3 MEETING AND FIELD VISITS

After completing the initial desk studies, a team of experts from NESPAK Lahore Office reached Karachi. Purpose was to hold detailed discussions with the Project Management team at Karachi and also visit the site. The team comprised of the following experts:

- Mr. Kamran Ahmad (Chief Engineer - Hydraulics)
- Mr. M. Aslam Qazi (Senior Engineer - Hydraulics)
- Mr. Salman Maqsood Randhawa (Senior Hydrologist)

Visiting team held a meeting with the following Project Management team in Nespak’s Karachi office on August 12, 2020.

- Mr. Rehan Zamin (Project Manager / Chief Engineer Infra-Structure)
- Mr. M. Adnan (Principal Engineer)

The visit objectives were as follows:

- Overview of existing infrastructure i.e., Jam Sadiq Bridge, causeways and existing protection bunds.
- Overview of proposed arrangements and its connection with existing infrastructure.
- Assessment of vegetal cover and bed material size for estimation of Manning’s Roughness.

2.4 PHOTOGRAPHS OF STUDY AREA

Photographs taken during the field visits are presented below:
Flood Plain View of Malir River

View of Left Embankment Upstream of EMB Causeway

Pictorial View of Jam Sadiq Bridge

Jam Sadiq Bridge from Up-Stream of Malir River

Pictorial View of Jam Sadiq Bridge from Down-Stream of Malir River

View of Existing Right Side Embankment of Malir River Downstream of Korangi Causeway
Vegetations along Left Bank d/s of Jam Sadiq Bridge

PARCO Elevated Oil Pipeline
3. TOPOGRAPHIC SURVEY OF KORANGI CAUSEWAY AREA

Survey team carried out the cross sectional and topographical survey as required for the proposed interventions. Survey has been carried out in the months of July & August, 2020 for the causeway area, upstream & downstream of JS Bridge and downstream of National Industrial Park (NIP)/ PARCO pipeline (near sea).

3.1 LOCATION & EXTENTS OF THE PROJECT SITE

The project area for which survey has been carried out starts about 800 meter U/S of EBM causeway (Falcon Complex Area) and extends downstream of NIP/ PARCO elevated oil pipeline near sea. Total length of the study reach is about 6.6 km.

3.2 SCOPE OF SURVEY WORK

Scope of survey required to carry out the present study mainly include following;

- Reconnaissance visit of the project area.
- Establishment of survey Bench Marks (BM) in the area.
- Carry out topographic survey work from EBM Causeway to NIP (near sea).
- Preparation of inventory of existing structures.
- Processing of the observed data.
- Preparation of topographic survey map of project area.

The above-mentioned scope of the work has been completed by using the following methodology.

3.3 WORK PLAN AND SITE RECONNAISSANCE VISIT

A comprehensive work plan was established and executed in the field by qualified survey team. Site reconnaissance survey of the study area was carried out to assess the field conditions and general topography to finalize the survey activities/ plan.

3.4 ESTABLISHMENT OF SURVEY BENCHMARK

Establishment of local control points is very important for carrying out surveying and mapping of the area for any engineering project. New technology Global Navigation Satellite System (GNSS) makes it more efficient and effective to establish a primary control bench mark. Often National Geodetic Survey (NGS) vertical control is not readily available within the project area, Thus the new procedures allow for establishing a vertical height easily, efficiently, and economically using GNSS.

A project control point was selected and vertical data derived from GNSS observation was used / processed through Online Positioning User Service (OPUS) as a primary control bench mark. The values obtained in World Geographic System (WGS) were transferred to local or Universal Transverse Mercator (UTM) Systems. This BM was used as a reference for further establishment of horizontal and vertical control network for the study area.
The coordinates and location of established control points are presented in Table 3.1 and Table 3.2 in WGS-84 and UTM coordinate system, respectively and shown in Figure 3.1.

Table 3.1: List of Control Points Coordinates in World Geographic System-84

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Control Point</th>
<th>Latitude (DMS)</th>
<th>Longitude (DMS)</th>
<th>Elevation (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>P1/ BM 02</td>
<td>24° 49' 28.549&quot; N</td>
<td>67° 5' 11.339&quot; E</td>
<td>9.216</td>
</tr>
<tr>
<td>2</td>
<td>P1/ BM 04</td>
<td>24° 49' 30.523&quot; N</td>
<td>67° 5' 10.432&quot; E</td>
<td>9.012</td>
</tr>
<tr>
<td>3</td>
<td>P1/CP01</td>
<td>24° 49' 35.114&quot; N</td>
<td>67° 5' 12.971&quot; E</td>
<td>11.304</td>
</tr>
<tr>
<td>4</td>
<td>P1/CP02</td>
<td>24° 49' 26.292&quot; N</td>
<td>67° 5' 29.806&quot; E</td>
<td>6.123</td>
</tr>
<tr>
<td>5</td>
<td>P1/CP03</td>
<td>24° 49' 15.604&quot; N</td>
<td>67° 6' 2.461&quot; E</td>
<td>10.620</td>
</tr>
<tr>
<td>6</td>
<td>P1/CP04</td>
<td>24° 48' 52.947&quot; N</td>
<td>67° 6' 43.882&quot; E</td>
<td>5.996</td>
</tr>
<tr>
<td>7</td>
<td>P1/CP05</td>
<td>24° 48' 45.311&quot; N</td>
<td>67° 6' 57.809&quot; E</td>
<td>6.652</td>
</tr>
<tr>
<td>8</td>
<td>P1/CP06</td>
<td>24° 48' 25.770&quot; N</td>
<td>67° 6' 9.382&quot; E</td>
<td>8.787</td>
</tr>
<tr>
<td>9</td>
<td>P4/ BM 01</td>
<td>24° 51' 3.698&quot; N</td>
<td>67° 5' 40.279&quot; E</td>
<td>8.667</td>
</tr>
<tr>
<td>10</td>
<td>P4/CP01</td>
<td>24° 51' 3.351&quot; N</td>
<td>67° 5' 40.158&quot; E</td>
<td>8.818</td>
</tr>
<tr>
<td>11</td>
<td>P4/CP02</td>
<td>24° 50' 0.666&quot; N</td>
<td>67° 5' 33.083&quot; E</td>
<td>12.733</td>
</tr>
</tbody>
</table>

Table 3.2: List of Control Points Coordinates in Universal Transverse Mercator - 42N

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Control Point</th>
<th>Easting (m)</th>
<th>Northing (m)</th>
<th>Elevation (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>P1/ BM 02</td>
<td>306610.908</td>
<td>2746881.995</td>
<td>9.216</td>
</tr>
<tr>
<td>2</td>
<td>P1/ BM 04</td>
<td>306586.277</td>
<td>2746943.095</td>
<td>9.012</td>
</tr>
<tr>
<td>3</td>
<td>P1/CP01</td>
<td>306659.546</td>
<td>2747083.353</td>
<td>11.304</td>
</tr>
<tr>
<td>4</td>
<td>P1/CP02</td>
<td>307128.469</td>
<td>2746805.285</td>
<td>6.123</td>
</tr>
<tr>
<td>5</td>
<td>P1/CP03</td>
<td>308040.860</td>
<td>2746463.647</td>
<td>10.620</td>
</tr>
<tr>
<td>6</td>
<td>P1/CP04</td>
<td>309194.364</td>
<td>2745750.390</td>
<td>5.996</td>
</tr>
<tr>
<td>7</td>
<td>P1/CP05</td>
<td>309582.223</td>
<td>2745510.044</td>
<td>6.652</td>
</tr>
<tr>
<td>8</td>
<td>P1/CP06</td>
<td>308213.902</td>
<td>2744927.617</td>
<td>8.787</td>
</tr>
<tr>
<td>9</td>
<td>P4/ BM 01</td>
<td>307464.455</td>
<td>2749798.205</td>
<td>8.667</td>
</tr>
<tr>
<td>10</td>
<td>P4/CP01</td>
<td>307460.903</td>
<td>2749787.564</td>
<td>8.818</td>
</tr>
<tr>
<td>11</td>
<td>P4/CP02</td>
<td>307235.303</td>
<td>2747861.612</td>
<td>12.733</td>
</tr>
</tbody>
</table>
Figure 3.1: Location Map of Established Survey Bench Marks
3.5 **SELECTION OF CONTROL POINTS LOCATION**

Selection of location for control points (Established Bench Marks) were based on three elements i.e., stability for the soil conditions encountered for each point set, safety of the established point and ample clear view to the sky, which are crucial for GNSS observations. In order to mitigate errors and increase accuracy, the control network was planned and designed to form triangles wherever possible.

3.6 **ESTABLISHMENT OF HORIZONTAL AND VERTICAL CONTROL NETWORKS**

Horizontal and vertical project control survey was established for the project. Whenever feasible, the horizontal and vertical control is based on high-precision GNSS observations. In order to achieve maximum possible accuracy and minimal spatial variations in both horizontal and vertical planes, control network was established by using state of the art "GNSS" equipment encompassing the entire project area. For base line computation, three (3) GNSS instruments were used simultaneously. To receive the signals from satellite, the receiver should have minimum obstructions like building, trees, power lines etc, around it. The signal can be weakening due to unfavorable weather conditions like rainfall, clouds and vehicle noise. The observations have to be repeated till satisfactory readings/data. For all time observations, at least four (4) satellites should be available with Geometric Dilution of Precision/Position Dilution of Precision (GDOP/PDOP) value of less than five (5). The availability of satellites and GDOP value can be known in advance with the help of computer program for given time, date and point of observations. Each instrument is set to work at least 30 minutes for simultaneous observations. Out of three (3) receivers, one acted as reference (for which coordinates of the observing point are known) and the other two (2) as rovers (coordinates to be computed). The observed point coordinates served as reference for further observing points to make a triangle or large polygon. Control Points (CPs) have been engraved at the permanent structures.

The accuracy of the survey control points in static mode is as follows:

- Horizontal .................. ± 3 mm +1 ppm RMS
- Vertical..................... ± 5 mm +1 ppm RMS

3.7 **INSTRUMENTS USED**

The Leica Viva GS 10, GS 15 and Trimble R2, R9 were used to establish the control points. Also, these systems with one base and receivers (rovers) were used to collect the survey data in Real Time Kinematic (RTK) mode.

The base station was placed on the known control point and the rover was used for collecting the survey points. The accuracy of the GNSS equipment in RTK mode is as follows:

- Horizontal .................. ± 10 mm +1 ppm RMS
- Vertical..................... ± 20 mm + 1 ppm RMS
3.8 MEASUREMENT UNITS

The linear measurement units used in survey and mapping work are metric and the angular measurement are in degrees, minutes and second of arc.

3.9 FIELD DATA PROCESSING

The data observed was downloaded to laptop which was available with survey team at the survey site. The data was processed and checked at the site for quality and gaps, if any. The GPS baselines were processed using Leica Geo Office (LGO) and Trimble Business Centre (TBC) software. The default acceptance criteria for baselines were used in LGO & TBC. Any baseline not fulfilling the acceptance criteria was repeated. As the GNSS reading is based upon the WGS-84, the data was converted into UTM Zone 42.

3.10 SOFTWARE USED

All the observed data was processed using LGO, TBC and ArcGIS software, which are widely used for field data processing. AutoCAD and Eagle Point software were used for preparation of the topographic survey layouts from the field survey data.

3.11 DATA PROCESSING AND PRODUCTION OF DRAWINGS

The observed data was digitized using AutoCAD software in the form of points, lines and polygons. The digitization of features was done in different AutoCAD layers. The feature layers have unique style and symbols so that these can be well distinguished from other features. Finally, the layouts were prepared on appropriate scale for further study and analysis. All features like settlements, roads, bunds, etc., have been observed crossing the desired cross-sectional lines.

One cross section get from July & August, 2020 survey is shown in Figure 3.2.

![Profile of Cross Section](image-url)

Figure 3.2: Surveyed Cross-Section from NESPAK Survey in 2020
4. HYDROLOGICAL STUDIES

4.1 GENERAL

Malir River is formed by the confluence of Mol and Khadeji tributaries, the catchment area of which are 611 km$^2$ (235 mile$^2$) and 567 km$^2$ (219 mile$^2$), respectively, whereas total catchment area up to its estuary is 2,314 km$^2$ (893 mile$^2$). After the confluence of Mol and Khadeji, the Malir River traverses through Karachi city about 43 km (27 mile) and outfalls to Arabian Sea. The catchments of Mol and Khadeji are generally mountainous and mostly comprise of barren hills of low to medium height consisting of pale colored limestone containing alluvial deposits, boulders, gravel and sandy clays.

The hydrological studies carried out include the following;

i. Review of previous studies.
ii. Review of available hydro-met data.
iii. Reconnaissance site visit.
iv. Rainfall-runoff analysis to estimate the design flood discharges.

4.2 REVIEW OF PREVIOUS STUDIES


The study was conducted by Hydro Electric Planning Organization (HEPO) of WAPDA with the objective of designing of flood protection works for Karachi against inundations from Malir and Layari rivers. For estimation of rainfall, retention magnitude of 0.1 inches was considered as consistent per hour losses during the storm whereas for the first increment this rate was enhance to 0.3 inch. The 100-year and 1,000-year, 36-hr point rainfall was estimated as 19.3 inch and 24.2 inch, respectively.

The study estimated discharges of Mol and Khadeji tributaries against 100-year and 1,000-year return periods as 235,000 ft$^3$/s (6,655 m$^3$/s) and 322,000 ft$^3$/s (9,118 m$^3$/s) at their confluence points respectively, whereas the 100-year discharge at the river mouth of Malir River was estimated as 409,000 ft$^3$/s (11,580 m$^3$/s) in the same report.

Besides, Probable Maximum Floods (PMFs) were also estimated using phenomenon based Probable Maximum Precipitation (PMP) approach. PMP was estimated by the selection of 19-22 July 1913 storm as most critical storm and its maximization for the moisture maximization factor (1.25). The depth-area-duration relationship of observed 1913 storm is reproduced in Table 4.1.

Table 4.1: Depth-Area-Duration Relationship for Mol & Khadeji Rivers (HEPO-1990)

<table>
<thead>
<tr>
<th>Area (mile$^2$)</th>
<th>6-hr</th>
<th>12-hr</th>
<th>18-hr</th>
<th>24-hr</th>
<th>30-hr</th>
<th>36-hr</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>10.4</td>
<td>14.6</td>
<td>17.50</td>
<td>18.43</td>
<td>19.57</td>
<td>20.45</td>
</tr>
<tr>
<td>50</td>
<td>10.25</td>
<td>14.25</td>
<td>17.10</td>
<td>18.04</td>
<td>19.20</td>
<td>20.10</td>
</tr>
<tr>
<td>100</td>
<td>10.15</td>
<td>14.10</td>
<td>16.90</td>
<td>17.84</td>
<td>18.99</td>
<td>19.80</td>
</tr>
<tr>
<td>150</td>
<td>10.02</td>
<td>13.92</td>
<td>16.72</td>
<td>17.65</td>
<td>18.78</td>
<td>19.60</td>
</tr>
<tr>
<td>200</td>
<td>9.9</td>
<td>13.77</td>
<td>16.55</td>
<td>17.45</td>
<td>18.60</td>
<td>19.40</td>
</tr>
<tr>
<td>216</td>
<td>9.86</td>
<td>13.75</td>
<td>16.51</td>
<td>17.42</td>
<td>18.53</td>
<td>19.35</td>
</tr>
<tr>
<td>235</td>
<td>9.80</td>
<td>13.68</td>
<td>16.44</td>
<td>17.36</td>
<td>18.48</td>
<td>19.27</td>
</tr>
</tbody>
</table>
HEPO (1990) recommended construction of Malir flood protection bunds into two stages i.e., Stage-I, flood protection against 1978, the highest observed flood peak of 220,000 ft$^3$/s (6,230 m$^3$/s) observed by Surface Water Hydrology Project (SWHP) of WAPDA, while for Stage-II, further raising of the flood protection bunds, ultimately for 100-year flood of 409,000 ft$^3$/s (11,580 m$^3$/s).

4.2.2 Survey, Feasibility and Detail Design for Re-Alignment of Bund from North Side of Malir River (NESPAK 2013)

The Consultants carried out hydraulic modeling study for the river for RD 41+000 to RD 55+000; Korangi Causeway also lies in this reach. The model was calibrated for 1978 flood peak and simulated for 100-year flood to estimate the flood levels. The 100-year flood estimated by HEPO-1990 was adopted.

4.2.3 Hydrology & Hydraulic Report, Malir Expressway Project Along Left Bank of Malir River from KPT Interchange near Jam Sadiq Bridge to Super Highway (M9) - 2015

This study conducted by the Local Government of Sindh in 2015 through under Public Private Partnership (PPP) Mode, a consortium of three consultants i.e. M/s. EA Consulting (Pvt) Ltd, M/s. Ernst & Young and M/s. Haidermot BNR & Co. The project are divided in two phases as follows:

- Phase-I: Transaction preparation and approval.
- Phase-II: Transaction Execution.

For the design of drainage structure, peak discharge is required. Peak discharge has been calculated using three formulate based on catchment area sizes (Refer Annexure-A & B of above-mentioned report for Calculations).

Rational formula has been applied for small catchment areas. It is one, which takes into account the particulars of the catchments, such as shape, size, slope, permeability, etc on one hand and particulars of the rainfall such as intensity, duration, distribution on the other hand in calculating the discharge of the flood. Unit Hydrograph (Triangular) method has been used for large catchment area.

Based on the hydrologic studies carried out, following hydrologic parameters were calculated:

**For 50 Years Return Period**

(i) Return period for the estimation of storm water flows 50-Year
(ii) 24-hour rainfall at Karachi for 50-year return period 189.4 mm
(iii) Estimated storm water flow at Outfall of Malir River 153.658 cusec

**For 100 Years Return Period**

(i) Return period for the estimation of storm water flows 100-Year
(ii) 24-hour rainfall at Karachi for 50-year return period 220 mm
(iii) Estimated storm water flow at Outfall of Malir River 179,866 cusec

In addition, this report recommends that proposed alignment is feasible and suggested height of embankment up 6 meters from the bed of Malir River for 50, 100-year return period.

4.3 RECONNAISSANCE VISIT

A reconnaissance site visit was carried out for visualization of existing flood protection works, identification of gauges, type of gauges, and discharge estimation procedure at upstream structures. Further collection of flood marks and interviews of the locals were also conducted for overall flooding situation in the river as well as to the nearby settlements.

There is no gauging of the river downstream of Jam Sadiq Bridge; Provincial Irrigation Department (PID) officials also confirmed non availability of observed stream flow data/gauge at the site. It has been reported by the locals that during the catastrophic flood of 1978, when major inundations up to Korangi area were reported; since then, no major flood has been witnessed in the river. Normally, the flood depth in the river remains about 4-5 feet during wet season. It has further been noted that the river stage has also influence from Arabian Sea tides; daily rise of 2-3 feet can be observed in the evening.

The pictorial view of JS Bridge and a local highlighting the flood marks are shown in Figure 4.1 and Figure 4.2, respectively.

![Figure 4.1: Jam Sadiq Bridge Immediately Upstream of Korangi Causeway](image-url)
4.4 DATA COLLECTION

The observed discharge data of Malir River is available for the eleven years (1976-1986) at Super Highway Bridge. This data is insufficient for the estimation of 100-year flood peak. Therefore, rainfall-runoff modelling approach has been adopted for estimation of floods of various frequencies. Long term daily rainfall time series for Karachi Masroor for the period 1970-2020 was collected from Pakistan Meteorological Department (PMD). Historic rainfall records of 1913 storm (required for verification of HEPO-1990 analysis) were not available with PMD.

Perusal of the data shows that floods in the Malir River are generally generated from the rainfall storms of more than 1-Day. The annual series of 1-Day, 2-Day & 3-Day annual maximum rainfalls are shown in Figure 4.3.
Further, rainfall data corresponding to historic flood events (3-Day) in and around the project area have been collected and are given in Table 4.2. In addition, one day (24 Hours) heaviest rainfall in the Karachi City are also given in Table 4.3.

Observed rainfall depths of 25-27 August, 2020 for Karachi City have also been collected and are given in Table 4.4. Rainfall magnitudes of 3-hourly rainfall data of August 2020 rainstorm is also given in Table 4.5.

Table 4.2: Maximum Rainfall of Extra-Ordinary Storms in the Sindh Province

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Event Date</th>
<th>Rainfall (mm)</th>
<th>Rainfall (inches)</th>
<th>Station</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>18-23 July, 1913</td>
<td>425</td>
<td>16.73</td>
<td>Thatta</td>
</tr>
<tr>
<td>2</td>
<td>24-29 July, 1929</td>
<td>300</td>
<td>11.81</td>
<td>Near Tando Allah Yar</td>
</tr>
<tr>
<td>3</td>
<td>02-04 August, 1944</td>
<td>225</td>
<td>8.86</td>
<td>Karachi A.P.</td>
</tr>
<tr>
<td>4</td>
<td>30th June to 6 July, 1959</td>
<td>250</td>
<td>9.84</td>
<td>Malir</td>
</tr>
<tr>
<td>5</td>
<td>11-12 September, 2012</td>
<td>457</td>
<td>18.00</td>
<td>Jacobabad</td>
</tr>
<tr>
<td>6</td>
<td>25-27 August, 2020</td>
<td>368</td>
<td>14.49</td>
<td>Faisal Base, Karachi</td>
</tr>
</tbody>
</table>

Table 4.3: Heaviest Falls in 24 Hours of Extra-Ordinary Storms in the Karachi City (More Than 100 mm)

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Event Date</th>
<th>Rainfall (mm)</th>
<th>Rainfall (inches)</th>
<th>Sr. No.</th>
<th>Event Date</th>
<th>Rainfall (mm)</th>
<th>Rainfall (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>July 07, 1933</td>
<td>119.9</td>
<td>4.7</td>
<td>1</td>
<td>April 12, 1881</td>
<td>104.4</td>
<td>4.1</td>
</tr>
<tr>
<td>2</td>
<td>August 02, 1944</td>
<td>152.4</td>
<td>6.0</td>
<td>2</td>
<td>June 17, 1902</td>
<td>182.1</td>
<td>7.2</td>
</tr>
<tr>
<td>3</td>
<td>September 06, 1959</td>
<td>111.8</td>
<td>4.4</td>
<td>3</td>
<td>September 06, 1926</td>
<td>206.0</td>
<td>8.1</td>
</tr>
<tr>
<td>4</td>
<td>July 01, 1977</td>
<td>207.0</td>
<td>8.1</td>
<td>4</td>
<td>July 11, 1942</td>
<td>222.50</td>
<td>8.8</td>
</tr>
<tr>
<td>5</td>
<td>August 7, 1979</td>
<td>166.0</td>
<td>6.5</td>
<td>5</td>
<td>August 07, 1953</td>
<td>278.1</td>
<td>10.9</td>
</tr>
</tbody>
</table>
Analysis of the above collected rainfall events show that generally low frequency rains in the area last more than 2-3 days; therefore, analyses of 1-Day, 2-Day and 3-Day rainfall depths have been carried out for estimation of 100-year flood in the Malir River Catchment.
4.5 DATA ANALYSIS

4.5.1 Frequency Analyses

100-year rainfall depths in the catchment have been estimated using frequency analyses of 1-Day, 2-Day & 3-Day annual maximum rainfall data. The frequency analyses have been carried out using Gumbel’s EV Type-I distribution. Plotting positions have been computed by Weibull’s formula (1-Day, 2-Day & 3-Day), are shown in Figures 4.4 to 4.6. The rainfall magnitudes for various return periods are shown in Table 4.6.

4.5.2 Time Distribution of Design Storms

It has been reported that rain event of 2020 was the highest rainfall depth since the recorded history of Karachi city. Therefore, rainfall distribution of 25-27 August 2020 events was analyzed and adopted for the rainfall-runoff modelling. The maximized 3-hr rainfall distributions of the event are shown in Figure 4.7.

![Image of Figure 4.4: Plotting Positions and Fitted Line to 1-Day Annual Maximum Rainfall](image-url)
Rainfall Frequencies of 2-Day Annual Maximum Rainfall Events for Karachi-Masror Rain Gauge Station using Gumbel EV Type-I

\[ y = 68.771x + 90.643 \]
\[ R^2 = 0.9802 \]

Figure 4.5: Plotting Positions and Fitted Line to 2-Day Annual Maximum Rainfall

Rainfall Frequencies of 3-Day Annual Maximum Rainfall Events for Karachi-Masror Rain Gauge Station using Gumbel EV Type-I

\[ y = 75.521x + 78.645 \]
\[ R^2 = 0.9438 \]

Figure 4.6: Plotting Positions and Fitted Line to 3-Day Annual Maximum Rainfall
Table 4.6: Rainfall Magnitudes for Various Return Periods at Karachi Masroor
Values in mm (inches)

<table>
<thead>
<tr>
<th>Return Period (Year)</th>
<th>1-Day</th>
<th>2-Day</th>
<th>3-Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.33</td>
<td>58 (2.3)</td>
<td>81 (3.2)</td>
<td>76 (3.0)</td>
</tr>
<tr>
<td>5</td>
<td>107 (4.2)</td>
<td>127 (5.0)</td>
<td>132 (5.2)</td>
</tr>
<tr>
<td>10</td>
<td>145 (5.7)</td>
<td>168 (6.6)</td>
<td>175 (6.9)</td>
</tr>
<tr>
<td>25</td>
<td>193 (7.6)</td>
<td>218 (8.6)</td>
<td>231 (9.1)</td>
</tr>
<tr>
<td>50</td>
<td>229 (9.0)</td>
<td>254 (10.0)</td>
<td>274 (10.8)</td>
</tr>
<tr>
<td>100</td>
<td>267 (10.5)</td>
<td>290 (11.4)</td>
<td>315 (12.4)</td>
</tr>
</tbody>
</table>

Figure 4.7: Time Distribution of August 25-27, 2020 Event

4.6 ESTIMATION OF PEAK DISCHARGES

4.6.1 Catchment Characteristics

The catchment characteristics of the area such as soil cover, land use, soil type and extents affect the runoff generation potential. These parameters have been investigated using the public domain satellite imageries as well as from the field/catchment visit. The natural slope and the drainage network in the vicinity of the project area have been determined from the topographic maps and Digital Elevation Model (DEM) of Shuttle Radar Topographic Mission (SRTM).
**Soil**

In SCS Curve Number method, soils are classified in four groups called Hydrologic Soil Group A, B, C and D. Group A corresponds to highly permeable soils with low runoff potential while group D corresponds to highly impermeable soils. Group B and C soils are of intermediate properties. It was observed during the site visit that silty clay/clayey silt material exists on the ground strata, whereas upper catchment is mountainous with thin layer of overburdens which makes the catchment in soil group B & C with low to moderate permeability properties.

**Vegetation Cover**

The type of cover also influences the amount of runoff. The cover of lower part of the catchment consists of agriculture fields along the river and urban area whereas upper part is consisting of barren mountains. Therefore, the lower catchment has been placed in to fair hydrologic condition with vegetation cover between 50%-75% and upper part prior to confluence of Mol and Khadeji rivers has been placed in to poor hydrologic condition with vegetation cover less than 50%.

**Degree of Wetness of Watershed**

The degree of wetness of watershed also influences the amount of runoff from a fixed amount of rainfall. The more wet the watershed, higher the runoff. The driest condition of watershed corresponds to Antecedent Moisture Condition-I (AMC-I), intermediate condition as (AMC-II) and the wettest condition as (AMC-III). The combination of a hydrological soil group (soil) and a land treatment class (cover) is a hydrological soil cover complex. The runoff generating potential of this complex is represented by a Curve Number (CN). Based on the above parameters CN is selected for the project area under consideration.

**Selection of Curve Number**

Equivalent hydrologic soil group has been found for every soil and the curve number selected for each soil, keeping in view the future land use of the project area. Vegetation and land use have been determined by the field visit and Landsat 8 data. According to Antecedent Moisture Condition (AMC) selection criteria as discussed above the project area corresponds to Antecedent Moisture Condition (AMC-III). A weighted CN 92 has been estimated for the catchment, keeping in view the land use and soil types for AMC-III.

**Time of Concentration**

Kirpich formula has been used for estimation of time of concentration and time of concentration has been estimated as 23 hours.

\[
T_c = \frac{L^{0.77}}{7700 \times S^{0.385}}
\]

Where,
- \(T_c\) = Time of Concentration (hours)
- \(L\) = Length of the longest stream (feet)
- \(S\) = Average slope of channel from farthest point to point under consideration
4.6.2 Estimation of Peak Discharges

Curve Number Method of U.S. National Resources Soil Conservation Service (USNRC) has been used to convert the rainfall depths to runoff depths. The method takes into account various factors affecting runoff from a given amount of rainfall such as soil, land use, type and density of vegetation and degree of wetness of watershed, represented by Curve Number. A curve number of 92 for AMC-III condition has been selected.

HEC-HMS model has been used for the estimation of peak discharges. The catchment has been divided in to three sub-basins. The Natural Resources Conservation Services (NRCS) unit hydrograph method has been selected as runoff transform method whereas CN method has been selected as rainfall loss method. The schematic layout of HEC-HMS model is shown in Figure 4.8.

**Figure 4.8: Schematic Layout of Malir River in HEC-HMS Model**

**100-Year for 1-Day, 2-Day and 3-Day Rainfall**

The 100-year 1-Day, 2-Day and 3-Day rainfall is given in Table 4.5.100-year 1-Day, 2-Day and 3-Day rainfall hyetographs has been simulated in HEC-HMS model, which has provided a discharge magnitude 226,000 ft³/s, 234,000 ft³/s and 256,000 ft³/s, respectively, at Korangi Causeway location.
**August 25-27, 2020 Event as Design Rainfall**

In this scenario, maximum rainfall among all stations during 25-27 August, 2020 (Table 4.4) at Faisal Base (14.5") has been taken as design rainfall for the Malir Basin. The HEC-HMS has provided a discharge magnitude of 305,000 ft³/s at Korangi Causeway location.

### 4.7 CONCLUSIONS

- The annual instantaneous peak discharge data of Malir River at Super Highway Bridge is available for the period 1976-1986 (11-year), which is insufficient for flood frequency analysis which generally requires minimum 30-years data of recent years.

- Historic rainfall records and corresponding details of 1913 storm (required for verification of HEPO-1990 analysis) were not available with PMD. Further various hydrological parameters required to reproduce HEPO-1990 flood peak were not available in respective report.

- The 100-year 3-Day rainfall depth has been estimated as 315 mm (12.4 inch) at Karachi Masroor rain gauge station using rainfall data for the period 1970-2020, which resulted in flood peak estimates of 256,000 ft³/s (7,250 m³/s).

- The historic highest flood magnitude of 220,000 ft³/s (6,230 m³/s) was observed in 1978 at super highway bridge by Surface Water Hydrology Project of WAPDA.

- Rainfall runoff simulations indicate that a rainstorm similar to August 2020 in the Malir catchment can generate flood peak of as high as 305,000 ft³/s (8,640 m³/s).

### 4.8 RECOMMENDATION

While analysis and selection of design discharge for a new structure along a stream, it is considered necessary to get maximum discharge carrying capacity of existing structures located upstream/ downstream of newly proposed location. This information is required to avoid bottle necks corresponding to design flood magnitude in the stream. The design capacity of existing Jam Sadiq Bridge is 409,000 ft³/s (11,580 m³/s).

Climate change projections of the area indicates higher frequencies as well as higher magnitude of extreme events (rainfall, floods, etc.,). Recent flood events of August 2020 may be considered as the impact of climate change. In view of the uncertainties associated with the rainfall data and likelihood of higher rainfall intensities and magnitude under future climate change scenarios, it is highly recommended that 100-year flood estimate by HEPO-1990 (Table 4.7), as more conservative estimate, may be adopted as design flood for providing flood protection structures in the study reach. The recommended flood magnitude has already been adopted at existing bridge and flood embankments.
<table>
<thead>
<tr>
<th>Return Period</th>
<th>Discharge (ft³/s)</th>
<th>Discharge (m³/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100-Year</td>
<td>409,000</td>
<td>11,580</td>
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<tr>
<td>75-Year</td>
<td>372,000</td>
<td>10,500</td>
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<td>50-Year</td>
<td>240,000</td>
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<td>20-Year</td>
<td>193,000</td>
<td>5,460</td>
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</table>
5. DETAILED ENGINEERING DESIGN

5.1 GENERAL

This chapter of the report presents mathematical model, hydraulic design for the proposed Korangi Bridge and proposed flood protection works including shifting of left Bund near Korangi Causeway. The design discharge of the proposed bridge has been fixed as the 100-year return period discharge, which is a common practice for bridge construction over rivers in Pakistan. The 100-Year discharge has been estimated through hydrological studies and worked out to 409,000 ft³/s (11,580 m³/s), as described in Chapter 4 of this report.

5.2 MATHEMATICAL MODELING USING HEC-RAS

In order to estimate the impact of relocating left flood bund on water surface profile of the river reach under study and to design hydraulic parameters of the proposed bridge, one dimensional computer model HEC-RAS, developed by US Army Corps of Engineers (USACE) has been used. The model takes into account river geometry from input cross sections, flood discharge as upstream boundary condition, and known water surface level at the most d/s section as a downstream boundary condition. Resistance to the flow has been modeled by entering channel roughness (Manning’s Roughness Coefficient). The program computes water level at all cross sections and produces water surface profile for the modeled reach.

5.3 INPUTS FOR MATHEMATICAL MODEL

5.3.1 River Reach

In order to study the impact of relocating the left flood bund and other project components on the existing river infrastructure, the river reach has been thoroughly investigated. JS Bridge and EBM Causeway are two key locations, where the effect of newly proposed bridge has been estimated. A major sewerage nullah discharges into the river from the left bank at a location, where Parco Oil Pipeline crosses the river over pedestals.

The upstream end of the study reach is 1 km beyond EBM causeway, and the d/s end is at the Parco Oil Pipeline; which make the total length about 6.6 km. JS Bridge has been incorporated as an inline structure in the model (Figure 1.1).

5.3.2 River Cross Sections

River reach has been examined in detail using Google Earth Images and Geographical Information tools to find the extent of flood plain and meandering of river. Total 29 cross sections at variable interval have been used to develop the model. The layout plan showing locations of cross sections is shown in Figure 5.1. A survey team was mobilized to gather the information from field. Some areas along the proposed survey lines could not be surveyed due to thick vegetation and marshy lands. In order to maintain computational stability to run the model some additional cross sections have been interpolated in-between the surveyed cross sections using latest computational techniques. The surveyed cross-
sections and the Digital Elevation Model (DEM) of study reach are shown in Figure 5.2. Plot of the survey cross sections are provided in Annexure A.

Figure 5.1: Layout Plan Showing Location of Cross Sections at Various Intervals
5.3.3 Proposed Project Works

Layout of proposed works is as under:

- Proposed Korangi Bridge, about 600 m downstream of JS Bridge, just upstream of Existing Korangi Road Causeway.
- The upstream Right Guide Bank (RGB) and upstream Left Guide Bank (LGB) for the proposed Korangi Bridge have been proposed as the straight continuation of the d/s LGB and d/s RGB for JS Bridge.
- The downstream LGB for the proposed Korangi Bridge has been assumed as the straight continuation of the d/s LGB for JS bridge upto the Parco Oil Pipeline. Due to this layout, the existing left flood bund on the d/s of proposed Korangi Bridge comes
under the shadow of d/s LGB; and the land between the existing left flood bund and the newly proposed LGB may be used for the development purposes (about 105 ha).

- The d/s RGB is proposed as a small straight portion initially, which then curves rightward to meet the existing right flood bank.

Layout of existing and proposed bunds are given in Figure 5.3.
5.3.4 Manning’s Roughness Co-efficient

The value of roughness coefficient ‘n’ depends upon the morphology, bed material, vegetation and manmade interventions in and along the flood plain of the rivers. The factors that affect the ‘n’ value include surface roughness, the size and shape of the grains of the materials forming the wetted parameter, vegetation type and cover, channel alignment and obstructions. The Manning’s roughness coefficient is generally higher for overbanks as compared to main channel.

Keeping in view all the above factors, roughness coefficient of 0.03 for main channel and 0.035 for left and right over banks have been assumed for the upstream reach of the JS Bridge. Similarly, the roughness coefficient of 0.035 for main channel and 0.045 for left and right over banks have been selected for the d/s reach of the JS Bridge. Summary of manning’s “n” for main channel and over banks are given in Table 5.1.

<table>
<thead>
<tr>
<th>Location</th>
<th>Manning’s Roughness Coefficient for Main Channel</th>
<th>Manning’s Roughness Coefficient for Over Banks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upstream Reach of Jam Sadiq Bridge</td>
<td>0.030</td>
<td>0.035</td>
</tr>
<tr>
<td>Downstream Reach of Jam Sadiq Bridge</td>
<td>0.035</td>
<td>0.045</td>
</tr>
</tbody>
</table>

5.3.5 Boundary Condition

The analysis of the study reach has been carried out by inserting known water surface level at the most d/s cross section as boundary condition. The worst-case scenario of the historic highest tide was established by fixing the water surface level of 4.0 m at Parco Oil Pipeline. The value of high tide has been taken from the report “Pakistan Tide Table 2020”.

5.3.6 Freeboard

Freeboard is the vertical clearance above the design flood level. The soffit level of Jam Sadiq Bridge (EL.13.3 m) has a freeboard of more than 2 m (required is 1.8 m); and hence it is safe. For the proposed Korangi Bridge, the design free board has been proposed as 2 m (about 6 ft), as per the guidelines of Federal Flood Commission Report.

5.4 RESULTS OF HEC-RAS MODEL STUDY

5.4.1 Water Surface Profiles

One of the important objectives of the study was to estimate water levels along both banks of the river. Following two scenarios have been analyzed against 100 year’s discharge of 409,000 ft³/s (11,580 m³/s).

- Scenario 1: Water Surface Profile with Existing River Infrastructure.
- Scenario 2: Water Surface Profile with Proposed Project Features (Bridge and Flood & Guide Bunds).
5.4.2 Water Surface Profile with Existing Condition (Without Project)

HEC-RAS model has been simulated with the existing river infrastructure between EBM causeway and Parco Oil Pipeline. JS Bridge has been introduced as an in-line structure, whereas all other features i.e., embankments, levees and ineffective areas etc. have incorporated as per their existing conditions. The d/s boundary condition has been taken as the historic maximum high-tide of 4.0 m. Simulated water surface profiles along both banks of the river are shown Figure 5.4.

**Figure 5.4: Simulated Water Level Profile in Existing Condition for Discharge of 409,000 Cusecs**

Right Bank-Top Profile

The model was simulated for the design flood (409,000 cusec) without project features; simulation results indicate that the right bank has sufficient freeboard for its entire length.

Left Bank-Top Profile

For the design flood without project features, simulation results indicate that the left bank has sufficient freeboard for its entire length.
5.5 WATER SURFACE PROFILES WITH PROPOSED WORKS

Water surface profiles have been simulated by incorporating all existing and proposed interventions/features into HEC-RAS Model. Following structures (Existing/Proposed) have been incorporated in model, which is shown in Figure 5.5:

- Jam Sadiq Bridge;
- Proposed Korangi Bridge;
- Relocated about 3 km long left bund, starting from about 390 m downstream of Jam Sadiq Bridge upto elevated Parco Oil Pipeline;
- About 810 m long u/s and d/s segments of right guide bank for the proposed Korangi Bridge; and
- About 400 m long u/s segment of left guide bank for the proposed Korangi Bridge.

After incorporating all proposed arrangements, model was simulated using steady flow analysis. Simulated water levels along river banks are shown in Figure 5.5, and summary of water elevation profile along with elevation of existing bunds are given in Table 5.2.

![Malir River Water Levels Along with Project Condition](image)

**Figure 5.5: Water Level Profile for Discharge of 409,000 Cusecs with Proposed Works**

Analysis shows that the freeboard of both the existing left and right banks in between existing Jam Sadiq Bridge and Proposed Korangi Bridge is slightly encroached, therefore a little bit raising and strengthening of the existing left and right bunds is required (Figure 5.6). Whereas, the soffit level elevation (EL.13.3 m) of JS Bridge remains safe (2 m higher or 6 ft) against design discharge of 409,000 cusecs (11,580 cumecs).
Figure 5.6: Layout Plan Showing Proposed Arrangements
### Table 5.2: Elevations of Water Surface Profiles and Flood Bunds

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>River Station</th>
<th>Distance from JS Bridge (m)</th>
<th>Min Ch. Elev. (m)</th>
<th>Water Surface Elevation (m) With Project</th>
<th>Existing Top Elevation (m)</th>
<th>Relocated Left Bank Top Elevation (m)</th>
<th>Relocated Right Bank Top Elevation (m)</th>
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</thead>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>With Project</td>
<td>Existing Top Elevation</td>
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<td>4</td>
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</tr>
</tbody>
</table>

LB = LEFT BANK, RB = RIGHT BANK, ELEV. = ELEVATION, MIN. = MINIMUM CH. = CHANNEL

### 5.6 DESIGN OF FLOOD PROTECTION EMBANKMENTS/ BUNDS

Flood bunds are man-made structures and usually earthen bunds are designed to contain the flood waters, so as to provide protection against inundation. Flood bunds provide a considerable reduction in the risk of flooding, but cannot be expected to provide a total protection with zero flood risk. Therefore, flood bunds provide protection with some risk due to many factors; including deferred maintenance, rodents, growth of herbaceous plants, poor quality of compaction and soil type etc. The extent of risk varies with the prevailing site conditions. Considering the areas along both banks and impact of sea tides, design discharge of 100-year return period of 11,590 cumecs (409,000 cusecs) has been adopted for fixing the top level of bund.
5.6.1 Top Width and Side Slope of Bunds

The geometry of the section i.e., the river side and country side slopes, top width etc. are fixed to ensure a stability of section under all flow conditions. Top width of the proposed bund varies from 25 m to 35 m mentioned in the Drawing (Annexure C). Slope of inner side (facing water) is fixed as 3H:1V and for outer side, it is 2H:1V. The proposed typical cross section of the embankment is shown in Figure 5.7.

![Figure 5.7: Proposed Typical Cross Section of Embankment](image)

5.6.2 Design of Stone Protection Works

Stone protection works of the proposed embankment comprise of the following two components:

- Stone Pitching along slope of embankments / bunds.
- Horizontal Launching Apron at the toe of embankments / bunds.

In order to design protection works, it is necessary to calculate the scour depth long proposed guide bund.

5.6.2.1 Determination of Scour Depth

If the provided water way is less than the Lacey’s regime width, the potential scour depth depends on the discharge intensity “q” (discharge per unit width), silt factor “f” (function of $d_{50}$), and scour factor “X” (as per the vulnerability of location).

$$XR = 1.34 \times \left(\frac{q^2}{f}\right)^{1/3}$$ (in metric units)

where:
- $q$ = Design discharge per unit width in m$^3$/sec.
- $f$ = Lacey’s silt factor depending upon bed material.
- $R$ = Scour depth below FSL or HFL in meter.
- $X$ = Scour Factor.

General values of $X$ are as follows:

- In a straight reach 1.5 $R$
- At right angle bend 2.0 $R$
- At nose of Pier 2.0 $R$
When the provided water way is greater than the Lacey's regime width (present case), the potential scour depends on the total discharge, silt factor, and the scour factor.

\[ XR = 0.475 \times \left[ \frac{Q}{f} \right]^{1/3} \] (in metric units)

The value of silt factor “f” has been adopted as 1, which has been taken from the Preliminary Geotechnical Investigations Conducted for the project. However, the Silt factor shall be reviewed/verified based on the value of d50 obtained from confirmatory Geotechnical Investigations conducted at Physical Model/detailed design stage.

The scour level for piers and guide banks have been worked out to 15.0 m and 6.8 m, respectively. The actual scour depth depends on the bed level at the point of interest.

5.6.2.2 Stone Pitching

Side slopes of protection bund have been proposed to be protected against river water action by providing stone pitching. Thickness of pitching is provided against the predominant flow characteristics (i.e., discharge intensity and velocity), which affect the stability of pitching.

The thickness of stone pitching is proposed as 0.8 times the thickness of horizontal apron in launched position; which works out to be 1.0 m (3.3 ft).

5.6.2.3 Size of Stone

Size of the stone depends on the flow velocity, specific gravity, and the type of turbulence. ISBASH curve or its equation is usually adopted for recommending the stone size. The size (dia) of stone size has been worked out as 0.64 m (approx. 2ft) using ISBASH curve and base filter layer under stone pitching on the level and on slope shall comprise of graded spall/ bajri of size 1/8 inch to 2 inches

5.6.2.4 Launching Apron

Launching apron is the horizontal extension of slope pitching on the river bed to guard against undermining and collapse of stone pitching and progressive slipping of the protection bund material into the scour hole, caused at the toe during floods. The launching apron is usually laid in a width of 1.5 times the scour depth below bed.

The scour depth below bed (D) is computed as the difference of potential/factored scour depth and flow depth computed by HEC-RAS (XR-Y). The launching angle is taken as the saturated angle of repose (\( \theta \)), and the length of finally launched apron (along hypotenus) is computed as D/Sin \( \theta \). The volume of stone per foot run is computed as the product of hypotenuse length and the desired thickness “t” (1.2 m = 4 ft). This volume of stone (t* D/Sin \( \theta \)) has been distributed on a length of 1.5 D (15 m) along guide banks, and the thickness of apron in horizontal position “t” is worked out to be \( \frac{t}{1.5 \ Sin \ \theta} \) (1.6 m = 5.25 ft).
5.7 PROPOSED WATERWAY FOR KORANGI BRIDGE

5.7.1 General

Waterway is the actual width from which the flowing water has to pass after the stream has been constricted. Since the width is reduced at the proposed location, therefore the discharge per unit length is increased.

Lacey’s Regime width has been calculated by using the following formula:

\[ W = 2.67 \sqrt{Q} \]  \text{(in FPS)}

Where:
\[ Q = 409,000 \text{ cusec, and} \]
\[ W \text{ computes as 521 m} \]

By adopting 19 spans of 31.25 m clear span and pier width of 1.5 m (similar to JS Bridge), the increased water way computes as 593.8 m and the width between abutments works out at 620.8 m.

5.7.2 Freeboard for The Proposed Bridge

The provision of freeboard depends upon many factors, including the expected amount/quantity of debris, the geometry of the channel and floodplain, the availability of hydrologic data for the reach, etc. As per guide lines of Federal Flood Commission, 6 ft (2 m) free board has been proposed.

5.7.3 Hydraulic Parameters of Proposed Bridge

Hydraulic parameters of proposed bridge extracted taken from HEC-RAS Model are given in Table 5.3.

<table>
<thead>
<tr>
<th>Discharge (cumecs / cusecs)</th>
<th>Total Width (m)</th>
<th>No. of Spans N</th>
<th>Width of Single Span (m)</th>
<th>Flow Velocity (m/s)</th>
<th>Highest Flood Level HFL (m)</th>
<th>Freeboard (m)</th>
<th>Soffit Level (m)</th>
<th>Clear Waterway (m)</th>
</tr>
</thead>
<tbody>
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<td>11,580 / 409,000</td>
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ANNEXURE A
Survey Cross Sections of the Project Area in 2020
URBAN ROAD INITIATIVES IN KARACHI
LOCAL GOVERNMENT & HTP DEPARTMENT

Technical Feasibility Study

SUB-PROJECT 1 – LINK ROAD TO KORANGI

FINAL REPORT
May 2021

National Engineering Services Pakistan (Pvt.) Ltd.
13th Floor, N.I.C. Building, Abbasi Shaheed Road, Off. Shahrah-e-Faisal, Karachi
Phone: (0092 21) 99207277-84
Fax: (0092 21) 35651994
E-mail: nespakkh@khi.wol.net.pk
Web: http://www.nespak.com.pk
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<th>Abbreviation</th>
<th>Full Form</th>
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<tr>
<td>ADB</td>
<td>Asian Development Bank</td>
</tr>
<tr>
<td>AMC</td>
<td>Antecedent Moisture Condition</td>
</tr>
<tr>
<td>CBR</td>
<td>California Bearing Ratio</td>
</tr>
<tr>
<td>CSR</td>
<td>Composite Schedule of Rates</td>
</tr>
<tr>
<td>EIA</td>
<td>Environmental Impact Assessment</td>
</tr>
<tr>
<td>ESAL</td>
<td>Equivalent Standard Axle Load</td>
</tr>
<tr>
<td>FHWA</td>
<td>Federal Highway Administration</td>
</tr>
<tr>
<td>GoS</td>
<td>Government of Sindh</td>
</tr>
<tr>
<td>GCF</td>
<td>Green Climate Fund</td>
</tr>
<tr>
<td>GNSS</td>
<td>Global Navigation Satellite System</td>
</tr>
<tr>
<td>HCM</td>
<td>Highway Capacity Manual</td>
</tr>
<tr>
<td>JICA</td>
<td>Japan International Cooperation Agency</td>
</tr>
<tr>
<td>KCR</td>
<td>Karachi Circular Railway</td>
</tr>
<tr>
<td>KE</td>
<td>Karachi Electric Company</td>
</tr>
<tr>
<td>KMC</td>
<td>Karachi Metropolitan Corporation</td>
</tr>
<tr>
<td>KPT</td>
<td>Karachi Port Trust</td>
</tr>
<tr>
<td>KTIP</td>
<td>Karachi Transportation Improvement Project</td>
</tr>
<tr>
<td>KWSB</td>
<td>Karachi Water &amp; Sewerage Board</td>
</tr>
<tr>
<td>LOS</td>
<td>Level of Service</td>
</tr>
<tr>
<td>NHA</td>
<td>National Highway Authority</td>
</tr>
<tr>
<td>NIP</td>
<td>National Industrial Parks</td>
</tr>
<tr>
<td>NTRC</td>
<td>National Transport Research Center</td>
</tr>
<tr>
<td>PCPHPL</td>
<td>Passenger Cars per hour per lane</td>
</tr>
<tr>
<td>PCU</td>
<td>Passenger Car Unit</td>
</tr>
<tr>
<td>PMD</td>
<td>Pakistan Meteorological Department</td>
</tr>
<tr>
<td>PN</td>
<td>Pakistan Navy</td>
</tr>
<tr>
<td>PPP</td>
<td>Public Private Partnership</td>
</tr>
<tr>
<td>PRL</td>
<td>Pakistan Refinery Ltd.</td>
</tr>
<tr>
<td>PTCL</td>
<td>Pakistan Telecommunication Corporation Ltd.</td>
</tr>
<tr>
<td>RFP</td>
<td>Request for Proposal</td>
</tr>
<tr>
<td>ROW</td>
<td>Right-of-Way</td>
</tr>
<tr>
<td>SRB</td>
<td>Sindh Revenue Board</td>
</tr>
<tr>
<td>SSGC</td>
<td>Sui Southern Gas Company Ltd.</td>
</tr>
<tr>
<td>SST</td>
<td>Sindh Sales Tax</td>
</tr>
<tr>
<td>TOR</td>
<td>Terms of Reference</td>
</tr>
<tr>
<td>UTM</td>
<td>Universal Transverse Mercator</td>
</tr>
<tr>
<td>WGS</td>
<td>World Geographic System</td>
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</table>
1.0 INTRODUCTION

Karachi is the largest city, main seaport and the financial center of Pakistan, as well as the capital of the province of Sindh. According to Karachi Metropolitan Corporation (KMC), the metropolitan area of Karachi is spread over 3,530 sq km and, has an estimated population of over 15 million as per Census 2017. It is one of the world's largest cities in terms of population. It is Pakistan's premier center for banking, industry, economic activity and trade and is home to Pakistan's largest corporations, including those involved in textiles, shipping, automotive, entertainment, the arts, fashion, advertising, publishing, software development and medical research.

The commercial activities generate large volume of traffic within the city. Considerable volume of heavy freight traffic is generated to and from the Karachi Port and industrial areas to the rest of the country.

In 1947, Karachi was populated on an area of 83 sq. km. which has presently expanded to 3,530 sq. km (Karachi Metropolitan Corporation website). Due to the growth in population and the size of the city, the developments led to increase in the number of vehicles on the road network.

The increase in population, industrialization and commercial activities in the city has resulted in rapid increase in all kinds of motorized traffic, and it has become imperative to avert further aggravation of the problems of the residents.

As per Japan International Cooperation Agency (JICA) funded Karachi Transportation Improvement Project (KTIP), 2030, Karachi roughly maintains a 10,000 km road network. This road space combined with poor maintenance, delayed repair work, poor quality construction, and absence of essential support functions creates problems in satisfying the traffic demand. There are many places where large numbers of commuters move at the same time from one location to another, however, the access roads and links offer very few choices and hence there is considerable congestion on the roads specially during the peak hours.

The urban transport needs of a city are cyclic in nature and largely depend on the travel behavior of the citizens. Although the trips made by private and para transit vehicles are increasing, the public transport system (buses / minibuses) caters to over 34% of the modal share in 2018 (Green Climate Fund (GCF) Funding Proposal document by the Asian Development Bank (ADB), 2018), down from 53.5% in 2008 (JICA, KTIP, 2030). Due to reduction in public transport services in
Karachi, the modal share of motorcycles has increased significantly from 16% in 2008 (JICA, KTIP, 2030) to 33% (GCF, ADB, 2018).

To mitigate the traffic congestion problems and provide quick and safe access to the commuters of Karachi, the Government of Sindh (GoS) through its Local Government & HTP Department, has initiated three urban road projects under Public Private Partnership (PPP) mode under the Urban Road Initiatives (URI). These three (03) sub-projects are:

1. **Sub-project 1**: Link Road from Korangi (from KPT Interchange to PAF Airmen Academy),
2. **Sub-project 2**: Expressway from Mauripur Road (end of Lyari Expressway) to Y Junction (Kakapir Road / Mauripur Rd Intersection), and
3. **Sub-project 3**: Interchange at ICI Bridge Intersection.

This report discusses the technical feasibility of **Sub-project 1 (Link Road from Korangi)**.

**1.1 Project Description**

The Local Government & HTP Department, GoS has conceived Link Road for Korangi as replacement to existing causeway on Malir River (Refer Figure 1-1 for project location map). Under the scheme, a bridge is proposed over Malir River as an alternate to the existing causeway and an expressway is proposed along the left bank of Malir River up to PAF Airmen Golf Club with Connection to Korangi Creek Road. The causeway will be abandoned after the construction of new bridge.

Korangi Crossing Road is the main entrance to Korangi Creek and the adjoining residential and industrial areas for the traffic from Qayyumabad, Defence Housing Authority (DHA) and beyond. An Irish causeway across Malir River presently serves the traffic to / from this densely populated built-up area. Several important educational institutions like the College of Business Management (CBM), Ilma University (Formerly Institute of Business Technology), National Textile University and major health care facilities like Indus Hospital, Chiniot General Hospital, LRBT Eye Hospital, Fazle Elahi Hospital for Heart Diseases, etc. are in close vicinity.

The existing road also provides access to Korangi Creek Industrial Park (KCIP), Pakistan Refinery Ltd. (PRL) and other industries located in the vicinity. The fishing village / Jetty of Ibrahim Hyderi is also served by this causeway besides the commercial area, hardware tiles and ceramics shops, and the housing colonies
including Bhitai Colony, Dar us Salam Cooperative Housing Society, Gilgit Colony, PAF Colony and Airmen Golf Club located along this road.

During rainy season, existing causeway gets under water and traffic across the river gets disrupted and is rerouted to other longer routes. In addition to a lot of inconvenience to people of this area and those coming here from other areas, this also causes traffic congestion on the other exits from Korangi and on Main Korangi Industrial Area Road. Patients visiting major health care facilities, especially Indus Hospital, LRBT Eye Hospital, the Fazle Elahi Hospital for Heart Diseases and the Chiniot General Hospital, etc., and the students and staff of the above mentioned well-known educational institutions like the CBM, IBT, are stuck for hours when the causeway is closed due to heavy flow of water in Malir River.

Similarly, access to many factories, mills and industries and the Korangi Creek Industrial Park (KCIP), Pakistan Refinery Ltd. (PRL) also gets blocked, and the industrial activity suffers causing huge loss to the national and local economy. Unnecessary delays and travel cost are incurred by the road users besides disturbance to the industrial activity as their supply line is severely affected.
Figure 1-1: Project Location Map
1.2 Project Objectives

The project will provide direct access to Korangi area throughout the year by replacing the existing Causeway which comes under water during parts of the year. Construction of this new access will reduce travel delays and relieve pressure from the adjacent Jam Sadiq Bridge.

In addition, the nearby Malir Expressway project will have its start point near the existing causeway / KPT interchange (Jam Sadiq Bridge) and it is envisaged that traffic load in this area will further increase as a result of this development making it imperative to undertake the proposed project well in time to meet the increasing travel demand. Proposed Link Road to Korangi and the new bridge on Malir River will be an alternate direct access route serving the residential, industrial, and commercial traffic to / from these areas.

1.3 Scope of Work

The scope of works for technical study of Sub project – 1 works shall cover, but not be limited to following:

- Reconnaissance Survey,
- Data Collection / Coordination with local agencies and stakeholders,
- Alignment Study and Preparation of Inception report,
- Detailed Topographic Survey,
- Traffic Survey,
- Geotechnical Investigation Survey,
- Preliminary Design of Roads, and allied civil works,
- Preliminary Structural designs,
- Preliminary Electrical designs,
- Cost Estimates based on Preliminary Design,
- Technical Feasibility Study Report, and
- Environmental and Social Impact Assessment (separate deliverable).

In addition to the above, Client gave additional work of Hydrology and Hydraulic Study for Shifting of Existing Bund along Left Bank of Malir River at Korangi Causeway.
1.4 Project Deliverables

The contract agreement was signed on October 15, 2020, while the letter of award was issued in June 2020. The project deliverables from the contract signing date and as per the Terms of Reference (TOR), comprise of the following:

Table 1-1: Project Deliverables (from signing of Agreement)

<table>
<thead>
<tr>
<th>Phase</th>
<th>Phase-1: Feasibility</th>
<th>Timeline</th>
<th>Date</th>
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<tr>
<td></td>
<td>Inception Report</td>
<td>One week</td>
<td>22-Oct-20</td>
</tr>
<tr>
<td></td>
<td>Technical Feasibility Study</td>
<td>4 months</td>
<td>12-Feb-21</td>
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<td></td>
<td>Hydrology and Hydraulic Study for Shifting of Existing Bund Along Left Bank of Malir River at Korangi Causeway (Addl. work)</td>
<td>3 months</td>
<td>12-Feb-21</td>
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<tr>
<td></td>
<td>Environment and Social Impact Assessment</td>
<td>5.5 months</td>
<td>29-Mar-21</td>
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<td></td>
<td>Financial Viability Assessment Report</td>
<td>6 months</td>
<td>13-Apr-21</td>
</tr>
<tr>
<td></td>
<td>PPP Options Analysis Report</td>
<td>6 months</td>
<td>13-Apr-21</td>
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<tr>
<td></td>
<td>Legal and Regulatory Assessment Report</td>
<td>8 months</td>
<td>12-Jun-21</td>
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<th>Phase-2: Transaction Advisory</th>
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<tr>
<td></td>
<td>Marketing &amp; Submission of Procurement Package</td>
<td>9 months</td>
<td>12-Jul-21</td>
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<td></td>
<td>Submission of Bid Evaluation Report</td>
<td>11 months</td>
<td>10-Sep-21</td>
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<tr>
<td></td>
<td>Issuance of Letter of Award/Acceptance</td>
<td>12 months</td>
<td>10-Oct-21</td>
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<table>
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<th>Phase-3: Transaction Negotiation and Financial Closure</th>
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<tr>
<td>Financial Close</td>
<td></td>
<td>18 months</td>
<td>08-Apr-22</td>
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1.5 Report Outline

This report outlines the technical feasibility of the proposed project and elaborates on the proposed methodology. It includes information on surveys conducted for the project as well as the current site conditions including utility locations.

- Details of surveys including Reconnaissance Survey, Topographic Survey, and Traffic Survey,
- Geotechnical / soil investigations,
- Identification of Existing Utilities, relocation, and preliminary estimates,
- Stakeholder consultation,
- Project Design including Preliminary Geometric, Pavement & Structural Design for Civil Works and Allied Electrical Works,
- Hydrology and Hydraulic Study for shifting of left bank of Malir River,
- Details about Intersection Improvements,
- Embankment design,
- Electrical systems design,
- Land Acquisition Requirement, and
- Cost estimates based on Preliminary Design.
2.0 SURVEYS

2.1 Reconnaissance Survey

A series of reconnaissance surveys were performed by engineers of various disciplines and planners from NESPAK to obtain information about the existing traffic, road conditions and availability of additional land required for geometric improvement plan within the Project Area. During these surveys, photographs of various existing features, facilities and surroundings were captured. Important locations such as intersections, geometric layout & traffic bottlenecks were observed.

During the site visits, information regarding traffic flow, traffic control, traffic mix and on-street parking was collected. Present pavement conditions & geometrical features were observed. The data collected during reconnaissance, was preserved for the purpose of design in form of sketches drawn at site, written notes, and photographs.

Figures 2-1 thru 2-4 below show some of the reconnaissance survey activities.

![Figure 2-1: Korangi Causeway - Creek Ave Intersection](image1)

![Figure 2-2: Korangi Left Bund Near NIP](image2)

![Figure 2-3: Korangi Causeway Road](image3)

![Figure 2-4: Korangi Road Near CBM](image4)
2.2 Topographic Survey

Topographic surveys required for preliminary design were carried out using modern electronic surveying equipment, and data obtained was processed and recorded in digital form. Based on reconnaissance survey data, available maps / information, and approved concept plans, detailed topographic survey program was prepared.

The linear measurement units used in survey and mapping work are in metric system of units and the angular measurement are in degrees, minutes and second of arc.

Local control points were established prior to actual commencement of surveying and mapping of the project area. The values obtained in World Geographic System (WGS) were transferred to Universal Transverse Mercator (UTM) Systems.

The coordinates & location of established control points are presented in Table 2-1 and Table 2-2 in WGS-84 and UTM coordinate system, respectively.

**Table 2-1: List of Control Points Coordinates in WGS 84**

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Control Point</th>
<th>Latitude (DMS)</th>
<th>Longitude (DMS)</th>
<th>Elevation (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>P1/CP01</td>
<td>24° 49' 35.114&quot; N</td>
<td>67° 5' 12.971&quot; E</td>
<td>11.304</td>
</tr>
<tr>
<td>2</td>
<td>P1/CP02</td>
<td>24° 49' 26.292&quot; N</td>
<td>67° 5' 29.806&quot; E</td>
<td>6.123</td>
</tr>
<tr>
<td>3</td>
<td>P1/CP03</td>
<td>24° 49' 15.604&quot; N</td>
<td>67° 6' 2.461&quot; E</td>
<td>10.620</td>
</tr>
<tr>
<td>4</td>
<td>P1/CP04</td>
<td>24° 48' 52.947&quot; N</td>
<td>67° 6' 43.882&quot; E</td>
<td>5.996</td>
</tr>
<tr>
<td>5</td>
<td>P1/CP05</td>
<td>24° 48' 45.311&quot; N</td>
<td>67° 6' 57.809&quot; E</td>
<td>6.652</td>
</tr>
<tr>
<td>6</td>
<td>P1/CP06</td>
<td>24° 48' 25.770&quot; N</td>
<td>67° 6' 9.382&quot; E</td>
<td>8.787</td>
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### Table 2-2: List of Control Points Coordinates in UTM Zone 42N

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Control Point</th>
<th>Easting (m)</th>
<th>Northing (m)</th>
<th>Elevation (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>MEW.BM-2</td>
<td>306623.414</td>
<td>2747062.963</td>
<td>11.84*</td>
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<tr>
<td>2</td>
<td>P1/CP01</td>
<td>306659.546</td>
<td>2747083.353</td>
<td>11.304</td>
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<tr>
<td>3</td>
<td>P1/CP02</td>
<td>307128.469</td>
<td>2746805.285</td>
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<tr>
<td>4</td>
<td>P1/CP03</td>
<td>308040.860</td>
<td>2746463.647</td>
<td>10.620</td>
</tr>
<tr>
<td>5</td>
<td>P1/CP04</td>
<td>309194.364</td>
<td>2745750.390</td>
<td>5.996</td>
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<td>6</td>
<td>P1/CP05</td>
<td>309582.223</td>
<td>2745510.044</td>
<td>6.652</td>
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<tr>
<td>7</td>
<td>P1/CP06</td>
<td>308213.902</td>
<td>2744927.617</td>
<td>8.787</td>
</tr>
</tbody>
</table>

* Assumed for Project Site.

Topographic survey was drawn on appropriate scales and contour intervals. Planning and Design of this sub project has been carried out considering the following objectives:

- Development of site plans of right-of-way of the roads and service corridor,
- Observe and plot cross-sections of reaches of the roads at strategic locations,
- To establish ground control for road alignment and vertical profile,
- Preparation of survey plans on appropriate horizontal and vertical scales,
- Establishment of permanent benchmarks and reference points at site.
- Identification of all above ground existing services and utilities, located in the right-of-way, and their marking in survey maps / layout.
- approximate outline of water bodies - including drains, nullahs, rivers/streams/ponds etc. along with direction of flow, angle of skew and locations,
- Collect field measurement and digital representation of ground levels at appropriate distances / grids, and
- Mark location, orientation and levels of all existing features and structures.

The Topographic Survey Report is attached as **Annexure-1** to this report.
2.3 Geotechnical Investigations

2.3.1 General

The geotechnical investigations are aimed to examine the surface and subsurface soils at the proposed site for designing of pavements and structures. The objective of the investigation is to identify the core properties of the soil and a realistic basis for recommendation for an appropriate and realistic foundation design which has subsequently been used till construction of works. The study specified an efficient and cost-effective system of foundation for structures and pavement design. Relevant ASTM/AASHTO standards were used for field and laboratory studies.

2.3.2 Planning

The geotechnical investigations were planned through execution of boreholes, test pits, field testing and sampling followed by appropriate laboratory testing. The investigations provided sufficient information about the condition and strength of various sub-strata. The frequency of tests was decided as per the project requirements/survey/review of available data. The laboratory testing was carried out by engaging a specialist Geotechnical Contractor on the basis of competitive bidding.

Confirmatory/ detailed geotechnical Investigations shall be carried out by the concessionaire at detailed design stage, as required.

Figure 2-5 below shows the locations of bore holes and test pits.

The Geotechnical Investigation Report is attached as Annexure-3 to this report.
Figure 2-5: Locations of Boreholes and Tests-Pits
3.0 PROJECT ALIGNMENT

Initially, the Korangi Bridge over Malir River was planned to be constructed along the Korangi causeway, however, bearing in mind the alignment of Jam Sadiq bridge, it was finalized that the Korangi Bridge be constructed parallel to Jam Sadiq Bridge to reduce the length of bridge and would also cause minimum impact on the hydrology of Malir River.

3.1 Alignment Options

Several options were explored regarding the alignment and connection of proposed bridge with the Korangi Road / Korangi Creek Road near Attock Petrol Pump since construction of this bridge will divert traffic from Jam Sadiq Bridge. Furthermore, the PRL refinery is located on Korangi Creek Road due to which all tanker traffic to / from PRL uses Korangi Road for access, resulting in creating congestion and increasing delays along the route.

The existing road network is shown in Figure 4-1 below.
Figure 3-1: Existing Road Network
Following options were considered for finalization of alignment:

3.1.1 **Do-Nothing Option**

The existing causeway comes into the water during monsoon season due to high flood and gets disconnected with the existing road network. The traffic to / from Korangi Road is diverted to exiting Jam Sadiq Bridge which increases traffic congestion on Jam Sadiq bridge. If no measures are taken, the existing causeway will continue to be submerged under water during the raining season, thereby resulting in traffic congestion which will worsen over time as traffic increases due to development activities in the Korangi / Landhi areas.

Korangi Road between Attock Petrol Pump and Landhi Road intersection consists of a narrow ROW (around 22m). Travelers experienced severe delays at the Korangi Road / Landhi Road intersection in the past. To alleviate the congestion, KMC constructed a 2-lane flyover on Korangi Road several years back. The purpose of the existing flyover was to facilitate the straight movement on Korangi Road which will then bypass the at-grade Korangi Road / Landhi Road intersection.

Generally, 2-lane flyovers (single lane in each direction) on main movement in urban areas are not recommended since vehicle breakdown / accident would block the flyover traffic and result in severe congestion. However, this existing flyover has been constructed without providing shoulders, thus rendering it a very short-term solution to the traffic congestion issues.

Furthermore, the most critical part of this flyover arrangement is the start of ramps on either side. ROW is limited with shops located along both sides of Korangi Road. There are hardly 2 lanes of space available for at-grade traffic on Korangi Road. Loading / unloading maneuvers of various shops (tiles, sanitary etc.) further limit the space, thus creating a bottleneck for traffic at the start of ramps.

**Figure 4-2** below shows Korangi Road from Causeway up to PRL Refinery intersection.
Figures 4-3 to 4-6 below show the existing traffic conditions, while Figure 4-7 shows the existing cross-section of Korangi Road near Landhi Road intersection.

Figure 3-2: Korangi Road – Existing Alignment

Figure 3-3: Korangi Road - Towards PRL

Figure 3-4: Korangi Road - Towards PRL

Figure 3-5: Korangi Road - Towards Causeway

Figure 3-6: Narrow 2-lane Flyover
As can be seen in figures above, the ROW near Landhi Road intersection is narrow. The planned construction of Korangi Bridge over Malir River is expected to divert additional traffic from Jam Sadiq Bridge, which will further increase the traffic congestion.

3.1.2 Option-1: Demolition of Existing Flyover on Korangi Road

To mitigate traffic congestion on Korangi Road between Attock Petrol Pump and Landhi Road intersection after the bridge over Malir River is constructed, one option considered was to demolish the existing 2-lane flyover to effectively utilize the existing ROW. This flyover was constructed for the purpose of reducing congestion, hence, demolition of this flyover will not resolve the traffic congestion issues. Instead, the existing Korangi Road / Landhi Road intersection will witness severe congestion, especially during peak hours. In light of the same, demolition of the existing flyover was not considered further.

3.1.3 Option-2: Widening of Korangi Road along with 4-lane Flyover

In order to mitigate traffic congestion on Korangi Road, the existing 2-lane flyover will need to be demolished and a new 4-lane flyover is proposed to be constructed to cater for future traffic growth. In addition, at-grade service lanes / access to / from Landhi Road will also need to be provided to cater for smooth traffic flow, while allowing for loading / unloading of trucks for businesses.

Figure 4-8 below shows the proposed cross-section.
Construction of the 4-lane flyover and widening of at-grade roads will require existing buildings to be demolished as the ROW requirements will be 33.5m. Table 4-1 below lists the various types of buildings / business that would need to be demolished.

Table 3-1: Option–2: Demolition of Existing Structures

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Land-use Type</th>
<th>Approximate Numbers</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Small businesses</td>
<td>141</td>
<td>Marble / Tile, Mattress, Overhead tank shops, Mechanics, Medical Stores, and food shops</td>
</tr>
<tr>
<td>2</td>
<td>College</td>
<td>1</td>
<td>SSAT Degree College</td>
</tr>
<tr>
<td>3</td>
<td>Masjid</td>
<td>2</td>
<td>Masjid-e-Bilal and Bhittai Masjid</td>
</tr>
<tr>
<td>4</td>
<td>Multi-story Building (Commercial + Residential)</td>
<td>1</td>
<td>Ajwa Super Store tower (10 stories)</td>
</tr>
<tr>
<td>5</td>
<td>Boundary Wall</td>
<td>2</td>
<td>SSAT Degree College and Indus Hospital</td>
</tr>
<tr>
<td>6</td>
<td>Banks</td>
<td>3</td>
<td>Zarai Bank, UBL and HBL</td>
</tr>
</tbody>
</table>

As can be seen from Table 3-1 above, construction of Option-2 will result in massive demolition of business centers / commercial areas including high-rise towers, mosques, banks, college, and the boundary wall of Indus hospital. In light of the same, construction of Option – 2 was not considered further.
3.1.4 Option-3: Alternate Access to Korangi Road / Korangi Creek Road

To mitigate traffic congestion on Korangi Road while accounting for future traffic growth, it was considered to provide an alternate access to Korangi Road since the only available alternate access is on 8000 Road. 8000 Road is already congested with heavy truck / trailer movements due to Korangi and Landhi Industrial areas, which limits the use of this road for onward journey.

Since the causeway is proposed to be converted into a bridge (6-lane to accommodate for future traffic growth), it was planned to construct an alternate road along the left bank of Malir River, which will terminate at the PRL Road intersection with Korangi Creek Road. This arrangement will provide for a high-speed, limited access road for travelers and avoid the congested segment of Korangi Road from Attock Petrol Pump to Landhi Road intersection.

The proposed Link Road to Airmen Golf Club and PRL Road starts at end of proposed Korangi bridge and runs parallel to the left bank of Malir River. A roundabout has been proposed at Creek Avenue/ Korangi bridge to provide uninterrupted traffic flow to / from Creek Avenue, proposed Malir expressway and Korangi bridge. Since Korangi Road is often congested, Link Road to Korangi Creek will serve as an alternate route for traffic coming to and going from, National Industrial Park (NIP), proposed sewerage treatment plant of Karachi Water & Sewerage Board (KWSB), Airmen Golf Club, Airmen Academy, PRL, and other destinations along Korangi Road.

3.2 Finalized Alignment Option

After detail discussion with the Client, the consultants adopted Option-3 with slight modifications for the alignment of the project. The start point of the project has been finalized in such a way an interchange with Creek Avenue has been proposed, which will connect traffic from DHA to the proposed Malir expressway. In order to accommodate this interchange, part of existing Creek Ave. was realigned, which was only proposed after the results of the hydraulic study.

Initially, the alignment was proposed on the existing left bank of Malir River. The Client asked the consultants to study the realignment of existing left bank of Malir River to ensure high-speed access to PRL Road and PAF Airmen Academy, which will also provide additional land to GoS for future development schemes. The Consultants only proposed this alignment after evaluating the results of the Hydrology and Hydraulic Study of Shifting of Left Bank of Malir River. The consultants have reviewed only the technical aspects of this shifting of Left Bank of Malir River as per their scope of work. Accordingly, the left bank of Malir River
has been realigned after approval of realignment of left bank of Malir River from the Client, and the road was designed on realigned bank. This option will also avoid resettlement as the land between the existing and proposed bank is vacant.

An interchange has also been proposed between Korangi Bridge and Link Road to Korangi Creek Road for uninterrupted flow of traffic. A link road to Korangi Road via road accessing PRL is proposed to provide alternate access to traffic to / from Korangi Creek. The existing road will be widened from the already existing 2 lane road to a 4 lane road.

A spur has also been proposed from the Link Road which will connect Brookes Chowrangi via 10000 Road / Shah Muhammad Road to access Korangi bridge and Link Road to Korangi Creek. Additionally, Road-3, also known as Shah Muhammad Road, will be connected to the proposed bridge thereby providing connectivity to Brookes Chowrangi and beyond.

**Figure 4-9** below shows the finalized alignment for the project.
Figure 3-9: Finalized Route Alignment
4.0 PROJECT DESIGN

4.1 Design Criteria

A brief Design Criteria Report has been developed for sub-project 1 (Link Road to Korangi). Design Criteria provides information related to design basis, which has been adopted / formulated by different engineering design specialties, to finalize technical data, design assumptions, codes of practice, methods and procedures for Sub-Project 1.

Design Criteria Report is attached as Annexure –4.

4.2 Hydrology and Hydraulic Study

Hydrology is the study of the distribution and movement of water both on and below the Earth’s surface, as well as the impact of human activity on water availability and conditions. A detailed hydrology and hydraulic study was carried out for the proposed bridge and realignment of left bank of Malir river before finalization of design.

Jam Sadiq Bridge (JS Bridge) is the only bridge connecting both banks of the Malir River in the vicinity of Korangi Industrial Area. The bridge observes heavy traffic jams during flood season as both causeways (English Biscuit Manufacturers & Korangi) upstream and downstream of Jam Sadiq Bridge submerge due to high flood depths in Malir River. For the proposed bridge, reduced waterway / length of bridge, almost similar to JS Bridge, has been adopted. The proposed bridge will run parallel to the existing JS Bridge as it traverses the shortest route to connect both banks of the river. Existing left bund downstream of JS Bridge will be extended up to the newly proposed bridge. Thereafter, the left bund will be realigned through the flood plain area up to the existing PARCO Elevated Oil Pipeline.

To ensure safety of the built-up areas along both banks of river, it is essential to study the impact of proposed project components (Korangi Bridge, u/s and d/s guide banks, and realignment of left flood protection bund) on the existing infrastructure (JS Bridge and riverbanks) with in the study reach. Objectives of the study are outlined as follows:

- Determine the hydraulic parameters of proposed bridge downstream of JS Bridge,
- Determine backwater effect at Jam Sadiq Bridge,
- Estimate increase in water level for the reach between English Biscuit Manufacturers (EBM) Causeway and PARCO Elevated Oil Pipeline,
 Design of relocated left flood protection bund and propose guide banks of bridge, and
 With relocation of the existing left bund part of flood plain on left bank of the Malir River can be reclaimed.

The conclusions of the study are as below:
 The annual instantaneous peak discharge data of Malir River at Super Highway Bridge is available for the period 1976-1986 (11-year), which is insufficient for flood frequency analysis which generally requires minimum 30-years data of recent years.
 Historic rainfall records and corresponding details of 1913 storm (required for verification of HEPO-1990 analysis) were not available with PMD. Further various hydrological parameters required to reproduce HEPO-1990 flood peak were not available in respective report.
 The 100-year 3-Day rainfall depth has been estimated as 315 mm (12.4 inch) at Karachi Masroor rain gauge station using rainfall data for the period 1970-2020, which resulted in flood peak estimates of 256,000 ft³/s (7,250 m³/s).
 The historic highest flood magnitude of 220,000 ft³/s (6,230 m³/s) was observed in 1978 at Super Highway bridge by Surface Water Hydrology Project of WAPDA.
 Rainfall runoff simulations indicate that a rainstorm similar to August 2020 in the Malir catchment can generate flood peak of as high as 305,000 ft³/s (8,640 m³/s).

When analyzing and selecting design discharge for a new structure along a stream, it is considered necessary to get maximum discharge carrying capacity of existing structures located upstream/ downstream of newly proposed location. This information is required to avoid bottlenecks corresponding to design flood magnitude in the stream. The design capacity of existing Jam Sadiq Bridge is 409,000 ft³/s (11,580 m³/s).

Climate change projections of the area indicates higher frequencies as well as higher magnitude of extreme events (rainfall, floods, etc.,). Recent flood events of August 2020 may be considered as the impact of climate change. In view of the uncertainties associated with the rainfall data and likelihood of higher rainfall intensities and magnitude under future climate change scenarios, it is highly
recommended that 100-year flood estimate by HEPO-1990, as more conservative estimate, may be adopted as design flood for providing flood protection structures in the study reach. The recommended flood magnitude has already been adopted at existing bridge and flood embankments.

The detailed report is submitted separately under the title “Hydrology and Hydraulic Study Report for Realignment of Existing Left Bank of Malir River at Korangi Causeway”.

4.3 Geometric Design

Geometric design involves the elaboration of those roadway features having to do with the road geometry: lane width, shoulder width, horizontal and vertical curvature, fore-slopes and back-slopes, and various ancillary characteristics.

Guided by the applicable geometric standards and as defined in the Request for Proposal (RFP), the project was designed following generally accepted engineering practices. Preliminary alignment and earthwork calculations were made based on initial surveys using latest equipment. Once complete topographic surveys were carried out, the information was processed electronically.

In geometric design, the standards were formulated based on traffic mix, design speed and road classification. The proposed design was based on the concept of easy maneuverability ensuring minimum conflicts and maximum road safety for passengers. Road aesthetics were also part of the criteria.

The pavement composition was kept according to the load of each road category and was designed keeping in view the strength of sub-grade and other geotechnical investigations. The period for construction phase was kept in view to allow for movement of construction vehicles.

The design was prepared showing the following:

- Optimization to determine most economic design,
- Type of pavement and foundation design,
- Width of carriageway, footpaths, services etc.,
- Type of material proposed, and
- Study the location, gradients and other details of the structure including the feasibility from construction point of view, diversion of traffic etc.

Based on the design criteria, the horizontal alignments were fixed to suit the topography, and plans were prepared showing the details of road centerline
geometry, the super elevations at curves, setting out data for the centerlines both for its straight and curvilinear segments. The vertical profile was designed to cater for the elevations at structures and the pavement design requirements of various road structural layers. The profile was plotted on 1:1000 scale (Horizontal) and 1:100 scale (Vertical) on the same sheets as for the plans.

Salient features of the geometric design are shown in Table 4-1 below:

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Salient Features</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bridge approximately 0.9 km length over Malir River (between Korangi Causeway and Jam Sadiq Bridge)</td>
<td>3 + 3</td>
</tr>
<tr>
<td>2</td>
<td>Flyover over Korangi Bridge</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>New Construction of road over Left Bank of Korangi river to connect Korangi Road (approximately 1.5 km)</td>
<td>2 + 2</td>
</tr>
<tr>
<td>4</td>
<td>3 lane interchange / loop ramps at Korangi Bridge / Link Road to Korangi Creek</td>
<td>2 + 2</td>
</tr>
<tr>
<td>5</td>
<td>Coastal/River Road with shoulders on either side including revetement and earthwork (approximately 5.9 km)</td>
<td>2 + 2</td>
</tr>
<tr>
<td>6</td>
<td>PRL road to connect Link Korangi to Korangi Creek of approximately 1.0 km length</td>
<td>2 + 2</td>
</tr>
<tr>
<td>7</td>
<td>Rehabilitation / Widening of Existing PRL road of approximately 1.6 km)</td>
<td>5m on each side</td>
</tr>
<tr>
<td>9</td>
<td>Roundabout at Creek Avenue to link with Malir Expressway</td>
<td>3</td>
</tr>
</tbody>
</table>

### 4.4 Pavement Design

The design period for major roads is usually taken as 10 and 20 years, primarily due to the reason that traffic / passenger projections beyond that horizon are very unreliable and un-realistic and it is also economically not feasible to invest a whole sum in a project which may not have effective longer useful life span. In fact, from an economic standpoint, for roads, for which passenger traffic is expected to increase slowly at first, best engineering practice is to propose a geometric feature adequate for the projected 20-year traffic. However, pavement design should better be analyzed for 20 years. Hence by extending the traffic analysis period to 20 years was more to benchmark against international practice as a check.

Pavement design was governed primarily by the following factors:
 Design period in years, for which the pavement should provide acceptable service, with adequate maintenance,

 Number of repetitions of vehicle wheel loads during the design period, measured as Equivalent Standard Axle Loads (ESAL),

 Support value of the material over which the pavement structure will be constructed, commonly defined by California Bearing Ratio (CBR), and

 CBR value of each component layer of the pavement structure.

Testing and surveys conducted and presented in Geotechnical report recommends using on-site material for design of subgrade and road embankment with minimum soaked CBR value as 30% at 95% modified AASHTO maximum dry density. However, if on-site material is not available in required quantity, then suitable borrow areas near the project site needs to be explored prior to start of construction. The borrow areas must contain A-4 or better material as per AASHTO soil classification with minimum soaked CBR value as 7% and 5% for subgrade and road embankment, respectively. Reasonable CBR value of 10% is considered for the pavement analysis.

### 4.4.1 Equivalent Axle Loads

Equivalent standard axle loads (ESAL) were computed using the equivalence load factors. The pavement design analysis was carried out for 20 years design period.

### 4.4.2 Structural Design

Sub-project mainly includes a new bridge proposed to be constructed over Malir river and several roads. The flyover has been planned in a way so as not to disturb the intersection space and that the pier / piles are located in such a manner that the piling works will not create any hindrance to the existing nullah flowing under the interchange. Furthermore, the radius at this location does not allow pre-cast pre-stressed girders to be placed. Hence, a four (4) span continuous box girder of around 57m span each has been designed at this location.

At one end of the flyover the bridge ends at abutment followed by a retaining wall. The piers of the proposed bridge have been planned in a way to maintain the clearance. For rest of the length of bridge, pre-cast I-girders have been planned for fast-track construction. Seismic analysis has been carried out as per code
requirements (AASHTO). Abutment is provided keeping the height that will allow maintenance work to be carried out underneath the bridge.

Typical cross sections are attached as Annexure – 5 to this report.
5.0 STAKEHOLDER CONSULTATION

5.1 Coordination with Various Stakeholders

Several meetings were held with various stakeholders including Local Government Depart (LGD, Public Private Partnership (PPP) Unit, Karachi Port Trust (KPT), National Highway Authority (NHA), and Karachi Metropolitan Corporation (KMC), to finalize the project alignment and to determine impacts on existing services. Various alternatives developed for the project were shared with the participants to obtain their feedback. The finalized option was selected after careful deliberation with the various stakeholders, sensitivity of the area, and availability of ROW.

For the Environmental Impact Assessment (EIA) and Social Assessment Report, to get opinion of different stakeholders and to discuss anticipated social issues of the proposed Project, consultations were held with LGD, PPP Unit, NGOs, Traffic Police Karachi, Road users and local community as well. Their views and suggestions were recorded and incorporated in the EIA document. Overall, all the stakeholders appreciated the project. Detailed discussion on the same is presented in the EIA report (separate document).

Figures 5-1 to 5-4 below show some of the stakeholder consultations for the project.

Figure 5-1: Consultation with Irrigation Department

Figure 5-2: Consultation with Conservator of Forest Mangrove
5.2 Coordination with Utility Agencies

Requisite surveys were conducted after taking permission from relevant authorities and preliminary design drawings were prepared based on the collected data and project requirements. These preliminary drawings were sent to various government agencies including National Telecommunication Company LTD. (NTC), Sui Southern Gas Company Ltd. (SSGC), K-Electric Company Ltd., Karachi Water & Sewerage Board (KW&SB), Pakistan Telecommunication Corporation Ltd. (PTCL), National Refinery Limited (NRL), Pakistan Refinery Limited (PRL) and Pak-Arab Refinery Company Limited (PARCO).

Information received from various agencies was incorporated in the design drawings. The cost for the utility relocation as received from various utilities agencies is Rs. 223,658,284/-, whereas utilities identified by the various utility companies are marked on the preliminary drawings.
6.0 LAND ACQUISITION REQUIREMENTS

The land acquisition plan has been prepared along with the preliminary design based on the data provided by the Board of revenue (BoR) / City Survey Superintendent.

The area required for land acquisition for the project is shown in **Figure 6-1** while **Figures 6-2 to 6-5** below show each land acquisition requirement separately.

![Figure 6-1: Land Acquisition Information along the Project Alignment](image)

**Figure 6-1: Land Acquisition Information along the Project Alignment**
Figure 6-2: Approx. Area Requirement near Project Start (Korangi Road / Creek Ave)

Figure 6-3: Approx. Area Requirement near Road-3 (10000 Road)
Figure 6-4: Approx. Area Requirement near Road-3 (near NIP)

Figure 6-5: Approx. Area Requirement near Road-3 / PRL Road Intersection
7.0 CONCLUSION

Korangi Causeway is an important link to/from Korangi with the rest of the city. Major population centers (Korangi/Landhi) as well as commercial and industrial establishments are located in Korangi/Landhi. At present, Jam Sadiq bridge on 8000 Road is the major entry/exit point to Korangi/Landhi along with the causeway on Malir River. Construction of a bridge in place of existing causeway has been planned since long, which will not only relieve congestion on Jam Sadiq bridge, but also provide quicker and safer access to many localities in Korangi/Landhi areas.

The proposed project will also provide connectivity to the proposed Malir Expressway, which will be beneficial for the people traveling from Korangi and DHA to Super Highway and beyond.

This project is primarily conceived (i) To provide route that remains operational throughout the year for traffic coming to and going from Korangi Causeway (ii) provide linked roads for traffic generating from the area benefitting around 2.5 million people living in adjoining areas (ii) to provide uninterrupted flow of traffic.

Construction of this bridge along with improvement in the existing road network will contribute to the increase of economic activity and result in considerable time savings for the people of these areas.
The methodology covers details of locations of survey control network, instruments used, measurement details, position fixation and coordinates and layout of the above defined scope of works. The scope of the project is already discussed in section of the report.

1. LOCATION & EXTENTS OF THE PROJECT SITE

The project area for which survey has been carried out includes Korangi Area, Bhittai Colony etc. allied structures. The Bathymetry survey data within the project area has also been collected for the study.

The location map of the subject project is shown in Figure-1.

2. SCOPE OF SURVEY WORK

Survey is required to obtain basic information regarding topography, terrain, drainage pattern, profile etc. of the project area. The survey detail is inclusive of, but not limited to the elements listed below;

- Site Reconnaissance visit of the project area.
- Establishment of survey Bench Marks (BM) in the project area.
- Topographic survey of entire project area.
- Inventory of existing structures.
- Processing of the observed data.
- Preparation of topographic survey map and related report of project area.

The above-mentioned scope of the work has been completed by using the following methodology;

3. WORK PLAN AND SITE RECONNAISSANCE VISIT

A comprehensive work plan has been established and implemented in the field by qualified survey team during execution of survey works. Site reconnaissance survey of the project area has been carried out to assess the field conditions and general topography to finalize the survey activities/implementation plan.

4. ESTABLISHMENT OF SURVEY BENCH MARK (BM) (ADD PHOTOGRAPHS OF BENCH MARKS FOR REFERENCE)

Establishment of local control points is an essential activity which is to be carried out prior to actual commencement of surveying and mapping of the project area. New technology Global Navigation Satellite System (GNSS) makes it more efficient and effective to establish a primary control bench mark. Often National Geodetic Survey (NGS) vertical control is not readily available within the project area, thus the new procedures allow for establishing a vertical height easily, efficiently, and economically using GNSS.
Next activity is selection of a project control point and utilization of vertical data derived from GNSS observation processed through Online Positioning User Service (OPUS) as our primary control benchmark. The values obtained in World Geographic System (WGS) can easily be transferred to local or Universal Transverse Mercator (UTM) Systems. This Bench Mark has been used as a reference point for further establishment of horizontal and vertical control network, within the project area, to carry out the topographical and cross-sectional survey work.

The coordinates & location of established control points are presented in Table-1 and Table-2 in WGS-84 and UTM coordinate system respectively and shown in Figure-2.

5. **SELECTION OF CONTROL POINTS LOCATION**

Quality is a characteristic of comparable things that allows us to decide that one thing is better than another. In the context of geographic data, the ultimate standard of quality is the degree to which a data set is fit for its effective use.

Selection of location for control points (Established Bench Marks) were based on three elements i.e. stability for the soil conditions encountered for each point set, safety of the established point and ample clear view to the sky, which are crucial for GNSS observations. In order to mitigate errors and to increase accuracy, the control network was planned and designed to form triangles wherever possible.

6. **ESTABLISHMENT OF HORIZONTAL AND VERTICAL CONTROL NETWORKS**

Horizontal and vertical project control survey has been established for the project. Whenever feasible, the horizontal and vertical control is based on high-precision GNSS observations.

In order to achieve maximum possible accuracy and minimal spatial variations in both horizontal and vertical planes, control network was established by using state of the art “GNSS’ equipment encompassing the entire project area. For base line computation, three (3) GNSS instruments have been used simultaneously. To receive the signals from satellite, the receiver should have minimum obstructions like building, trees, power lines etc, around it. In case of weakening of signals due to unfavourable weather conditions like rainfall, clouds and vehicle noise, the observations have repeatedly been noted till obtaining satisfactory readings/data. For all time observations, at least four (4) satellites should be available with Geometric Dilution of Precision/Position Dilution of Precision (GDOP/PDOP) value of less than five (5). The availability of satellites and GDOP value can be known in advance with the help of computer program for given time, date and point of observations. Each instrument is set to work at least 30 minutes for simultaneous observations. Out of three (3) receivers, one acted as reference (for which coordinates of the observing point are known) and the other two (2) as rovers (coordinates to be computed). The observed point coordinates served as reference for further observing points to make a triangle or large polygon. CPs has been engraved at the permanent structures.
Figure 1: Location Map of Project Area
### Table-1 : List of Control Points Coordinates in World Geographic System (WGS) 84

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Control Point</th>
<th>Latitude (DMS)</th>
<th>Longitude (DMS)</th>
<th>Elevation (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>P1/CP01</td>
<td>24° 49' 35.114&quot; N</td>
<td>67° 5' 12.971&quot; E</td>
<td>11.304</td>
</tr>
<tr>
<td>2</td>
<td>P1/CP02</td>
<td>24° 49' 26.292&quot; N</td>
<td>67° 5' 29.806&quot; E</td>
<td>6.123</td>
</tr>
<tr>
<td>3</td>
<td>P1/CP03</td>
<td>24° 49' 15.604&quot; N</td>
<td>67° 6' 2.461&quot; E</td>
<td>10.620</td>
</tr>
<tr>
<td>4</td>
<td>P1/CP04</td>
<td>24° 48' 52.947&quot; N</td>
<td>67° 6' 43.882&quot; E</td>
<td>5.996</td>
</tr>
<tr>
<td>5</td>
<td>P1/CP05</td>
<td>24° 48' 45.311&quot; N</td>
<td>67° 6' 57.809&quot; E</td>
<td>6.652</td>
</tr>
<tr>
<td>6</td>
<td>P1/CP06</td>
<td>24° 48' 25.770&quot; N</td>
<td>67° 6' 9.382&quot; E</td>
<td>8.787</td>
</tr>
</tbody>
</table>

### Table-2 : List of Control Points Coordinates in Universal Transverse Mercator (UTM) Zone 42N

<table>
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The accuracy of the survey control points in static mode is as follows:

Horizontal .................. ± 3 mm +1 ppm RMS  
Vertical .......................... ± 5 mm +1 ppm RMS

7. INSTRUMENTS USED
Leica Viva GS 10, GS 15 and Trimble R2, R9 were used to establish the control points. Also, these systems with one base and receivers (rovers) were used to collect the survey data in RTK mode.

The topographic survey has been carried out by using the GNSS in Real Time Kinematic (RTK) mode. The base station was placed on the known control point and the rover has been used for collecting the survey points. The accuracy of the GNSS equipment in RTK mode is as follows:

Horizontal .................. ± 10 mm +1 ppm RMS  
Vertical .......................... ± 20 mm + 1 ppm RMS

8. MEASUREMENT UNITS
The linear measurement units used in survey and mapping work are in metric system of units and the angular measurement are in degrees, minutes and second of arc.

9. FIELD DATA PROCESSING
The data observed was downloaded to laptop which always remain available with survey team at the survey site. The data has been processed and checked at the site for quality and gaps, if any. The GPS baselines were processed using Leica Geo Office (LGO) and Trimble Business Centre (TBC) software. The default acceptance criteria for baselines were used in LGO & TBC. Any baseline not fulfilling the acceptance criteria has been repeated. As the GNSS reading is based upon the WGS-84, the data was converted into UTM Zone 42.

10. SOFTWARE USED
All the observed data has been processed using LGO, TBC and ArcGIS software which are widely used for field data processing. AutoCAD and Eagle Point software have been used for preparation of the topographic survey layouts using the field survey data.

11. DATA POST PROCESSING AND PRODUCTION OF DRAWINGS
The observed data was digitized using AutoCAD software in the form of points, lines and polygons. The digitization of features has been done in different AutoCAD layers. The feature layers have unique style and symbols so that these can be well distinguished from other features.
Figure-2: Location Map of Established Survey Bench Marks
ANNEXURE - 3
Feasibility Study and Transaction Advisory Services, 'Urban Road Initiatives in Karachi'

Sub Project 1: Link Road for Korangi

Geotechnical Investigation Report

December 2020

National Engineering Services Pakistan (Pvt.) Ltd.
13th Floor, N.I.C. Building, Abbasi Shaheed Road, Off. Shahrah-e-Faisal, Karachi
Phone: (092 21) 99207277-84
Fax: (092 21) 35861984
E-mail: nespakkh@khi.wol.net.pk
Web: http://www.nespak.com.pk

Clearance Code P-38035/024/D/34(20) Doc No. P-38035/050/P/1/GT/03 Rev No. 00
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**Geotechnical Investigation Report**

P-38035/050/P1/GT/03

NESPak

Karachi
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<tr>
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<td>AASHTO</td>
<td>American Association of State Highway and Transportation Officials</td>
</tr>
<tr>
<td>ACI</td>
<td>American Concrete Institute</td>
</tr>
<tr>
<td>ASTM</td>
<td>American Society for Testing and Materials</td>
</tr>
<tr>
<td>BA</td>
<td>Borrow Area</td>
</tr>
<tr>
<td>BH</td>
<td>Borehole</td>
</tr>
<tr>
<td>BS</td>
<td>British Standard</td>
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<tr>
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<td>California Bearing Ratio</td>
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<td>Liquid Limit</td>
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<td>LS</td>
<td>Lalji Syncline</td>
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<tr>
<td>MBT</td>
<td>Main Boundary Thrust</td>
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<tr>
<td>MDD</td>
<td>Maximum Dry Density</td>
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<tr>
<td>m.y.</td>
<td>Million Year</td>
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<td>NAVFAC</td>
<td>Naval Facilities Engineering Command</td>
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<td>NESPAK</td>
<td>National Engineering Services Pakistan (Pvt.) Ltd</td>
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<tr>
<td>NMC</td>
<td>Natural Moisture Content</td>
</tr>
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<td>NSL</td>
<td>Natural Surface Level</td>
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<tr>
<td>OMC</td>
<td>Optimum Moisture Content</td>
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<td>SRC</td>
<td>Sulphate Resistant Cement</td>
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</tr>
<tr>
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</tr>
<tr>
<td>PPP</td>
<td>Public Private Partnership</td>
</tr>
<tr>
<td>PMA</td>
<td>Pir Mangho Anticline</td>
</tr>
<tr>
<td>PMF</td>
<td>Pir Mangho Fault</td>
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<td>SPT</td>
<td>Standard Penetration Test</td>
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<td>Undisturbed Soil Sample</td>
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<td>Unified Soil Classification System</td>
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EXECUTIVE SUMMARY

Local Government & HTP Department, Govt. of Sindh intends to conduct Feasibility Study and Transaction Advisory Services for three urban road projects that will be initiated under Public Private Partnership (PPP) mode. The project consists of following parts:

Sub Project – 1: Link Road for Korangi (from KPT Interchange to PAF Airmen Academy)
Sub Project – 2: Expressway from Mauripur Road (End of Lyari Expressway) to Y Junction (Kakapir Rd / Mauripur Rd Intersection)
Sub Project – 3: Interchange at ICI Bridge Intersection

National Engineering Services Pakistan (Pvt.) Ltd. (NESPAK) has been appointed as a Consultant by the Client for conducting Feasibility Study and Transaction Advisory Services for the subject project. This report deals with geotechnical studies and necessary geotechnical recommendations for Sub Project – 1: Link Road from Korangi (from KPT Interchange to PAF Airmen Academy).

The task of geotechnical investigations was awarded to M/s Soil Testing Services (STS), Karachi through competitive bidding as per PPRA rules. The field investigations were carried out under the full-time supervision of geotechnical engineers of NESPAK from September 10, 2020 to September 23, 2020.

The geotechnical investigations were aimed at delineating the major subsoil / bedrock conditions spread over the site area, to evolve soil / rock parameters for the feasibility level design of foundations for proposed structures, to evolve geotechnical parameters for the feasibility level design of road works & to identify any problematic ground conditions and provide remedy. Geotechnical investigations comprised drilling of boreholes, excavation of test pits, performance of field testing, collection of soil / rock / water samples and laboratory testing on selected samples followed by engineering analysis.

The geotechnical investigations indicated that the subsurface stratigraphy along the project alignment comprised of overburden soils i.e. Lean Clay / Silty Clay / Silty Sand etc. up to the depth of 26 m below NSL. Bedrock, comprised of weak to very weak Claystone / Mudstone, from 26 m to maximum investigated depth of 30 m below NSL.

Based on the subsurface ground conditions and the type of loads of the proposed structures, RC piles and strip / square foundations were recommended as per structural requirements.

Chemical test results indicated that groundwater contain severe proportion of harmful salts. Therefore, Sulphate Resisting Cement (SRC) was recommended to be used for concrete works of foundations.
Test results indicated that on-site A-1-a / A-4 material with soaked CBR as 14 % at 95 % modified AASHTO maximum dry density can be used for the pavement design of road works.
1. INTRODUCTION

1.1 GENERAL

Local Government & HTP Department, Govt. of Sindh intends to conduct Feasibility Study and Transaction Advisory Services for three urban road projects that will be initiated under Public Private Partnership (PPP) mode. The primary objective of the project is to mitigate the traffic congestion problems and provide quick & safe access to the local commuters. The project consists of following parts:

Sub Project – 1: Link Road from Korangi (from KPT Interchange to PAF Airmen Academy)
Sub Project – 2: Expressway from Mauripur Road (End of Lyari Expressway) to Y Junction (Kakapir Rd / Mauripur Rd Intersection)
Sub Project – 3: Interchange at ICI Bridge Intersection

This report solely deals with geotechnical studies and necessary geotechnical recommendations for feasibility level design of roads and foundations for proposed development works on Sub Project – 1: Link Road from Korangi (from KPT Interchange to PAF Airmen Academy). The proposed development works consist of:

i. Bridge on Malir River
ii. Culvert under Road for Light Traffic at RD 1+400 Km
iii. Culvert / Bridge at RD 2+300 Km
iv. Bridge / Culvert near RD 4+500 Road - 2

National Engineering Services Pakistan (Pvt.) Ltd. (NESPAK) has been appointed as a Consultant by the Client for conducting Feasibility Study and Transaction advisory services for the subject project.

In order to evaluate the subsurface conditions at project site and to arrive at a safe and economical design of foundations of the proposed structures, geotechnical investigations were considered necessary.

The task of geotechnical investigations was awarded to M/s Soil Testing Services (STS), Karachi through competitive bidding as per PPRA rules. The field investigations were carried out under the full-time supervision of geotechnical engineers of NESPAK from September 10, 2020 to September 23, 2020.

The selected soil / rock and water samples collected during the field geotechnical investigations were tested at Geotechnical testing Laboratory of SOILCON and University of Engineering & Technology, Lahore as per laboratory testing programs prepared by NESPAK.
This report provides an account of the geotechnical activities carried out at the site, characteristics of subsurface materials, details of field & laboratory tests, selection of geotechnical parameters and geotechnical recommendations for feasibility level design of foundations and road works.

1.2 OBJECTIVES OF GEOTECHNICAL INVESTIGATIONS

The geotechnical investigations were undertaken to meet the following objectives:

- To delineate major subsurface material types spread over the site area.
- To evolve geotechnical parameters for feasibility level design of foundations for the proposed structures.
- To evolve geotechnical parameters for feasibility level design of road works.
- To furnish general geotechnical considerations for the construction of foundations and road works.

1.3 SCOPE OF WORK

Following scope of work for geotechnical investigations was executed to fulfill the above mentioned objectives:

- Execution of six (06) boreholes up to a maximum depth of 30 m below natural surface level (NSL) at the proposed structure locations using straight rotary drilling method.
- Excavation of six (06) test pits up to a maximum depth of 2 m below NSL at road locations.
- Continuous core drilling in bedrock along with collection & preservation of rock cores.
- Performance of Standard Penetration Tests (SPTs) in overburden soils encountered in boreholes, generally at 1 m depth interval.
- Performance of Field Density Test (FDT) in test pits, generally at 1 test per test pit at designated depths.
- Collection and preservation of disturbed/undisturbed soil samples from the boreholes and test pits.
- Collection and preservation of groundwater samples from the boreholes.
- Laboratory testing of selected soil / rock samples for the evaluation of classification, strength, compaction and chemical characteristics.
- Chemical analysis of groundwater samples.
• Analysis of field and laboratory data for determination of foundation design parameters including soil / rock parameters, foundation type, depth & size, allowable bearing pressures, etc.

• Formulation of geotechnical considerations for the construction of foundations and road works.

• Compilation of Geotechnical Investigation Report on the basis of the above mentioned studies.

1.4 DESCRIPTION OF SITE

The proposed project site starts from existing Malir Bridge and ends near Airmen Golf Course. The site can be accessed through Korangi Creek road and Main Korangi road.

The terrain of the site area is generally flat. Location plan of the project site is appended as Fig. A-1 (Appendix A).
2. GEOLOGY AND SEISMICITY OF AREA

2.1 GEOLOGY

2.1.1 Regional Geology

Regionally, the project area is located in the Karachi arc which is located on the southern margin of the Sulaiman Kirthar fold belt. Karachi arc is an eastward arcuate feature bounded by east west oriented sinistral and dextral faults near Mancher Lake in north and near Karachi in south respectively (Sarwar and DeJong, 1979). The east verging structures in the Karachi Arc indicate an eastward tectonic transport in a thin skinned fashion as a result of India - Arabia convergence (Sarwar, 1992; Niamatullah, 1998). The Karachi arcuate feature is also bounded by the Chaman Transform Fault System to the west and the Kirthar or Kachhi Foredeep in the east. The fold belt has formed by folding and thrusting of shelf sediments at the northwestern edge of the Indian Plate. The fold belt has originated as a result of India-Eurasia convergence to the north and India-Arabia to the south (Sarwar, 1992; Niamatullah, 1998). A thin skinned deformation style has been present all along the Karachi arc as a result eastward tectonic transport. However, some thick skinned deformation has also been reported in the southern part of it (Smewing et al., 2002).

The major structures of the area are the Pir Mangho Anticline (PMA) and the Lalji Syncline (LS). The strike of the pronounced structural trend is NE-SW in the area. In the north of Pir Mangho Anticline, structural trend changes sharply to the NS. A number of sinistral strike slip faults displace the strata. The most important is the Pir Mangho Fault (PMF), which is a NW-SW trending vertical fault with subhorizontal striation and having sinistral displacement. This fault has partitioned the strain in the area.

Laji Syncline is located in the SW of the Pir Mangho Anticline which is a double syncline with a kink geometry and hinges plunging towards SW. The two synclinal hinges are separate in the NE but converge towards SW, where they join together and form a single hinge asymmetric fold facing SE in Orangi area. Where fold is double hinged, its eastern limb is dipping at a low angle towards west, while its northwestern limb is dipping at a higher angle towards SE (Structural Geometry and Tectonics of Southern Part of Karachi Arc - A Case Study of Pirmangho and Lalji Area, April 2012).

2.1.2 Site Geology

The project site lie at the foot hills of Sulaiman Kirther Mountains and is comprised of unconsolidated surficial deposits of clay, silt, sand and gravel which forms distinct piedmont plains. These piedmont plains are characterized by gentler slope comprising of softer rocks and commonly contains parallel or concentric, low, scalloped, homoclinal ridges and hogbacks.
2.2 SEISMICITY

The project area is located in the southern part of Pakistan which is seismically active. The tectonic feature most critical for the project area is the Pab Fault which is passing at a distance of about 18 km north-west from project area. Moderate to low level of seismicity is observed to be associated with this fault. Very active Kutch seismic zone is present about 200km south-east from project area. In Kuch seismic zone several damaging earthquakes (with maximum intensity upto XI on Modified Mercellic Intensity scale) have occurred including 2000 Bhoj Earthquake of magnitude 7.9.

Probabilistic seismic hazard assessment carried out as part of the revision of the Building Code of Pakistan Seismic Provisions (2007) shows that the project area falls in Zone-2B.

It is therefore recommended that the project structures should be designed to cater for the requirements of Zone-2B of Building Code of Pakistan seismic provisions (2007) after giving due consideration to the soil profile of the site area.
3. FIELD GEOTECHNICAL STUDIES

3.1 PLANNING

In order to evaluate subsurface ground conditions at the project site, boreholes and test pits of appropriate depth were executed at the selected locations, in the light of the project requirements. The location of these boreholes and test pits was fixed in such a manner so as to cover the structure locations. The geotechnical investigation plan showing location of boreholes and test pits is appended to this report as Fig. A-2 (Appendix-A).

3.2 DRILLING OF BOREHOLES

A total of six (06) boreholes up to a maximum depth of 30 m below natural surface level (NSL) were drilled at proposed structure locations. Details of boreholes are as follows:

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<th>Depth below NSL (meter)</th>
<th>Location</th>
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<td>BH – 1</td>
<td>26</td>
<td>Bridge on Malir River</td>
</tr>
<tr>
<td>BH – 2</td>
<td>30</td>
<td></td>
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<td>BH – 3</td>
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<td>BH – 4</td>
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<td>Bridge / Culvert (RD 2+300 KM)</td>
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<td>BH – 5</td>
<td>22</td>
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</tr>
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<td>BH – 6</td>
<td>29</td>
<td>Bridge / Culvert (RD 4+500 Road – 2)</td>
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Straight rotary drilling method was used for execution of boreholes. Fish tail / tricon roller bit with a diameter of 100 mm was used to drill the boreholes in overburden soils. However, NX sized double tube core barrel was used for drilling in bedrock. Bentonite slurry was used as drilling fluid during execution of boreholes.

Field borehole logs were developed on the basis of material encountered at the site and later confirmed on the basis of laboratory test results. The borehole logs are appended to this report as Appendix-B. The subsurface soil / rock profile developed on the basis of borehole logs is appended with the report as Fig. A-3 (Appendix-A).

3.3 EXCAVATION OF TEST PITS

Six (06) test pits of 0.6 – 2.0 m depth below NSL were excavated at road locations. The test pits were excavated using conventional hand digging tools like pick-axe and hand shovel.

The test pits were carefully logged during excavation and field logs were developed, which were later confirmed through laboratory testing. The test pit logs are appended to this report as Appendix-B.
3.4 STANDARD PENETRATION TESTS (SPTs)

Standard Penetration Tests (SPTs) were performed in all the boreholes according to the latest ASTM D 1586, generally at 1 m depth interval, where possible. A donut type hammer, weighing 63.5 kg, was used for the test. During performance of SPTs in boreholes, the hammer was lifted and dropped mechanically through the flywheel of drilling rig and pulley hanged to a tripod. A split spoon sampler without a liner was used for all the tests. Disturbed soil samples were obtained through the split spoon sampler. The SPT blow counts were recorded for 45 cm total penetration of split spoon sampler. The number of blows required to drive the sampler through the last 30 cm viz. 'N' values have been shown on the respective borehole logs (Appendix-B).

Plots of field and corrected SPT-N value with depth have been developed for all the boreholes and appended to this report as Fig. C-1 and Fig. C-2 (Appendix-C), respectively.

3.5 IN-SITU DENSITY TESTS

To evaluate the in-situ density of the subsurface soils, density tests were performed in the test pits at selected depths below NSL. Sand replacement method was used to perform the density tests according to the latest ASTM D 1556. Three (03) field density tests were performed in the test pits. The results of these density tests are shown on the individual test pit logs (Appendix-B).

3.6 UNDISTURBED SAMPLING

Fourteen (14) relatively undisturbed soil samples were recovered from boreholes using Pitcher / Denison / Shelby samplers as per latest ASTM D 1587. After determining the in-situ density, the soil samples were properly waxed, labeled, preserved and transported to the approved geotechnical testing laboratory.

Thirteen (13) representative undisturbed rock samples (rock cores) were carefully recovered from boreholes. These rock samples (rock cores) were properly waxed, labeled and preserved in core boxes before transportation to the geotechnical testing laboratory.

3.7 DISTURBED SAMPLING

The SPT samples obtained from overburden soils in the boreholes and composite soil samples collected from on-site test pits were properly labeled and preserved as disturbed samples. All the disturbed samples were transported to the approved geotechnical testing laboratory.

For determination of the in-situ moisture content, small quantity of soil samples were also collected in tin cans from the depths where the density tests were carried out in test pits. These samples were weighted at the site and subsequently sealed & labeled for dispatch to the laboratory for evaluation of moisture content by oven drying method.
3.8 GROUNDWATER

Groundwater was encountered at a depth of 0.6 m to 6.0 m below NSL during field geotechnical investigations executed in the month of September 2020.
4. LABORATORY TESTING

4.1 GENERAL

Selected soil / rock and water samples collected from boreholes and test pits were subjected to the following tests as per laboratory testing programs prepared by NESPAK in accordance with latest ASTM / BS or equivalent standard in Geotechnical Testing Laboratories of SOILCON and University of Engineering & Technology, Lahore:

- Grain Size Analysis (ASTM D – 421, 422)
- Atterberg Limits (ASTM D – 4318)
- Natural Moisture Content (ASTM D – 2216)
- Bulk & Dry Density (ASTM D – 7263)
- Unconfined Compression (ASTM D – 2166)
- Uniaxial Compression Test (ASTM D 7012)
- Direct Shear (ASTM D 3080)
- Modified AASHTO Compaction (AASHTO T-180)
- 3-Point Soaked CBR (AASHTO T-193)
- Sulphate Content (BS 1377 Part 3)
- Chloride Content (BS 1377 Part 3)
- Organic Matter Content (BS 1377 Part 3)
- Chemical Analysis of Water (BS 1377 Part 3)

Summary of laboratory test results is appended to this report as Table D-1 & Table D-2 (Appendix-D) along with original test result sheets.

4.2 DISCUSSION ON RESULTS

4.2.1 Classification Test

Grain size analysis was performed on twenty eight (28) soil samples collected from boreholes and test pits. Test results showed that the on-site soils generally comprise Lean Clay / Lean Clay with Sand / Sandy Lean Clay (CL), Sandy Silt (ML), Silty Sand (SM), Poorly graded Sand with Silt (SP-SM) etc. as per Unified Soil Classification System (USCS). As per AASHTO soil classification, on-site soils generally belong to A-1-a, A-1-b, A-2-4, A-3, A-4, A-6 & A-7-6 group.

Twelve (12) on-site soil samples were subjected to Atterberg limit tests. Test results indicated liquid limit (LL) ranging from 25 to 48 % and the plasticity index (PI) ranging from 8 to 22 %.

4.2.2 Natural Moisture Content (NMC) and Dry Density Test

Twelve (12) relatively undisturbed soil samples collected from boreholes were tested for natural moisture content (NMC) and dry density. Test results indicated NMC value as 10.5 % to 28.4 % and dry density value varies from 14.0 to 17.8 kN/m³.
Thirteen (13) rock core samples collected from boreholes were also tested for natural moisture content (NMC) and density test. Test results indicated NMC value as 5.2 % to 15.9 % and dry density as 19.2 kN/m³ to 24.2 kN/m³.

4.2.3 Unconfined Compression Test

Unconfined compressive strength tests were performed on three (03) relatively undisturbed fine grained soil samples extracted from boreholes. Test results indicated the unconfined compressive strength of soil samples as 79.0 kPa to 93.2 kPa while the failure strain was 3.79 % to 9.27 %.

4.2.4 Uniaxial Compression Test

Uniaxial compression tests were performed on thirteen (13) rock core samples collected from boreholes. Test results indicated uniaxial compressive strength as 0.05 to 1.93 Mpa for claystone and 0.05 to 0.6 Mpa for mudstone.

4.2.5 Direct Shear Test

Direct shear test was performed on eight (08) undisturbed soil samples collected from boreholes. Test results indicated angle of internal friction (Φ) as 35o to 37o with cohesion as 0.0 kPa.

4.2.6 Modified AASHTO Compaction Test

Modified AASHTO compaction tests were performed on three (03) composite soil samples collected from on-site test pits. Test results indicated maximum dry density (MDD) as 16.8 kN/m³ to 17.4 kN/m³ and optimum moisture content (OMC) as 14.4 % to 14.8 %.

4.2.7 3-Point Soaked CBR Test

California Bearing Ratio (CBR) tests were performed on three (03) composite soil samples collected from on-site test pits, which revealed CBR value as 13.5 % to 15.8 % at 95% Modified AASHTO maximum dry density.

4.2.8 Chemical Test

Chemical tests were carried out on five (05) soil samples, collected from boreholes from 3.0 to 11.5 m depth below NSL. Test result indicated soluble sulphate content as 0.012 % to 0.119 %, chloride content as 0.102 % to 0.343 % and organic matter as 0.511 % to 1.883 %.

Chemical tests were also carried out on five (05) water samples collected from boreholes. Test results indicated sulphate content as 1858 ppm to 5964 ppm, chloride content as 2005 ppm to 39610 ppm, total dissolved solids (TDS) as 3844 ppm to 77333 ppm and pH as 5.58 to 6.95.
5. SITE GEOTECHNICS

5.1 STRATIGRAPHY AND CONSISTENCY

The geotechnical investigations carried out at the site of this project have revealed the presence of the following distinct lithological units:

Table 5-1: Subsurface Lithology

<table>
<thead>
<tr>
<th>Location</th>
<th>Layer Thickness below NSL (meter)</th>
<th>Lithology</th>
<th>Reference Borehole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bridge on Malir River</td>
<td>0.0 – 3.0</td>
<td>Loose to Medium Dense, Silty Sand / Sandy Silt, moist</td>
<td>BH – 1 &amp; BH - 2</td>
</tr>
<tr>
<td></td>
<td>3.0 – 5.0</td>
<td>Very Soft, Silty Clay / Lean Clay, Low Plastic, moist</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.0 – 10.0</td>
<td>Loose to Dense, Silty Sand / Sandy Silt, Moist</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10.0 – 12.0</td>
<td>Very Stiff, Lean Clay, Low to Medium Plastic, moist</td>
<td></td>
</tr>
<tr>
<td></td>
<td>12.0 – 19.0</td>
<td>Medium Dense to Very Dense, Poorly graded Sand with Silt / Poorly graded Gravel</td>
<td></td>
</tr>
<tr>
<td></td>
<td>19.0 – 30.</td>
<td>Bedrock, mainly consist of Claystone</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>Groundwater was at a depth of 0.6 – 0.9 m below NSL</td>
<td></td>
</tr>
<tr>
<td>Culvert under Road for Light Traffic (RD 1+400 KM)</td>
<td>0.0 – 11.0</td>
<td>Loose to Dense, Sandy Silt / Poorly graded Sand with Silt, trace mica</td>
<td>BH - 3</td>
</tr>
<tr>
<td></td>
<td>11.0 – 18.0</td>
<td>Firm to Very Stiff, Lean Clay, Low to Medium Plastic, moist</td>
<td></td>
</tr>
<tr>
<td></td>
<td>18.0 – 20.0</td>
<td>Very Dense, Silty Sand, trace mic, moist</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>Groundwater was at a depth of 6 m below NSL</td>
<td></td>
</tr>
<tr>
<td>Bridge / Culvert (RD 2+300 KM)</td>
<td>0.0 – 4.0</td>
<td>Very Soft to Soft, Lean Clay / Lean Clay with Sand, Low Plastic, Moist</td>
<td>BH – 4 &amp; BH - 5</td>
</tr>
<tr>
<td></td>
<td>4.0 – 11.0</td>
<td>Loose to Medium Dense, Silty Sand / Sandy Silt, moist</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11.0 – 17.0</td>
<td>Very Soft to Hard, Lean Clay / Lean Clay with Sand, Low to Medium Plastic, moist</td>
<td></td>
</tr>
<tr>
<td></td>
<td>17.0 – 26.0</td>
<td>Bedrock, mainly consist of Claystone / Mudstone</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>Groundwater was at a depth of 0.65 – 4.8 m below NSL</td>
<td></td>
</tr>
<tr>
<td>Location</td>
<td>Layer Thickness below NSL (meter)</td>
<td>Lithology</td>
<td>Reference Borehole</td>
</tr>
<tr>
<td>------------------------------</td>
<td>-----------------------------------</td>
<td>---------------------------------------------------------------------------</td>
<td>--------------------</td>
</tr>
<tr>
<td>Bridge / Culvert (RD 4+500 Road – 2)</td>
<td>0.0 – 1.0</td>
<td>Fill material mainly consists of Silt / Sandy Silt, slushy material</td>
<td>BH - 6</td>
</tr>
<tr>
<td></td>
<td>1.0 – 4.0</td>
<td>Soft, Lean Clay with Sand / Sandy Silty Clay, Low Plastic, moist</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.0 – 24.0</td>
<td>Medium Dense to very Dense, Silty Sand / Poorly graded Sand, moist</td>
<td></td>
</tr>
<tr>
<td></td>
<td>24.0 – 26.0</td>
<td>Hard, Sandy Lean Clay, Medium Plastic, Moist</td>
<td></td>
</tr>
<tr>
<td></td>
<td>26.0 – 29.1</td>
<td>Bedrock, mainly consist of Mudstone</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>Groundwater is at a depth of 1.7 m below NSL</td>
<td></td>
</tr>
</tbody>
</table>

5.2 SHEAR STRENGTH

The field and laboratory investigation data indicated that overburden soils and bedrock, present at the project site, generally have very low to low shear strength characteristics.

5.3 NATURAL MOISTURE CONTENT

Test results for natural moisture content indicated that the overburden soils at the project site are in moist condition while the bedrock is in dry to moist condition.

5.4 IN PLACE COMPACTION

Standard Penetration Test (SPT) results indicated that the overburden soil at the project site have very low to medium in place compaction.

5.5 CHEMICAL CHARACTERISTICS

Chemical test results indicated that the subsurface soil consists of negligible proportion of harmful salts. However, test results for water samples indicated severe proportion of harmful salts as per ACI Building Code Requirements for Structural Concrete.
6. CONSIDERATIONS FOR DESIGN AND CONSTRUCTION OF FOUNDATIONS

6.1 GENERAL

The considerations for the foundation design have been made keeping in view the type of structure, topography of the area and the subsoil / bedrock characteristics. A safe and an economical design of foundations of the structures have to be ensured. The following sections provide guidelines regarding the geotechnical design criteria, soil / rock parameters, selection of foundation type, depth of placement, foundation size, allowable bearing pressures, foundation settlements and allowable load carrying capacity.

6.2 GEOTECHNICAL DESIGN CRITERIA

The foundation of the proposed structures should meet the following minimum design criteria:

- It should be safe against shear failure of the supporting ground. A factor of safety of 2.5 & 3 is adopted for this purpose for RC pile and strip / square foundation, respectively.
- It should not settle excessively under the service loads. A limit of 25 mm has been put on the total settlement of strip / square foundations. Moreover, a group of piles should not settle in excess of 25 mm to 50 mm, depending upon size of group.

6.3 SUBSURFACE SOIL / ROCK PARAMETERS

Engineering analysis for the determination of bearing / load carrying capacity and settlements of foundations for encountered subsurface conditions are based on carefully selected representative subsurface parameters.

The following parameters have been defined for the subsurface on the basis of field investigations, laboratory test results, recent literature, engineering judgment and our experience with the similar ground conditions:

Table 6-1: Summary of Subsurface Parameters

<table>
<thead>
<tr>
<th>Location</th>
<th>Material Type</th>
<th>Depth below NSL (m)</th>
<th>Subsurface Parameters</th>
</tr>
</thead>
</table>
| Bridge on Malir River | Silty Sand / Sandy Silt   | 0.0 – 3.0           | Angle of Internal Friction (Φ) = 29°  
|                     |                           |                     | Bulk Unit Weight (γ₀) = 17 kN/m³          |
|                     | Lean Clay / Silty Clay    | 3.0 – 5.0           | Undrained Cohesion (cᵤ) = 10 kPa         |
|                     |                           |                     | Coefficient of Volume Compressibility (mᵥ) = 0.028 cm²/kg |
|                     | Silty Sand / Sandy Silt   | 5.0 – 10.0          | Angle of Internal Friction (Φ) = 30°  
<p>|                     |                           |                     | Bulk Unit Weight (γ₀) = 17 kN/m³          |
|                     | Lean Clay                 | 10.0 – 12.0         | Undrained Cohesion (cᵤ) = 100 kPa        |
|                     |                           |                     | Coefficient of Volume Compressibility (mᵥ) = 0.008 cm²/kg |</p>
<table>
<thead>
<tr>
<th></th>
<th>Bulk Unit Weight ($\gamma_b$)</th>
<th>Angle of Internal Friction ($\phi$)</th>
<th>Uniaxial Compressive Strength ($q_u$)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Silty Sand / Poorly graded Gravel</strong></td>
<td>$18$ kN/m$^3$</td>
<td>$35^\circ$</td>
<td>$0.50$ Mpa</td>
</tr>
<tr>
<td><strong>Bedrock</strong></td>
<td>$19$ kN/m$^3$</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Silty Sand / Poorly graded Sand with Silt</strong></td>
<td>$12.0 – 19.0$</td>
<td>$32^\circ$</td>
<td></td>
</tr>
<tr>
<td><strong>Lean Clay</strong></td>
<td>$11.0 – 13.0$</td>
<td>$27^\circ$</td>
<td>$50$ kPa</td>
</tr>
<tr>
<td><strong>Lean Clay</strong></td>
<td>$13.0 – 18.0$</td>
<td>$31^\circ$</td>
<td>$0.018$ cm$^2$/kg</td>
</tr>
<tr>
<td><strong>Silty Sand</strong></td>
<td>$18.0 – 20.0$</td>
<td>$34^\circ$</td>
<td>$18$ kN/m$^3$</td>
</tr>
<tr>
<td><strong>Sandy Silt / Poorly graded Sand with Silt</strong></td>
<td>$0.0 – 11.0$</td>
<td>$30^\circ$</td>
<td></td>
</tr>
<tr>
<td><strong>Lean Clay</strong></td>
<td>$11.0 – 13.0$</td>
<td>$20$ kPa</td>
<td>$0.028$ cm$^2$/kg</td>
</tr>
<tr>
<td><strong>Lean Clay</strong></td>
<td>$13.0 – 18.0$</td>
<td>$17$ kN/m$^3$</td>
<td>$0.008$ cm$^2$/kg</td>
</tr>
<tr>
<td><strong>Silty Sand</strong></td>
<td>$18.0 – 20.0$</td>
<td>$34^\circ$</td>
<td>$18$ kN/m$^3$</td>
</tr>
<tr>
<td><strong>Lean Clay / Silty Clay</strong></td>
<td>$1.0 – 4.0$</td>
<td>$25$ kPa</td>
<td></td>
</tr>
<tr>
<td><strong>Lean Clay / Poorly graded Sand with Silt</strong></td>
<td>$4.0 – 10.0$</td>
<td>$30^\circ$</td>
<td>$18$ kN/m$^3$</td>
</tr>
<tr>
<td><strong>Lean Clay</strong></td>
<td>$10.0 – 24.0$</td>
<td>$33^\circ$</td>
<td>$19$ kN/m$^3$</td>
</tr>
<tr>
<td><strong>Lean Clay</strong></td>
<td>$24.0 – 26.0$</td>
<td>$150$ kPa</td>
<td>$0.005$ cm$^2$/kg</td>
</tr>
<tr>
<td><strong>Mudstone</strong></td>
<td>$26.0 – 29.0$</td>
<td>$1.0$ Mpa</td>
<td>$0.005$ cm$^2$/kg</td>
</tr>
</tbody>
</table>

*Since, the bedrock at the project site was in very weak to weak condition, therefore, equivalent soil parameters have been used for bedrock during bearing capacity / load carrying capacity evaluation.

6.4 FOUNDATION TYPE

Considering, the safety of the structures, anticipated structural loads and subsurface ground conditions, cast in place R.C. piles and strip / square foundations can be considered for proposed development works as per structural requirements.
Foundation recommendations for light poles have been developed on the basis of available information regarding existing pole foundation types adjacent to the project site. Therefore, keeping in view of weak ground conditions in an erratic pattern, tentative design recommendations for proposed light pole foundations are provided. These recommendations should be firmed-up after detailed structure specific geotechnical investigations. Moreover, due consideration for negative skin friction has also been given during pile load carrying capacity evaluation for structures where weak ground conditions encountered.

### 6.5 FOUNDATION SIZE, DEPTH AND ALLOWABLE BEARING PRESSURE

The geotechnical recommendations for feasibility level design of foundations for proposed structures are as follows:

#### Bridge and Retaining Wall on Malir River

- **Foundation Type** = RC Piles
- **Diameter of Piles** = 760mm to 1500 mm
- **Length of Piles** = 20 m – 40 m below NSL
- **Load Carrying Capacity under Compression Loading** = Refer to Fig. E-1 & E-2**
- **Load Carrying Capacity under Tensile Loading** = Refer to Fig. E-3 & E-4**
- **Soil Spring Stiffness for RC Piles** = Refer to Fig. E-5
- **Soil Profile Type** = S D

#### Light Poles at Malir River

- **Foundation Type** = Square
- **Minimum Depth of Foundation (DF)** = 1.0 m below NSL
- **Minimum Thickness of Select Fill** = 1 m below foundation base
- **Width of Foundation (BF)** = 1 m – 3 m
- **Net Allowable Bearing Pressure** = Refer to Fig. E-6
- **Tolerable Settlement** = 25 mm

#### Culvert under Road for Light Traffic (RD 1+400 KM)

- **Foundation Type** = RC Piles
- **Diameter of Piles** = 760 mm, 1000 mm & 1200 mm
- **Length of Piles** = 15 m – 25 m below NSL
- **Load Carrying Capacity under Compression Loading** = Refer to Fig. E-7 & E-8**
- **Load Carrying Capacity under Tensile Loading** = Refer to Fig. E-9 & E-10**
- **Soil Spring Stiffness for RC Piles** = Refer to Fig. E-11
- **Soil Profile Type** = S D

#### Light Pole & Retaining Wall at RD 1+400 KM

- **Foundation Type** = Strip / Square
- Minimum Depth of Foundation \((D_f)\) = 1.0 m below NSL
- Width of Foundation \((B_f)\) = 1 m – 4 m
- Net Allowable Bearing Pressure = Refer to Fig. E-12
- Tolerable Settlement = 25 mm

**Culvert / Bridge and Retaining Wall at RD 2+300 KM**

- Foundation Type = RC Piles
- Diameter of Piles = 760 mm to 1500 mm
- Length of Piles = 20 m – 40 m below NSL
- Load Carrying Capacity under Compression Loading = Refer to Fig. E-13 & E-14**
- Load Carrying Capacity under Tensile Loading = Refer to Fig. E-15 & E-16**
- Soil Spring Stiffness for RC Piles = Refer to Fig. E-17
- Soil Profile Type = \(S_E\)

**Light Poles at RD 2+300 KM**

- Foundation Type = Square
- Minimum Depth of Foundation \((D_f)\) = 1.0 m below NSL
- Width of Foundation \((B_f)\) = 1 m – 3 m
- Minimum Thickness of Select Fill = 1.5 m below foundation base
- Net Allowable Bearing Pressure = Refer to Fig. E-18
- Tolerable Settlement = 25 mm

**Bridge / Culvert near RD 4+500 Road – 2**

- Foundation Type = RC Piles
- Diameter of Piles = 760 mm & 900 mm
- Length of Piles = 15 m – 35 m below NSL
- Load Carrying Capacity under Compression Loading = Refer to Fig. E-19 & E-20**
- Load Carrying Capacity under Tensile Loading = Refer to Fig. E-21 & E-22**
- Soil Spring Stiffness for RC Piles = Refer to Fig. E-23
- Soil Profile Type = \(S_D\)

**Light Poles and Retaining Wall near RD 4+500 Road – 2**

- Foundation Type = Strip / Square
- Minimum Depth of Foundation \((D_f)\) = 1.0 m below NSL
- Minimum Thickness of Select Fill = 1 m below foundation base
- Width of Foundation \((B_f)\) = 1 m – 4 m
- Net Allowable Bearing Pressure = Refer to Fig. E-24
- Tolerable Settlement = 25 mm
**No scour depth has been considered during evaluation of pile load carrying capacity. Moreover, the pile capacity curves are only valid if plain water or bentonite mud under controlled conditions as per FHWA requirements will be used as drilling fluid.**

Detailed geotechnical investigations should be carried out prior to the finalization of foundation design for all the proposed development works during detailed design phase.

If loose soil / soft pocket / fill material encountered at the base of the square / strip foundation excavation, it should be completely removed and backfilled with select fill material. Select fill should be A-3 or better material as per AASHTO soil classification. Select fill should be placed and compacted in layers appropriate to the type & size of compaction equipment to at least 95% of modified AASHTO maximum dry density.

During construction, the excavation of shallow foundation and casting of in-situ RC piles shall be inspected by an experienced geotechnical engineer/engineering geologist for firming-up the above recommendations. For any unusual subsurface conditions, geotechnical engineer must be consulted prior to initiation of the foundation construction.

### 6.6 FULL SCALE PILE LOAD TEST

The selected pile length/capacity must be confirmed by performing at least one (1) full scale pile load test at each structure location. The full scale pile load test must be carried out before construction of working piles to 3 times the design load (i.e. \( P_{\text{design load}} \times 3.0/\eta \)) to finalize the design.

Further, as per prevailing geotechnical engineering practices, a few proof load tests should also be carried out on the selected working piles of each structure, to a maximum of 1.5 times the design load. The quantum of proof load tests shall be decided in the light of scope of work and project specifications. The Contractor should submit his Method Statement, for carrying out the proof pile load tests, for approval of the Engineer. Moreover, sonic integrity test (SIT) should also be carried out to ascertain the integrity of all the working piles.

### 6.7 EXCAVATIONS

Excavations for square / strip foundations will generally be made in Lean Clay / Silty Clay / Silty Sand. The experience gained during excavation of test pits at this project showed that vertical excavation of pit walls was possible for reasonable duration of time. It is therefore, established that shallow temporary excavations with light/manual equipment would be possible.

Temporary excavations may be carried out at stable slopes as determined by trials at site. In case, excavations have to be made very close to the existing foundation like roads or buildings, suitable temporary excavation support system should be designed to stop any untoward incident. The excavations may preferably not be done during rainy season or otherwise some special precautions may deem necessary to ensure drainage of the
excavations. The contractor should submit his Method Statement and design for temporary excavation support system, for Engineer’s approval.

6.8 COEFFICIENTS OF LATERAL EARTH PRESSURE

It is recommended to use granular material as the backfill, where required. The granular material should be compacted to around 90 % Modified Proctor density.

The static lateral earth pressure coefficients for active ($K_a$), at rest ($K_o$) and passive ($K_p$) conditions, using granular material as backfill having $\Phi = 30^\circ$ are recommended as follows:

$$K_a = 0.33, \quad K_o = 0.50, \quad K_p = 3.00$$

The lateral earth pressures to be used in the design should be increased for the additional residual earth pressures to be induced by the effect of compaction, as per provisions of Naval Facilities Engineering Command (NAVFAC) Design Manual 7.02 (Chapter-3, Section-6).

The dynamic earth pressures for active and passive conditions should be evaluated on the basis of Mononobe-Okabe model.

6.9 TYPE OF CEMENT

On the basis of chemical test results for soil and water samples, Sulphate Resisting Cement (SRC) is recommended to be used for concrete works of foundations.

6.10 WATER FOR MIXING AND CURING

Water will be required during the construction for mixing and curing of concrete. The water required for this purpose needs to be reasonably clean and free from the detrimental amounts of soluble salts, alkalies, oil, organic matter and other deleterious substances that are injurious to concrete. In addition to these, the suspended solids also affect the water quality.

It is therefore recommended that during the construction stage before mixing and curing, the water should also be tested against the permissible limits of salts and solids of mixing and curing water as specified in BS 3148.

6.11 CONCRETE MATERIALS

Fine and coarse aggregates can be obtained from local sources subject to meeting the project specifications / ASTM gradation.
7. CONSIDERATIONS FOR DESIGN AND CONSTRUCTION OF ROADWAYS

7.1 GENERAL

The project also includes rehabilitation of approach / existing roads and construction of new roads. The following sections provide guidelines regarding geotechnical design and certain construction considerations for roadways:

7.2 PAVEMENT MATERIAL AND DESIGN CBR

7.2.1 Embankment and Subgrade Soils

The primary soil parameter required for the pavement design is the California Bearing Ratio (CBR) or alternatively, the resilient modulus. Laboratory facilities for evaluation of the latter parameter do not exist in Pakistan at present. If a pavement design method requires the use of resilient modulus, it can readily be evaluated from CBR value, using the recent literature.

Three (03) representative soil samples were collected from on-site test pits to evaluate the characteristics of in-situ soils. Test results have revealed that the on-site soils generally belong to A-1-a & A-4 groups as per ASSHTO soil classification.

It is therefore, recommended to use on-site A-1-a / A-4 material for design of road works with minimum soaked CBR value as 14 % at 95 % modified AASHTO maximum dry density. However, if on-site material is not available in requisite quantity than suitable borrow areas near the project site must be explored. The borrow areas must contain A-4 or better material as per AASHTO soil classification with minimum soaked CBR value as 7 % at 95 % modified AASHTO maximum dry density for subgrade and 5 % at 90 – 95 % modified AASHTO maximum dry density for road embankment, respectively. The suitability of on-site and / or borrow area material must be confirmed by performing appropriate laboratory testing prior to their use in road works.

7.2.2 Sub-Base and Base Course

Material from local sources can be used for the construction of sub-base and base course subject to meeting Project Specifications. The design CBR for these materials shall be governed by the project specifications. However, it would be desirable to use materials with minimum CBR values of 50 and 80, respectively, for these courses.

7.3 SITE PREPARATIONS

For a roadway to perform well, it is imperative that the subgrade of the pavement is competent to support the anticipated vehicular loads. It is therefore recommended that the subgrade should be properly prepared to meet the design CBR. In order to meet this requirement, the area that will support the pavement, should be properly cleared, grubbed by removing any topsoil containing objectionable material.
7.4 FILL PLACEMENT AND COMPACTION

Before placement of the borrow fill, in-situ soil should be proof-rolled to eliminate any soft pocket of soil. For the placement and compaction of the embankment and subgrade fill, loose lift thickness should generally not exceed 30 cm. The moisture content of the fill material should be controlled within ± 2% of the optimum moisture content.

For the sub-base and base courses, the placement should be in such a manner that the compacted thickness of 15 cm is not exceeded.

The following layer thickness and compaction levels are recommended for various pavement elements:

Table 7-1: Fill Placement and Compaction

<table>
<thead>
<tr>
<th>Material Type</th>
<th>Maximum compacted Layer thickness (cm)</th>
<th>Recommended Modified AASHTO Compaction (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base Course</td>
<td>15</td>
<td>100</td>
</tr>
<tr>
<td>Sub-base</td>
<td>15</td>
<td>98</td>
</tr>
<tr>
<td>Subgrade &amp; General Fill</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper 30cm</td>
<td>20</td>
<td>95</td>
</tr>
<tr>
<td>30cm – 70cm</td>
<td>25</td>
<td>93</td>
</tr>
<tr>
<td>Below 70cm</td>
<td>30</td>
<td>90</td>
</tr>
</tbody>
</table>

The above compaction levels have to be attained by the Contractor using appropriate machinery. However, prior to construction, the Contractor should submit method statement for fill placement and compaction, for approval of the Engineer.
8. CONCLUSION AND RECOMMENDATIONS

1) The project alignment comprised of overburden soils (i.e silty clay, lean clay, silty sand etc.) of depth ranging from 17 m to 26 m below NSL. The overburden soil was underlain by bedrock (i.e. claystone, mudstone) up to maximum drilled depth of 30 m below NSL. For detail, Refer to Section 5.1 and Appendix B.

2) Groundwater was encountered at a depth of 0.6 m to 6.0 m below NSL during field geotechnical investigations executed in the month of September 2020.

3) Shallow and deep foundations can be used for proposed development works as per structural requirements. For detail, refer to Section 6.4 & 6.5.

4) The selected pile length / capacity must be confirmed by performing at least one (01) full scale pile load test at each structure location. Load test arrangement and execution should be as per ASTM requirements.

5) On the basis of chemical test results for soil and water samples, Sulpahet Resisting Cement (SRC) is recommended to be used for concrete works of foundations.

6) Coarse and fine aggregates for concrete can be obtained from local quarries. The fine and coarse aggregates from these quarries must meet Project specifications and requirements of ASTM C 33.

7) On-site A-1-a / A-4 material can be used for road works with minimum soaked CBR value as 14 % at 95 % modified AASHTO maximum dry density. Alternatively, suitable borrow areas of A-4 or better material with minimum CBR value as 7 % and 5 % for subgrade and road embankment, respectively must be explored. CBR of on-site and borrow area material must be confirmed by performing appropriate laboratory testing prior to their use in subgrade and road embankment. For detail, refer to Section 7.2.

8) Detailed geotechnical investigations should be carried out prior to finalization of foundation design for the proposed development works.
9. DISCLAIMER

This report has been prepared by National Engineering Services Pakistan Pvt. Ltd (NESPAK) for proposed development works of Korangi Roads which is the part of the project titled as “Feasibility Study and Transaction Advisory Services for Urban Road Initiative Project”. The material contained in this report reflects engineering characteristics of soils / rocks and recommendations on the basis of actual field and laboratory test results at the time of preparation of this report. The recommendations provided in the report can only be used for feasibility level design of foundations. Detailed geotechnical investigations must be carried out prior to the finalization of design of foundations.

This document and the information are solely for the use of the authorized recipient. Any use, which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such party and NESPAK accepts no responsibility for damages, if any, suffered by any third party as a result of such decisions or actions.

During construction, the construction activity may alter the conditions from those prevailing at the time, this report was written or may reveal somewhat different conditions at places. This may require performance of additional investigations during the construction stage so as to adjust the design to safeguard against the revealed conditions. NESPAK does not accept any responsibility for the changes in the conditions and design recommendations provided in this report due to above circumstances.
APPENDICES

• APPENDIX-A:

  LOCATION PLAN, GEOTECHNICAL
  INVESTIGATION PLAN & SUBSURFACE
  SOIL PROFILE

• APPENDIX-B:

  BOREHOLE AND TESTPIT LOGS

• APPENDIX-C:

  SUBSURFACE CHARACTERISTICS

• APPENDIX-D:

  SUMMARY OF LABORATORY TEST RESULTS
  & DETAILED RESULT SHEETS

• APPENDIX-E:

  FOUNDATION RECOMMENDATIONS

• APPENDIX-F:

  SITE PHOTOGRAPHS
APPENDIX-A

LOCATION PLAN, GEOTECHNICAL INVESTIGATION PLAN & SUBSURFACE SOIL PROFILE

FIG. A-1   LOCATION PLAN
FIG. A-2   GEOTECHNICAL INVESTIGATION PLAN
FIG. A-3   SUBSURFACE SOIL PROFILE
APPENDIX-B

BOREHOLE AND TESTPIT LOGS
**BOREHOLE LOG**

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Sample No.</th>
<th>Legend</th>
<th>USCS Symbol</th>
<th>Description of Material</th>
<th>Date of Casing/Hole</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td>0</td>
<td></td>
<td></td>
<td>Greenish brown, SANDY SILT, trace gravels, fill material.</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>1.0</td>
<td>SPT-1</td>
<td>ML</td>
<td></td>
<td>Yellowish brown, loose, CLAYEY SANDY SILT, trace gravels, moist.</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>2.0</td>
<td>SPT-2</td>
<td>ML</td>
<td></td>
<td>Yellowish brown, loose, SANDY SILT, traces of clay, moist.</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>3.0</td>
<td>SPT-3</td>
<td>ML</td>
<td></td>
<td>Blackish grey, very soft, LEAN CLAY with organic matter, medium plastic, moist.</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>4.0</td>
<td>SPT-4</td>
<td>CL</td>
<td></td>
<td>Grey, very loose to loose, fine to medium grained, SILTY SAND with organic matter, trace to few gravels, moist.</td>
<td>70</td>
<td></td>
</tr>
<tr>
<td>5.0</td>
<td>SPT-5</td>
<td></td>
<td></td>
<td>Greyish, fine to coarse grained, SILTY SAND, trace gravel, moist.</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>6.0</td>
<td>UDS-1</td>
<td></td>
<td></td>
<td>Greyish, very dense, fine to coarse grained, SILTY SAND, trace gravel, moist.</td>
<td>90</td>
<td></td>
</tr>
<tr>
<td>7.0</td>
<td>SPT-7</td>
<td>SM</td>
<td></td>
<td>Greyish, medium dense, fine grained, SILTY SAND, traces of gravel, few mica, moist.</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

**Location: BRIDGE ON MALIR RIVER**

**Ground Elevation: 5.964 m**

**Contractor: M/S STS KARACHI**

**Drilling Fluid: BENTONITE SLURRY**

**Date: 13-09-2020 to 18-09-2020**

**USCS Symbols:**
- ML: ML
- CL: CL
- SM: SM

**Legend:**
- SPT Blows/30cm

**Remarks:**
- GWT
- REFJUAL

---

**Notes:**
- Greenish brown, SANDY SILT, trace gravels, fill material.
- Yellowish brown, loose, CLAYEY SANDY SILT, trace gravels, moist.
- Yellowish brown, loose, SANDY SILT, traces of clay, moist.
- Blackish grey, very soft, LEAN CLAY with organic matter, medium plastic, moist.
- Grey, very loose to loose, fine to medium grained, SILTY SAND with organic matter, trace to few gravels, moist.
- Greyish, fine to coarse grained, SILTY SAND, trace gravel, moist.
- Greyish, very dense, fine to coarse grained, SILTY SAND, trace gravel, moist.
- Greyish, medium dense, fine grained, SILTY SAND, traces of gravel, few mica, moist.
**BOREHOLE LOG**

**Job No.** P38035  
**Project** FEASIBILITY STUDY AND TRANSACTION ADVISORY SERVICES, "URBAN ROAD INITIATIVES IN KARACHI"  
**Location** BRIDGE ON MALIR RIVER  
**Type of boring** STRAIGHT ROTARY  
**Drilling Fluid** BENTONITE SLURRY  
**Ground Elevation** 5.964 m  
**Ground Water Depth** 0.6 m  
**Client** LOCAL GOVERNMENT & HTP DEPARTMENT  
**Contractor** M/S STS KARACHI

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Sample No.</th>
<th>Legend</th>
<th>USCS Symbol</th>
<th>Description of Material</th>
<th>Date of Casing/ Hole</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.0</td>
<td>SPT-9</td>
<td></td>
<td>CL-ML</td>
<td>Brownish grey, very stiff, SILTY CLAY, low to medium plastic, trace sand, trace mica, moist.</td>
<td></td>
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</tr>
<tr>
<td>11.0</td>
<td>SPT-10</td>
<td></td>
<td>CL</td>
<td>Brown, very stiff, LEAN CLAY, medium plastic, moist.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.0</td>
<td>SPT-11</td>
<td></td>
<td>SP-SM</td>
<td>Yellow, medium dense to very dense, fine to coarse grained, poorly graded SAND with SILT, trace gravel.</td>
<td></td>
<td></td>
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<tr>
<td>13.0</td>
<td>SPT-12</td>
<td></td>
<td></td>
<td>Variegated, very dense, sub angular to sub rounded, poorly graded GRAVEL, sedimentary origin, trace silt, size (13-61mm).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.0</td>
<td>SPT-13(C)</td>
<td></td>
<td>GP</td>
<td>Variegated, SILTY CLAYEY SAND with GRAVEL, very dense, moist.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15.0</td>
<td>DS-1</td>
<td></td>
<td>SC-SM</td>
<td>Brown, hard, LEAN CLAY with gravel, low to medium plastic, trace sand, moist.</td>
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</tr>
<tr>
<td>16.0</td>
<td>SPT-14(C)</td>
<td></td>
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<td>Top of BEDROCK</td>
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<tr>
<td>17.0</td>
<td>DS-2</td>
<td></td>
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**SHEET 2 OF 4**
## DISCONTINUITY DATA

<table>
<thead>
<tr>
<th>WPT</th>
<th>Frequency</th>
<th>Total Joints</th>
<th>Pressure</th>
<th>Value</th>
<th>Point Load</th>
</tr>
</thead>
</table>

### General Description

**SOIL:** Type, Colour, Consistency, Structure, Origin
**Rock:** Colour, Grain Size, Texture and Fabric, State of Weathering, State of Alteration Name, Strength, Shear Zones.

### lithology

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Run No.</th>
<th>Core</th>
<th>Recovery %</th>
<th>R.O.D. %</th>
<th>Fractional Core</th>
<th>Drilling Fluid</th>
<th>Core Barrel Bit</th>
<th>Hole</th>
<th>R.S.</th>
<th>Depth (m)</th>
<th>Elevation</th>
<th>Angle (with vertical)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td>1</td>
<td>102</td>
<td>84</td>
<td>0.6</td>
<td>100</td>
<td>Bentonite Slurry</td>
<td>Double Tube</td>
<td>C.B.</td>
<td>2</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>10.0</td>
<td>2</td>
<td>20</td>
<td>62</td>
<td>0.4</td>
<td>100</td>
<td>Bentonite Slurry</td>
<td>Double Tube</td>
<td>C.B.</td>
<td>2</td>
<td>10.3</td>
<td>10.3</td>
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<tr>
<td>15.0</td>
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<td>30</td>
<td>13</td>
<td>0.2</td>
<td>100</td>
<td>Bentonite Slurry</td>
<td>Double Tube</td>
<td>C.B.</td>
<td>2</td>
<td>15.0</td>
<td>14.3</td>
<td>1.3</td>
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<td>20.0</td>
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<td>4</td>
<td>0.1</td>
<td>100</td>
<td>Bentonite Slurry</td>
<td>Double Tube</td>
<td>C.B.</td>
<td>2</td>
<td>20.0</td>
<td>19.3</td>
<td>1.3</td>
</tr>
</tbody>
</table>

### Weathering of Rock Mass

- **Fresh:** Freshly exposed, no chemical or physical alteration.
- **Slightly Weathered:** Slightly altered, minor weathering effects.
- **Moderately Weathered:** Moderately altered, noticeable weathering effects.
- **Highly Weathered:** Highly altered, significant weathering effects.
- **Very Highly Weathered:** Very highly altered, extensive weathering effects.
- **Residual Soil:** Residual soil, altered rock material.

### Mechanical Properties

- **Manual Index Test:** Indented by thumbnail, peeled easily by knife, crumbled under hammer blow.
- **Lithology:** Bentonite Slurry, Double Tube, Core Barrel/Nx Size, Bit, C.B.

### CLAYSTONE:

- **TOP OF BEDROCK**
  - Yellowish grey, fresh to slightly weathered, extremely weak to very weak.
  - Brownish yellow, slightly weathered, extremely weak to very weak.
  - Brownish yellow, fresh to slightly weathered, extremely weak to very weak, embedded silt (10–15%).

### Key for Description of Discontinuities

- **Type:** Joint, Major Joint, Fault, Bedding, Fracture, Shear
- **Aperture:** Very Tight, Tight, Partially Open, Open
- **Roughness:** Smooth, Rough
- **Infilling:** Clean, Silt, Gravel, Gravelly Silt
- **State:** Clean, Silt, Gravel
- **Colour:** Yellowish grey, Brownish yellow, Light brown

### FEASIBILITY STUDY AND TRANSACTION ADVISORY SERVICES

**PROJECT:** BRIDGE ON MALIR RIVER
**SITE:** SITE:
**COORDINATES:** N 2747134.160 m E 306772.285 m
**DATE:** 13-09-2020
**START:** 18-09-2020
**COMPLETE:** 18-09-2020
**DRILLING AGENCY:** N/S STS Karachi
**STRAIGHT ROTARY**

### BACK FILLING MATERIAL

- **Drilling Fluid Loss %:** 8

### Legend

- **SAMPLE:** 11
- **DISCONTINUITY DATA:** 12
- **REMARKS:** 16

### Key to Weathering of Rock Mass

- **Grade:** R0, R1, R2, R3, R4, R5, R6
- **Term:** Extremely Weak, Very Weak, Weak, Medium Strong, Strong, Very Strong, Extremely Strong
- **Description:** Not weathered, Slightly Weathered, Moderately Weathered, Highly Weathered, Very Highly Weathered, Residual Soil

### Weathering of Rock Mass Strength Grade of Discontinuity Wall

- **Grade:** R0, R1, R2, R3, R4, R5, R6
- **Description:** Not weathered, Slightly Weathered, Moderately Weathered, Highly Weathered, Very Highly Weathered, Residual Soil
- **Pressure:** Not applicable
- **Value:** Not applicable
- **Point Load:** Not applicable

## remarks

- **NOTES:**
  - 1. For Detailed Description of Discontinuity Parameters Refer to "BSM Suggested Method for Quantitative Description of Discontinuities in Rock".
  - 2. Measured in Case of Clay Filled Discontinuities, the Strength of Clay Seam should be Reported as per BSM. Depth wise Zones of Similar Discontinuity
  - 3. Characteristics should be Recognised to fill in Column No. 11.
**LITHOLOGY**

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Type</th>
<th>Colour</th>
<th>Consistency</th>
<th>Structure</th>
<th>Origin</th>
<th>Weathering</th>
<th>State of Alteration</th>
<th>Name</th>
<th>Strength</th>
<th>Shear Zones</th>
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**DISCONTINUITY DATA**

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Joint Set</th>
<th>Graphics</th>
<th>Type</th>
<th>Attitude</th>
<th>Angle</th>
<th>Aperture</th>
<th>Roughness</th>
<th>Infilling</th>
<th>Strength</th>
<th>Grade</th>
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</tbody>
</table>

**WEATHERING OF ROCK MASS**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Term</th>
<th>Description / MPa</th>
</tr>
</thead>
<tbody>
<tr>
<td>R0</td>
<td>Extremely Weak / 0.25 - 1.0</td>
<td>watered by hydraulically</td>
</tr>
<tr>
<td>R1</td>
<td>Very Weak / 1.0 - 5.0</td>
<td>channeled by interlock</td>
</tr>
<tr>
<td>R2</td>
<td>Weak / 5.0 - 25</td>
<td>cored by hand</td>
</tr>
<tr>
<td>R3</td>
<td>Medium Strong / 25 - 50</td>
<td>cored by jackhammer</td>
</tr>
<tr>
<td>R4</td>
<td>Strong / 50 - 100</td>
<td>require more than one hammer blow</td>
</tr>
<tr>
<td>R5</td>
<td>Very Strong / 100 - 250</td>
<td>require many hammer blows</td>
</tr>
<tr>
<td>R6</td>
<td>Extremely Strong / &gt; 250</td>
<td>specimen can only be broken manually</td>
</tr>
</tbody>
</table>

**REMARKS**

- **CLAYSTONE/MUDSTONE:** Brown, slightly weathered, extremely weak to very weak, embedded sand.
- **CLAYSTONE:** Greyish brown/Dark brown, fresh to slightly weathered, extremely weak to very weak, embedded silt.
- **CLAYSTONE:** Brownish grey, fresh to slightly weathered, extremely weak to very weak, (embedded silt 25-30%).

**BOTTOM OF BOREHOLE**
## BOREHOLE LOG

### DESCRIPTION OF MATERIAL

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Sample No.</th>
<th>USCS Symbol</th>
<th>Description of Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td></td>
<td></td>
<td>Brownish yellow, SILTY SAND with gravel on top.</td>
</tr>
<tr>
<td>1.0</td>
<td>SPT-1</td>
<td>SM</td>
<td>Yellowish brown, medium dense, fine grained, SILTY SAND, trace to little clay, moist.</td>
</tr>
<tr>
<td>2.0</td>
<td>SPT-2</td>
<td>SM</td>
<td>Yellowish brown, loose, SANDY SILT, trace clay, moist.</td>
</tr>
<tr>
<td>3.0</td>
<td>SPT-3</td>
<td>ML</td>
<td>Dark grey, very soft, SILTY CLAY with organic matter and odour/slush.</td>
</tr>
<tr>
<td>4.0</td>
<td>SPT-4</td>
<td>CL-ML</td>
<td>Dark grey, very loose to medium dense, fine to coarse grained, SILTY SAND with organic matter and odour, trace clay, moist.</td>
</tr>
<tr>
<td>5.0</td>
<td>SPT-5</td>
<td></td>
<td>Dark grey, very dense, fine grained, SANDY SILT, little fine to coarse gravel.</td>
</tr>
<tr>
<td>6.0</td>
<td>SPT-6</td>
<td>SM</td>
<td></td>
</tr>
<tr>
<td>7.0</td>
<td>SPT-7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.0</td>
<td>UDS-1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.0</td>
<td>SPT-8</td>
<td>ML</td>
<td></td>
</tr>
<tr>
<td>10.0</td>
<td>SPT-9</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### LEGEND

- **SPT**
- **SM**
- **ML**
- **CL-ML**
- **Dark grey, very**
- **SILTY CLAY**
- **with organic matter**
- **and odour/slush.**
- **Yellowish brown, medium**
- **dense, fine grained,**
- **SILTY SAND,**
- **trace to little clay,**
- **moist.**
- **Yellowish brown, loose,**
- **SANDY SILT,**
- **trace clay,**
- **moist.**
- **Dark grey, very**
- **soft, SILTY CLAY**
- **with organic matter**
- **and odour/slush.**
- **Dark grey, very**
- **loose to medium dense,**
- **fine to coarse grained,**
- **SILTY SAND**
- **with organic matter**
- **and odour, trace clay,**
- **moist.**
- **Dark grey, very**
- **dense, fine grained,**
- **SANDY SILT,**
- **little fine to coarse gravel.**

### DRILLING DETAILS

- **Type of boring:** STRAIGHT ROTARY
- **Drilling Fluid:** BENTONITE SLURRY
- **SPT Blows/30cm:**
  - 0.0 to 1.0: 12
  - 1.0 to 2.0: 21
  - 2.0 to 3.0: 12
  - 3.0 to 4.0: 0
  - 4.0 to 5.0: 0
  - 5.0 to 6.0: 0
  - 6.0 to 7.0: 0
  - 7.0 to 8.0: 0
  - 8.0 to 9.0: 0
  - 9.0 to 10.0: 0
  - 10.0 to 10.0: 0
- **Remarks:**
  - **REFUSAL**

### PROJECT INFORMATION

- **Job No.:** P38035
- **Project:** FEASIBILITY STUDY AND TRANSACTION ADVISORY SERVICES, 'URBAN ROAD INITIATIVES IN KARACHI'
- **Client:** GOVERNMENT OF SINDH
- **Site Incharge:** JUNAID
- **Coordinates:** N: 2747120.802 m, E: 306771.818 m
- **Drilling Fluid:** BENTONITE SLURRY
- **Ground Elevation:** 6.271 m
- **Ground Water Depth:** 0.90 m
- **Date:** 20-09-2020
- **Contractor:** M/S STS KARACHI
- **Remarks:**
  - **LOCAL GOVERNMENT & HTP DEPARTMENT**
  - **GOVERNMENT OF SINDH**
  - **FEASIBILITY STUDY AND TRANSACTION ADVISORY SERVICES,**
  - **'URBAN ROAD INITIATIVES IN KARACHI'**
  - **SUB PROJECT 1: LINK ROAD FROM KORANGI**
  - **BRIDGE ON MALIR RIVER**
  - **REFUSAL**
<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Sample No.</th>
<th>Legend</th>
<th>USCS Symbol</th>
<th>Description of Material</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.0</td>
<td>SPT-9</td>
<td></td>
<td>SM</td>
<td>Greyish brown, very dense, fine to coarse grained, SILTY SAND, trace fine gravel, moist.</td>
<td></td>
</tr>
<tr>
<td>11.0</td>
<td>SPT-10</td>
<td></td>
<td>CL</td>
<td>Brownish grey, stiff, LEAN CLAY, medium plastic, trace fine sand, moist.</td>
<td></td>
</tr>
<tr>
<td>12.0</td>
<td>UDS-2</td>
<td></td>
<td>CL</td>
<td>Brownish yellow, dense to very dense, fine to medium grained, poorly graded SAND with SILT and gravel, trace clay, moist.</td>
<td></td>
</tr>
<tr>
<td>13.0</td>
<td>SPT-11</td>
<td></td>
<td>SP-SM</td>
<td>Grey, very dense, poorly graded GRAVEL with CLAY and SAND, trace clay, moist.</td>
<td></td>
</tr>
<tr>
<td>15.0</td>
<td>SPT-14(C)</td>
<td></td>
<td>GP-GC</td>
<td>Grey, very dense, poorly graded GRAVEL with SAND, trace clay, moist.</td>
<td></td>
</tr>
<tr>
<td>16.0</td>
<td>DS-2</td>
<td></td>
<td></td>
<td>Grey, very dense, poorly graded GRAVEL with SAND, trace clay, moist.</td>
<td></td>
</tr>
<tr>
<td>18.0</td>
<td>DS-4</td>
<td></td>
<td></td>
<td>Grey, very dense, poorly graded GRAVEL with SAND, trace clay, moist.</td>
<td></td>
</tr>
</tbody>
</table>

**NOTES:**
- Greyish brown, very dense, fine to coarse grained, SILTY SAND, trace fine gravel, moist.
- Brownish grey, stiff, LEAN CLAY, medium plastic, trace fine sand, moist.
- Brownish yellow, dense to very dense, fine to medium grained, poorly graded SAND with SILT and gravel, trace clay, moist.
- Grey, very dense, poorly graded GRAVEL with CLAY and SAND, trace clay, moist.

**Location:** BRIDGE ON MALIR RIVER

**Job No.:** P38035

**Project:** FEASIBILITY STUDY AND TRANSACTION ADVISORY SERVICES, "URBAN ROAD INITIATIVES IN KARACHI"

**Client:** LOCAL GOVERNMENT & HTD DEPARTMENT

**Contractor:** M/S STS KARACHI

**Date:** 20-09-2020 to 23-09-2020

**Drilling Fluid:** BENTONITE SLURRY

**Ground Water Depth:** 0.90 m

**Ground Elevation:** 6.271 m
**LITHOLOGY**

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Run No.</th>
<th>Core</th>
<th>Recovery %</th>
<th>R.O.D. %</th>
<th>Fractured Core</th>
<th>Core Barrel Bit</th>
<th>Stabilization Elevation (m)</th>
<th>Legend</th>
<th>Classification</th>
<th>SYM</th>
<th>SAMPLE</th>
<th>DISCONTINUITY DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.0</td>
<td>1</td>
<td>0</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**General Description**
- **Soil**: Type, Colour, Consistency, Structure, Origin
- **Rock**: Colour, Grain Size, Texture, Fabric, State of Weathering, State of Alteration, Name, Strength, Shear Zones

**Key for Description of Discontinuities**
- **Type**: J, M, F, B, R, S
- **Aperture**: Very Tight, Tight, Partly Open, Open
- **Roughness**: Smooth, Slickened
- **Infilling**: Clean, Silty Gravel/Gravely Silt, Hydro-Thermals, Oxides, Breccia, Sheared, Fricated, Residual Soil

**Weathering of Rock Mass**
- **Grade**: Fresh, Slightly Weathered, Moderately Weathered, Highly Weathered, Very High Weathered, Residual Soil

**Strength Grade of Discontinuity Wall**
- **Grade**: Extremely Weak, Very Weak, Weak, Medium Strong, Strong, Very Strong, Extremely Strong

**NOTES**:
1. For Detailed Description of Discontinuity Parameters Refer to "IRM Suggested Method for Quantitative Description of Discontinuities in Rock".
2. Measurements: In case of Clay Filled Discontinuities, the Strength of Clay Seam should be Reported as perIRM. Depth wise Zones of Similar Discontinuity.
3. Characteristics should be Recognized to fill in Column No. 11.
### Lithology

**CLAYSTONE:**
Brown, slightly to moderately weathered, thickly bedded, very weak.

### Discontinuity Data

**Type:**
- **Aperture:**
  - Very Tight: 0-0.10 mm
  - Tight: 0.10-0.25 mm
  - Partially Open: 0.25-1.00 mm
  - Open: >1.00 mm

**Roughness:**
- Smooth
- Slightly Rough
- Rough
- Very Rough

**Infilling:**
- Clean
- Very Clean
- Silt
- Without Infilling

---

### Remarks

- **Key for Description of Discontinuities:**
  - Type: M = Major Joint, F = Fault, B = Bedding, R = Riffle, H = Fissure, S = Shear, P = Pore
  - Aperture: Very Tight: 0-0.10 mm, Tight: 0.10-0.25 mm, Partially Open: 0.25-1.00 mm, Open: >1.00 mm
  - Roughness: Smooth, Slightly Rough, Rough, Very Rough
  - Infilling: Clean, Very Clean, Silt, Without Infilling

- **Notes:**
  1. For Detailed Description of Discontinuity Parameters Refer to "ERM Suggested Method for Quantitative Description of Discontinuities in Rock".
  2. "Masses", In Case of Clay Filled Discontinuities, the Strength of Clay Sheet should be Reported as per ERM. Depth wise Zones of Similar Discontinuity should be Recognized to fill in Column No. 11

- **Characteristics should be Recognized to fill in Column No. 11**
**BOREHOLE NO.** BH-03

**SHEET** 1 OF 2

**Job No.** P38035  
**Project** FEASIBILITY STUDY AND TRANSACTION ADVISORY SERVICES, "URBAN ROAD INITIATIVES IN karachi"  
**Location** CULVERT UNDER ROAD FOR LIGHT TRAFFIC  
**Site Incharge** JUNAID  
**Client** LOCAL GOVERNMENT & HTP DEPARTMENT  
**Contractor** M/S STS karachi  
**Coordinates**  
N: 2747322.732 m  
E: 307405.668 m  
**Ground Elevation** 12.344 m  
**Date** 15-09-2020 To 17-09-2020  
**Drilling Fluid** BENTONITE SLURRY  
**Type of boring** STRAIGHT ROTARY  
**Ground Water Depth** 6.0 m

---

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Sample No.</th>
<th>Legend</th>
<th>USCS Symbol</th>
<th>Description of Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td></td>
<td></td>
<td>ML</td>
<td>Yellow, SILT, non plastic, trace sand, trace concretions.</td>
</tr>
<tr>
<td>1.0</td>
<td>SPT-1</td>
<td></td>
<td>ML</td>
<td>Brownish yellow, dense, SANDY SILT, dry.</td>
</tr>
<tr>
<td>2.0</td>
<td>SPT-2</td>
<td></td>
<td>ML</td>
<td>Greyish brown, loose to very dense, poorly graded, SAND with SILT, moist.</td>
</tr>
<tr>
<td>3.0</td>
<td>SPT-3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.0</td>
<td>SPT-4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.0</td>
<td>SPT-5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.0</td>
<td>SPT-6</td>
<td></td>
<td>SP-SM</td>
<td></td>
</tr>
<tr>
<td>7.0</td>
<td>SPT-7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.0</td>
<td>SPT-8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.0</td>
<td>SPT-9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.0</td>
<td>SPT-10</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**Remarks**
<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Sample No.</th>
<th>Legend</th>
<th>USCS Symbol</th>
<th>Description of Material</th>
<th>Dia of Casing/Hole</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.0</td>
<td>SPT-10</td>
<td></td>
<td></td>
<td>Brownish grey, medium dense, fine grained, SILTY SAND, moist.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.0</td>
<td>SPT-11</td>
<td></td>
<td>SM</td>
<td>Dark grey, firm to very stiff, LEAN CLAY with organic matter and organic odour/slush, trace sand, moist.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.0</td>
<td>SPT-12</td>
<td></td>
<td>CL</td>
<td>Dark grey, dense, fine to coarse grained, SILTY SAND, trace fine gravel, moist.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.0</td>
<td>SPT-13</td>
<td></td>
<td>SM</td>
<td>Brownish grey, very stiff, LEAN CLAY, medium plastic, trace fine sand (embedded), moist.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.0</td>
<td>SPT-14</td>
<td></td>
<td></td>
<td>Brownish grey, very dense, fine to medium grained, SILTY SAND, trace clay, trace gravel, moist.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15.0</td>
<td>SPT-15</td>
<td></td>
<td></td>
<td>Brownish grey, medium dense, fine grained, SILTY SAND, moist.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16.0</td>
<td>SPT-16</td>
<td></td>
<td>CL</td>
<td>Brownish grey, very dense, fine to medium grained, SILTY SAND, trace clay, trace gravel, moist.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17.0</td>
<td>SPT-17</td>
<td></td>
<td></td>
<td>Brownish grey, very dense, fine to medium grained, SILTY SAND, trace clay, trace gravel, moist.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18.0</td>
<td>SPT-18</td>
<td></td>
<td></td>
<td>Brownish grey, very dense, fine to medium grained, SILTY SAND, trace clay, trace gravel, moist.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19.0</td>
<td>SPT-19</td>
<td></td>
<td>SM</td>
<td>Brownish grey, medium dense, fine grained, SILTY SAND, moist.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20.0</td>
<td>SPT-20</td>
<td></td>
<td></td>
<td>Bottom of Borehole</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Description of Material

### Fill material:
- **Sandy Silt with Gravels, Organic Odour, Trace Organic Matter, Polythene Pieces, Cloth Pieces and Porcelain Pieces, Moist.**

### Variegated, Very Loose to Loose, Sandy Silt with Gravel, Organic Odour, Trace Organic Matter, Polythene Pieces, Cloth Pieces and Porcelain Pieces, Moist.

### Brownish Grey, Loose to Medium Dense, Silty Clayey Sand, Trace Mica, Clay Lumps at Places, Moist.

### Brown, Silty Sand, Trace Mica, Moist.

### Brownish Grey, Loose to Medium Dense, Silty Sand, Trace Mica, Moist.

## Borehole Log

**Job No.** P38035  
**Project** URBAN ROAD INITIATIVES IN KARACHI  
**Location** BRIDGE / CULVERT  
**Site Incharge** M. ARIF  
**Client** GOVERNMENT OF SINDH  
**Contractor** M/S STS KARACHI  
**Ground Elevation** 10.00 m  
**Drilling Fluid** BENTONITE SLURRY  
**Type of boring** STRAIGHT ROTARY  
**Ground Water Depth** 4.8 m  
**Coordinates** N: 2744918.00 m  
**E: 307792.00 m**

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Sample No.</th>
<th>Legend</th>
<th>USCS Symbol</th>
<th>Description of Material</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.0</td>
<td>SPT-9</td>
<td></td>
<td>CL</td>
<td>Grey, soft, SANDY LEAN CLAY, low plastic, trace organic matter, organic odour, wet.</td>
<td></td>
</tr>
<tr>
<td>11.0</td>
<td>SPT-10</td>
<td></td>
<td>ML</td>
<td>Grey, very loose, SANDY SILT, non plastic, few organic matter, organic odour, moist.</td>
<td></td>
</tr>
<tr>
<td>12.0</td>
<td>SPT-11</td>
<td></td>
<td></td>
<td>Grey, medium dense, fine grained, poorly graded SAND with SILT, trace mica, wet.</td>
<td></td>
</tr>
<tr>
<td>13.0</td>
<td>UDS-2</td>
<td></td>
<td>SP-SM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.0</td>
<td>SPT-12</td>
<td></td>
<td></td>
<td>Grey, stiff, LEAN CLAY, medium plastic, moist.</td>
<td></td>
</tr>
<tr>
<td>15.0</td>
<td>SPT-13</td>
<td></td>
<td>CL</td>
<td>Grey, CLAYEY SAND, low to medium plastic, moist.</td>
<td></td>
</tr>
<tr>
<td>16.0</td>
<td>UDS-3</td>
<td></td>
<td>SC</td>
<td>Grey, CLAYEY SAND, low to medium plastic, moist.</td>
<td></td>
</tr>
<tr>
<td>17.0</td>
<td>SPT-14</td>
<td></td>
<td>CL-ML</td>
<td>Greenish grey, very stiff, SILTY CLAY, low to medium plastic, trace to few sand, moist.</td>
<td></td>
</tr>
<tr>
<td>18.0</td>
<td>SPT-15</td>
<td></td>
<td>SM</td>
<td>Grey, dense, fine grained, SILTY SAND, trace mica, trace clay lumps, wet.</td>
<td></td>
</tr>
<tr>
<td>19.0</td>
<td>SPT-16</td>
<td></td>
<td></td>
<td>Grey, hard, SILTY CLAY with SAND, low to medium plastic, trace fine gravels, moist.</td>
<td></td>
</tr>
<tr>
<td>20.0</td>
<td>SPT-17</td>
<td></td>
<td>CL-ML</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Date** 12-09-2020  
**To** 15-09-2020  

**USCS Symbol Key:**
- CL: Clay
- ML: Silt
- SC: Sand
- CL-ML: Clayey Sand
- SP-SM: Silt with Sand
- UD-3: Shelby sample

**Legend:**
- P.L.: Top of sample
- N.M.C.: Middle of sample
- L.L.: Bottom of sample
- SPT Blows/30cm
  - 10: 10
  - 20: 20
  - 30: 30
  - 40: 40
  - 50: 50
  - 60: 60
  - 70: 70
  - 80: 80
  - 90: 90
  - 100: 100

**Remarks:**
- UDS-2: Sample UDS-2 is taken at 13.00 - 13.90m depth.
- UDS-3: Sample UDS-3 is taken at 16.00 - 16.50m depth.
**BOREHOLE LOG**

**Job No.**: P38035  
**Project**: FEASIBILITY STUDY AND TRANSACTION ADVISORY SERVICES, "URBAN ROAD INITIATIVES IN KARACHI"  
**Location**: BRIDGE / CULVERT  
**Contractor**: M/S STS KARACHI  
**Client**: GOVERNMENT OF SINDH  
**Type of boring**: STRAIGHT ROTARY  
**Drilling Fluid**: BENTONITE SLURRY  
**Ground Water Depth**: 4.8 m  
**Ground Elevation**: 10.00 m  
**Date**: 12-09-2020 To 15-09-2020

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Sample No.</th>
<th>USCS Symbol</th>
<th>Description of Material</th>
<th>Dia of Casing/Hole</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>20.0</td>
<td>SPT-17</td>
<td>SP-SM</td>
<td>Grey, very dense, SAND with SILT.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>CL</td>
<td>Grey, hard, LEAN CLAY, medium plastic, moist.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21.0</td>
<td>SPT-18</td>
<td>SP-SM</td>
<td>Grey, very dense, fine to coarse, poorly graded SAND with SILT, trace mica, wet.</td>
<td></td>
<td>REFUSAL</td>
</tr>
<tr>
<td>22.0</td>
<td>SPT-19</td>
<td>SP-SM</td>
<td>Grey, very hard, LEAN CLAY, medium plastic, trace sand, trace mica, moist.</td>
<td></td>
<td>REFUSAL</td>
</tr>
<tr>
<td>23.0</td>
<td></td>
<td>CL</td>
<td></td>
<td></td>
<td>TOP OF BEDROCK</td>
</tr>
</tbody>
</table>

**Legend**:  
- □: SPT Blows/30cm  
- ▲: P.L.  
- ▼: N.M.C.  
- ▼: L.L.  
- ○: SPT Blows/30cm  
- ▼: P.L.  
- ▼: N.M.C.  
- ▼: L.L.  

**Remarks**:

- **TOP OF BEDROCK**

**Coordinates**:

- N: 2744918.00 m  
- E: 307792.00 m  
- Local Government & HTP Department, Government of Sindh  
- Feasibility Study and Transaction Advisory Services, "Urban Road Initiatives in Karachi"  
- Sub Project 1: Link Road from Korangi Bridge / Culvert 

**Remarks**:

- Grey, very dense, SAND with SILT.
- Grey, hard, LEAN CLAY, medium plastic, moist.
- Grey, very dense, fine to coarse, poorly graded SAND with SILT, trace mica, wet.
- Grey, very hard, LEAN CLAY, medium plastic, trace sand, trace mica, moist.

**Legend**:

- SPT Blows/30cm
- P.L.
- N.M.C.
- L.L.
- Remarks
### General Description

**Soil**: Type, Colour, Consistency, Structure, Origin

**Rock**: Colour, Grain Size, Texture and Fabric, State of Weathering, State of Alteration, Name, Strength, Shear Zones.

### Lithology

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Run No.</th>
<th>Core</th>
<th>Core Recovery %</th>
<th>R.O.D. %</th>
<th>Fractured Core</th>
<th>Core Barrel Bit</th>
<th>Hole Stability</th>
<th>Elevation (m)</th>
<th>Legend</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>20.0</td>
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<tr>
<td>24.0</td>
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<tr>
<td>26.0</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**CLAYSTONE:**

Grey, very thinly to thickly bedded, slightly to moderately fractured/jointed, fresh to slightly weathered, extremely weak to very weak.

**FOSSILFEROUS SILTSTONE:**

Grey, fresh, very weak.

### Discontinuity Data

<table>
<thead>
<tr>
<th>Type</th>
<th>Aperture</th>
<th>Roughness</th>
<th>Infilling</th>
<th>Weathering of Rock Mass</th>
<th>Strength Grade of Discontinuity Wall</th>
</tr>
</thead>
<tbody>
<tr>
<td>J-B</td>
<td>1-3°</td>
<td>PSm</td>
<td>USm</td>
<td>M.St.</td>
<td>R0-R1</td>
</tr>
<tr>
<td>WS-1, WS-2</td>
<td>1-3°</td>
<td>PSm</td>
<td>USm</td>
<td>M.St.</td>
<td>R0-R1</td>
</tr>
<tr>
<td>WS-3, WS-4</td>
<td>1-3°</td>
<td>PSm</td>
<td>USm</td>
<td>M.St.</td>
<td>R0-R1</td>
</tr>
<tr>
<td>WS-5</td>
<td>1-3°</td>
<td>PSm</td>
<td>USm</td>
<td>M.St.</td>
<td>R0-R1</td>
</tr>
</tbody>
</table>

**Remarks:**

1. For Detailed Description of Discontinuity Parameters refer to "IRM Suggested Method for Quantitative Description of Discontinuities in Rock.
2. Major in case of Clay Filled Discontinuities the Strength of Clay Seam should be reported as per IRM. Depth wise Zones of Similar Discontinuity.
3. Characteristics should be Recognised to fill in Column No. 11.

**Logo:**

- **Rough**
- **Smooth**
- **Slightly weathered**
- **Moderate weathered**
- **Highly weathered**
- **Very Highly Weathered**
- **Residual Soil**

**Legend:**

- **F** for Fault
- **P** for Plane
- **W** for Water
- **M** for Major Joint
- **F** for Fracture
- **S** for Shear
- **P** for Pressure
- **T** for Tension
- **V** for Vein
- **C** for Clay
- **S** for Sand
- **G** for Gypsum
- **Q** for Quartz
- **L** for Limestone
- **B** for Basalt
- **O** for Olivine
- **T** for Talc
- **C** for Calcite
- **I** for Iron Oxide
- **G** for Gypsite
## Borehole Log

**Job No.:** P38035  
**Project:** FEASIBILITY STUDY AND TRANSACTION ADVISORY SERVICES, "URBAN ROAD INITIATIVES IN KARACHI"  
**Location:** BRIDGE / CULVERT  
**Client:** GOVERNMENT OF SINDH  
**Contractor:** M/S STS KARACHI  

### Coordinates
- **N:** 2744613.00 m  
- **E:** 307741.00 m  
- **Ground Elevation:** 3.00 m  
- **Ground Water Depth:** 0.65 m  
- **Date:** 17-09-2020 To 21-09-2020

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Sample No.</th>
<th>Legend</th>
<th>USCS Symbol</th>
<th>Description of Material</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td></td>
<td></td>
<td></td>
<td>Fill material: Grey, LEAN CLAY with GRAVEL, low to medium plastic, trace pottery pieces, moist.</td>
<td></td>
</tr>
<tr>
<td>1.0</td>
<td>SPT-1</td>
<td></td>
<td>CL</td>
<td>Grey, very soft, LEAN CLAY with SAND, low to medium plastic, trace to few organic matter, organic odour, moist.</td>
<td></td>
</tr>
<tr>
<td>2.0</td>
<td>SPT-2</td>
<td></td>
<td>CL</td>
<td>Grey, very loose to loose, SANDY SILT, non plastic, wet.</td>
<td></td>
</tr>
<tr>
<td>3.0</td>
<td>SPT-3</td>
<td></td>
<td>CL</td>
<td>Grey, very loose to loose, fine grained, SILTY SAND, trace clay lumps, trace organic matter, organic odour, wet.</td>
<td></td>
</tr>
<tr>
<td>4.0</td>
<td>SPT-4</td>
<td></td>
<td>ML</td>
<td>Grey, medium dense, fine grained, poorly graded SAND with SILT, trace mica, trace organic content, organic odour, wet.</td>
<td></td>
</tr>
<tr>
<td>5.0</td>
<td>SPT-5</td>
<td></td>
<td>CL</td>
<td>Grey, very soft, LEAN CLAY with SAND, low to medium plastic, trace pottery pieces, moist.</td>
<td></td>
</tr>
<tr>
<td>6.0</td>
<td>SPT-6</td>
<td></td>
<td>CL</td>
<td>Grey, very loose to loose, SANDY SILT, non plastic, wet.</td>
<td></td>
</tr>
<tr>
<td>7.0</td>
<td>UDS-1</td>
<td></td>
<td>CL</td>
<td>Grey, medium dense, fine grained, poorly graded SAND with SILT, trace mica, trace organic content, organic odour, wet.</td>
<td></td>
</tr>
<tr>
<td>8.0</td>
<td>SPT-7</td>
<td></td>
<td>CL</td>
<td>Grey, very soft, LEAN CLAY with SAND, low to medium plastic, trace pottery pieces, moist.</td>
<td></td>
</tr>
<tr>
<td>9.0</td>
<td>UDS-2</td>
<td></td>
<td>CL</td>
<td>Grey, very loose to loose, SANDY SILT, non plastic, wet.</td>
<td></td>
</tr>
<tr>
<td>10.0</td>
<td>SPT-8</td>
<td></td>
<td>CL</td>
<td>Grey, medium dense, fine grained, poorly graded SAND with SILT, trace mica, trace organic content, organic odour, wet.</td>
<td></td>
</tr>
</tbody>
</table>

### Drilling Fluid
- **BENTONITE SLURRY 0.65 m**
## Borehole Log

**Job No.** P38035  **Project** FEASIBILITY STUDY AND TRANSACTION ADVISORY SERVICES, ‘URBAN ROAD INITIATIVES IN KARACHI’  
**Location** BRIDGE / CULVERT  
**Site Incharge** M. ARIF  
**Client** LOCAL GOVERNMENT & HTC DEPARTMENT  
**Contractor** M/S STS KARACHI  
**Coordinates** N: 2744613.00 m E: 307741.00 m  
**Ground Elevation** 3.00 m  
**Drilling Fluid** BENTONITE SLURRY  
**Ground Water Depth** 0.65 m  
**Date** 17-09-2020 To 21-09-2020

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Sample No.</th>
<th>Legend</th>
<th>USCS Symbol</th>
<th>Description of Material</th>
<th>SPT Blows/30cm</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.0</td>
<td>SPT-9</td>
<td></td>
<td>SP-SM</td>
<td>Grey, medium dense, fine grained, poorly graded SAND with SILT, trace organic matter, organic odour, wet.</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>11.0</td>
<td>SPT-10</td>
<td></td>
<td>UDS-3</td>
<td>Grey, very soft to stiff, LEAN CLAY, medium plastic, trace organic matter, organic odour, moist.</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>12.0</td>
<td>SPT-11</td>
<td></td>
<td></td>
<td>Grey, hard, LEAN CLAY with SAND, medium plastic, trace organic matter, moist.</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

**Legends:**
- **SP-SM**: Standard Penetration Test-10
- **UDS-3**: Uplift Drained Shear Test-3
- **CL**: Clay

**Description of Material:**
- **Grey, medium dense, fine grained, poorly graded SAND with SILT, trace organic matter, organic odour, wet.**
- **Grey, very soft to stiff, LEAN CLAY, medium plastic, trace organic matter, organic odour, moist.**
- **Grey, hard, LEAN CLAY with SAND, medium plastic, trace organic matter, moist.**

**Ground Water Depth:** 0.65 m

**Remarks:**
- **REFUSAL** at 17.0 m
- **TOP OF BEDROCK** at 17.0 m

**Symbols:**
- **P.L.**
- **N.M.C.**
- **L.L.**
- **SPT Blows/30cm**
- **(Shelby)**
- **UDS-3**
- Depth

**Client:** LOCAL GOVERNMENT & HTC DEPARTMENT  
**GOVERNMENT OF SINDH**

**Project:** FEASIBILITY STUDY AND TRANSACTION ADVISORY SERVICES, ‘URBAN ROAD INITIATIVES IN KARACHI’

**Sub Project:** LINK ROAD FROM KORANGI BRIDGE / CULVERT

**Client:** M/S STS KARACHI

**Contractor:** M/S STS KARACHI

**Location:** BRIDGE / CULVERT

**Date:** 17-09-2020 To 21-09-2020
**KEY TO DESCRIPTION OF DISCONTINUITIES**

<table>
<thead>
<tr>
<th>Type</th>
<th>Aperture</th>
<th>Joint Set</th>
<th>Graphical</th>
<th>Infilling</th>
<th>Weathering of Rock Mass</th>
<th>Strength Grade of Discontinuity Wall</th>
</tr>
</thead>
<tbody>
<tr>
<td>J/R</td>
<td>0-0.1 mm</td>
<td>Smooth</td>
<td>Clean</td>
<td>Fresh</td>
<td>I - Fresh</td>
<td>R0 - Extremely Weak / 0.25 - 1.0</td>
</tr>
<tr>
<td>M</td>
<td>0.1-0.25 mm</td>
<td>Rough</td>
<td>Silicate</td>
<td>Slightly Weathered</td>
<td>II - Slightly Weathered</td>
<td>R1 - Very Weak / 1.0 - 5.0</td>
</tr>
<tr>
<td>F</td>
<td>0.25-1.0 mm</td>
<td>Open</td>
<td>Sheared</td>
<td>Moderately Weathered</td>
<td>III - Moderately Weathered</td>
<td>R2 - Weak / 5.0 - 25</td>
</tr>
<tr>
<td>W</td>
<td>1.0+ mm</td>
<td>Smooth</td>
<td>Silicate</td>
<td>Highly Weathered</td>
<td>IV - Highly Weathered</td>
<td>R3 - Medium Strong / 25 - 50</td>
</tr>
</tbody>
</table>

**NOTES:**
1. For Detailed Description of Discontinuity Parameters Refer to "IRM Suggested Method for Quantitative Description of Discontinuities in Rock".
2. ‘Masses’, in case of Clay Filled Discontinuities, the Strength of Clay Seam should be Reported as per IRM. Depth wise Zones of Similar Discontinuity.
3. Characteristics should be recognised to fill in Column No. 11.

**LITHOLOGY**

- **Top of Bedrock**
  - Brown, fresh to slightly weathered, moderately to intensely fractured/jointed, very weak.

- **Mudstone:**
  - Brown, fresh to slightly weathered, moderately to intensely fractured/jointed, very weak.

**BOTTOM OF BOREHOLE**

- **Mudstone:**
  - Brown, fresh to slightly weathered, moderately to intensely fractured/jointed, very weak.
BOREHOLE LOG

**Job No.:** P38035  **Project:** FEASIBILITY STUDY AND TRANSACTION ADVISORY SERVICES, "URBAN ROAD INITIATIVES IN KARACHI"  **Location:** BRIDGE

**Site Incharge:** JUNAID  **Client:** LOCAL GOVERNMENT & HTP DEPARTMENT  **Contractor:** M/S STS KARACHI

**Type of boring:** STRAIGHT ROTARY  **Drilling Fluid:** BENTONITE SLURRY  **Ground Water Depth:** 1.70 m

**Coordinates:**
- **N:** 2743295.00 m
- **E:** 308480.00 m

**Date:** 10-09-2020  **To:** 14-09-2020

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Sample No.</th>
<th>Legend</th>
<th>USCS Symbol</th>
<th>Description of Material</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td></td>
<td></td>
<td></td>
<td>Fill material: Light brown, SANDY SILT/SILT, slush.</td>
<td></td>
</tr>
<tr>
<td>1.0</td>
<td>SPT-1</td>
<td>+</td>
<td></td>
<td>Greyish brown, soft, SANDY SILTY CLAY, low plastic, moist.</td>
<td></td>
</tr>
<tr>
<td>2.0</td>
<td>SPT-2</td>
<td>+</td>
<td>CL-ML</td>
<td>Blackish grey, soft, LEAN CLAY with SAND, low to medium plastic, moist.</td>
<td></td>
</tr>
<tr>
<td>3.0</td>
<td>SPT-3</td>
<td>+</td>
<td>CL</td>
<td>Brownish grey, medium dense, fine to medium grained, SILTY SAND, moist.</td>
<td></td>
</tr>
<tr>
<td>4.0</td>
<td>SPT-4</td>
<td>+</td>
<td>SM</td>
<td>Grey, fine grained, poorly graded SAND with SILT, trace mica, moist.</td>
<td></td>
</tr>
<tr>
<td>5.0</td>
<td>SPT-5</td>
<td>+</td>
<td></td>
<td>Grey, medium dense, fine grained, poorly graded SAND with SILT, trace to few mica, moist.</td>
<td></td>
</tr>
<tr>
<td>6.0</td>
<td>SPT-6</td>
<td>+</td>
<td></td>
<td>Blackish grey, soft, LEAN CLAY with SAND, low to medium plastic, moist.</td>
<td></td>
</tr>
<tr>
<td>7.0</td>
<td>SPT-7</td>
<td>+</td>
<td></td>
<td>Brownish grey, medium dense, fine to medium grained, SILTY SAND, moist.</td>
<td></td>
</tr>
<tr>
<td>8.0</td>
<td>SPT-8</td>
<td>+</td>
<td></td>
<td>Grey, fine grained, poorly graded SAND with SILT, trace mica, moist.</td>
<td></td>
</tr>
<tr>
<td>9.0</td>
<td>SPT-9</td>
<td>+</td>
<td></td>
<td>Grey, medium dense, fine grained, poorly graded SAND with SILT, trace to few mica, moist.</td>
<td></td>
</tr>
</tbody>
</table>

**Legend:**
- **P.L.**
- **N.M.C.**
- **L.L.**
- **SPT Blows/30cm**

**Remarks:**
- **UDS-1**
- **Pitcher**
- **UDS-1**
- **6.50-7.40m depth.**
# Borehole Log

**Job No.:** P38035  
**Project:** FEASIBILITY STUDY AND TRANSACTION ADVISORY SERVICES, "URBAN ROAD INITIATIVES IN KARACHI"  
**Location:** BRIDGE  
**Client:** LOCAL GOVERNMENT & HTP DEPARTMENT  
**Contractor:** M/S STS KARACHI  

**Type of boring:** STRAIGHT ROTARY  
**Drilling Fluid:** BENTONITE SLURRY  
**Ground Water Depth:** 1.70 m  
**Date:** 10-09-2020 To 14-09-2020

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Sample No.</th>
<th>Legend</th>
<th>USCS Symbol</th>
<th>Description of Material</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.0</td>
<td>SPT-9</td>
<td></td>
<td></td>
<td>Grey, medium dense to very dense, fine grained, SILTY SAND, trace mica, moist.</td>
<td></td>
</tr>
<tr>
<td>11.0</td>
<td>SPT-10</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.0</td>
<td>SPT-11</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.0</td>
<td>SPT-12</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>14.0</td>
<td>SPT-13</td>
<td></td>
<td>SM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15.0</td>
<td>UDS-2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16.0</td>
<td>SPT-14</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17.0</td>
<td>SPT-15</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18.0</td>
<td>SPT-16</td>
<td></td>
<td></td>
<td>Dark grey, stiff, LEAN CLAY, medium plastic, trace silt, moist.</td>
<td></td>
</tr>
<tr>
<td>19.0</td>
<td>SPT-17</td>
<td></td>
<td>CL</td>
<td>Dark grey, very dense, fine grained, SAND, trace silt, trace mica, moist.</td>
<td></td>
</tr>
<tr>
<td>20.0</td>
<td>SPT-18</td>
<td></td>
<td>SP</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Coordinates:** N: 2743295.00 m  
E: 308480.00 m  

**Graphical Symbols:**
- **P.L.**
- **N.M.C.**
- **L.L.**

**Graphical Notes:**
- Pitcher
- UDS-2
- 15.00-15.90m depth.
## BOREHOLE LOG

**Job No.** P38035  
**Project** FEASIBILITY STUDY AND TRANSACTION ADVISORY SERVICES, "URBAN ROAD INITIATIVES IN KARACHI"  
**Location** BRIDGE  
**Contractor** M/S STS KARACHI

<table>
<thead>
<tr>
<th>Coordinates</th>
<th>N: 2743295.00 m</th>
<th>E: 308480.00 m</th>
<th>Ground Elevation</th>
<th>2.0 m</th>
<th>Date</th>
<th>10-09-2020 To</th>
<th>14-09-2020</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Depth</strong> (m)</td>
<td><strong>Sample No.</strong></td>
<td><strong>Legend</strong></td>
<td><strong>USCS Symbol</strong></td>
<td><strong>Description of Material</strong></td>
<td><strong>Depth of Casing/ Hole</strong></td>
<td><strong>SPT Blows/30cm</strong></td>
<td><strong>Remarks</strong></td>
</tr>
<tr>
<td>20.0</td>
<td>SPT-18</td>
<td></td>
<td></td>
<td>Dark grey, medium dense, fine grained, SAND, trace silt, trace mica, moist.</td>
<td>28</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21.0</td>
<td>SPT-19</td>
<td></td>
<td></td>
<td>SP</td>
<td>17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22.0</td>
<td>SPT-20</td>
<td></td>
<td>SP</td>
<td>Greyish brown, hard, SANDY LEAN CLAY, medium plastic, trace mica, moist.</td>
<td>31</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23.0</td>
<td>SPT-21</td>
<td></td>
<td>CL</td>
<td>34</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24.0</td>
<td>SPT-22</td>
<td></td>
<td></td>
<td>TOP OF BEDROCK</td>
<td>73</td>
<td></td>
<td>REFUSAL</td>
</tr>
<tr>
<td>25.0</td>
<td>SPT-23</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>26.0</td>
<td>SPT-24</td>
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<td></td>
</tr>
<tr>
<td>26.10</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>27.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Project Details
- **Project:** Feasibility Study and Transaction Advisory Services, Urban Road Initiatives in Karachi
  - Sub Project 1: Link Road from Korangi Bridge

## Site Details
- **Site:** Bridge
- **Coordinates:**
  - N: 274326.00 m
  - E: 308480.00 m

## Drilling Details
- **Angle (with vertical):** 0
- **Bearing:** 0
- **Core Barrel / Bit:** Hole Stabilization Not Required
- **Core Recovery %:** 60
- **Sample:** Wax Samples
- **Bit Size:** Double Tube
- **R.O.D. %:** 15
- **R.Q.D. %:** 55
- **Core Length:** 132
- **Loss %:** 7
- **Logged By:** Junaid
- **Checked By:** -

## Lithology
- **Top of Bedrock:** MUDSTONE
  - Dark grey, fine grained embedded with sand (20-22%), highly weathered, extremely weak to very weak.
- **Botom of Borehole:** Core
  - Recovery %: 60

## Discontinuity Data
- **Type:**
  - J: Joint
  - M: Major Joint
  - F: Fault
  - B: Bedding
  - R: Fracture
  - S: Surface Orientation

## Key for Description of Discontinuities
- **Type:**
  - J: Joint
  - M: Major Joint
  - F: Fault
  - B: Bedding
  - R: Fracture
  - S: Surface Orientation
- **Aperture:**
  - Very Tight: < 0.1 mm
  - Tight: 0.1 - 0.25 mm
  - Partly Open: 0.25 - 1 mm
  - Open: > 1 mm
- **Roughness:**
  - Smooth
  - Slightly Roughen
  - Rough
  - Extremely Roughened
- **Infilling:**
  - Clean
  - Mudstone
  - Silty Gravel
  - Gravely Silt

## Weathering of Rock Mass
- **Grade:**
  - R0: Completely Fresh
  - R1: Slightly Weathered
  - R2: Moderately Weathered
  - R3: Highly Weathered
  - R4: Very High Weathered
  - R5: Residual Soil
- **Term:**
  - Fresh
  - Slightly Weathered
  - Moderately Weathered
  - Highly Weathered
  - Very High Weathered
  - Residual Soil

## Strength Grade of Discontinuity Wall
- **Grade:**
  - R0: Extremely Weak (0.25 to 1.0)
  - R1: Very Weak (1.0 to 5.0)
  - R2: Weak (5.0 to 25)
  - R3: Medium Strong (25 to 50)
  - R4: Strong (50 to 100)
  - R5: Very Strong (100 to 250)
  - R6: Extremely Strong (> 250)

## Notes:
1. Detailed Description of Discontinuity Parameters Refer to ISRM Suggested Method for Quantitative Description of Discontinuities in Rock
2. Masses: In Case of Clay Filled Discontinuities, the Strength of Clay Seam should be Reported as per ISRM. Depth wise zones of similar discontinuity should be Recognized to fill in Column No. 11
3. Characteristics should be Recognized to fill in Column No. 11
# TESTPIT LOG

**Job No.** P38035  **Project** FEASIBILITY STUDY AND TRANSACTION ADVISORY SERVICES, URBAN ROAD INITIATIVES IN KARACHI  **Location** BRIDGE ON MALIR RIVER

**Site Incharge** M. ARIF  **Client** LOCAL GOVERNMENT & HTP DEPARTMENT  **Contractor** M/S STS KARACHI

**Coordinates** N: 2747118.964 m  **Ground Elevation** 11.646 m

**Date** 22-09-2020 TO 22-09-2020

<table>
<thead>
<tr>
<th>Depth in meter</th>
<th>Elevation in meter</th>
<th>USCS Symbol</th>
<th>DESCRIPTION OF MATERIAL</th>
<th>Sample Type/No.</th>
<th>Field Density Test</th>
<th>Lab. Density Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td></td>
<td></td>
<td>Asphalt layer.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.5</td>
<td></td>
<td>GP</td>
<td>Variegated, sub angular to sub rounded, poorly graded GRAVEL with SAND, gravel size (5-50mm), moist.</td>
<td>FDT-1</td>
<td>17.4</td>
<td>6.70</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ML</td>
<td>Brown, SANDY SILT, low plastic, trace gravel, moist.</td>
<td>CS-1</td>
<td>17.4</td>
<td>14.6</td>
</tr>
<tr>
<td>1.0</td>
<td></td>
<td></td>
<td>Brown, fine to coarse, poorly graded SAND with GRAVEL, moist.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.5</td>
<td></td>
<td></td>
<td>Brown, fine grained, poorly graded SAND, trace silt, trace gravel, moist.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.0</td>
<td></td>
<td></td>
<td><strong>BOTTOM OF TESTPIT</strong></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
### TESTPIT LOG

**Job No.** P38035  
**Project** FEASIBILITY STUDY AND TRANSACTION ADVISORY SERVICES, URBAN ROAD INITIATIVES IN KARACHI  
**Site Incharge** MUDASSAR  
**Client** LOCAL GOVERNMENT & HTP DEPARTMENT GOVERNMENT OF SINDH  
**Coordinates** N: 2747145.792 m  
E: 306872.758 m  
**Ground Elevation** 5.91 m  
**Date** 22-09-2020 TO 22-09-2020  
**Location** BRIDGE ON MALIR RIVER  
**Contractor** M/S STS KARACHI

<table>
<thead>
<tr>
<th>Depth in meter</th>
<th>Elevation in meter</th>
<th>USCS Symbol</th>
<th>Description of Material</th>
<th>Sample Type/No.</th>
<th>Field Density Test</th>
<th>Lab. Density Test</th>
<th>Remark</th>
</tr>
</thead>
</table>
| 0.0            |                    |             | Fill material:  
Grey to brown, fine to medium grained, SILTY SAND with gravels, cobbles, boulders,  
concrete blocks, polythene bags, fabric pieces,  
trace clay, trace organic matter. |                |                    |                    |        |
| 0.5            |                    |             |                        |                |                    |                    |        |
| 0.6            |                    |             |                        |                |                    |                    |        |
| N: 2747145.792 |                    |             | BOTTOM OF TESTPIT      |                |                    |                    |        |

Seepage water encountered at 0.60 m depth.
### TESTPIT LOG

**Job No.** P38035  
**Project** FEASIBILITY STUDY AND TRANSACTION ADVISORY SERVICES, URBAN ROAD INITIATIVES IN KARACHI  
**Location** CULVERT UNDER ROAD FOR LIGHT TRAFFIC  
**Contractor** M/S STS KARACHI  

<table>
<thead>
<tr>
<th>Depth in meter</th>
<th>Elevation in meter</th>
<th>USCS Symbol</th>
<th>Description of Material</th>
<th>Sample Type/No.</th>
<th>Test Lab. Density</th>
<th>Field Density Test</th>
<th>Lab. Density Test</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td></td>
<td></td>
<td>Brownish yellow, SILTY SAND, moist.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.5</td>
<td></td>
<td>SM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.75</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Coordinates:**  
N: 2747229.242 m  
E: 307536.315 m  

**Ground Elevation:** 5.86 m  

**Date:** 18-09-2020 TO 18-09-2020  

**Remarks:** Seepage water encountered at 0.75 m depth.
## TESTPIT LOG

**Job No.** P38035  
**Project** FEASIBILITY STUDY AND TRANSACTION ADVISORY SERVICES, URBAN ROAD INITIATIVES IN KARACHI  
**Site Incharge** MUDASSAR  
**Client** LOCAL GOVERNMENT & T&D DEPARTMENT GOVERNMENT OF SINDH  
**Location** KORANGI CAUSEWAY  
**Contractor** M/S STS KARACHI  

**Coordinates**  
N: 2747133.323 m  
E: 307682.558 m  
**Ground Elevation** 6.106 m  
**Date** 18-09-2020 TO 18-09-2020

<table>
<thead>
<tr>
<th>Depth in meter</th>
<th>Elevation in meter</th>
<th>Legend</th>
<th>USCS Symbol</th>
<th>Sample Type/No.</th>
<th>Field Density Test</th>
<th>Lab. Density Test</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td></td>
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</tr>
<tr>
<td>0.5</td>
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<td></td>
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<td></td>
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</tr>
<tr>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.78</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**DESCRIPTION OF MATERIAL**

Brownish yellow, SILTY SAND, non plastic, dry to slightly moist.

**REMARKS**

Seepage water encountered at 1.78 m depth.
**TESTPIT LOG**

**Job No.** P38035 **Project** FEASIBILITY STUDY AND TRANSACTION ADVISORY SERVICES, URBAN ROAD INITIATIVES IN KARACHI

**Site Incharge** M. ARIF **Client** LOCAL GOVERNMENT & HTP DEPARTMENT GOVERNMENT OF SINDH

**Coordinates** N: 2746806.195 m E: 307902.655 m **Date** 22-09-2020 TO 22-09-2020

**Location** LEFT PROTECTION BUND OF MALIR RIVER, KORANGI **Contractor** M/S STS KARACHI

---

**DESCRIPTION OF MATERIAL**

<table>
<thead>
<tr>
<th>Depth in meter</th>
<th>Elevation in meter</th>
<th>USCS Symbol</th>
<th>Type/No. Sample</th>
<th>Field Density Test</th>
<th>Lab. Density Test</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td></td>
<td>SP</td>
<td>Red, fine to coarse, SAND, trace silt, fine gravel, dry. Brown, fine to coarse, poorly graded SAND, trace silt, fine gravel, dry.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.5</td>
<td></td>
<td>GS-1</td>
<td>Brown, poorly graded GRAVEL, trace silt, moist.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.0</td>
<td>FDT-1</td>
<td>12.8 5.70 16.8 14.8 76</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

**BOTTOM OF TESTPIT**
## TESTPIT LOG

### Job No. P38035
**Project:** FEASIBILITY STUDY AND TRANSACTION ADVISORY SERVICES, URBAN ROAD INITIATIVES IN KARACHI

### Site Incharge
- **M. ARIF**

### Coordinates
- **N:** 2844794.00 m
- **E:** 309437.00 m

### Client
- **LOCAL GOVERNMENT & HTP DEPARTMENT GOVERNMENT OF SINDH**

### Contractor
- **M/S STS KARACHI**

### Location
- **OPPOSITE TO PRL KORANGI**

### Date
- **22-09-2020 TO 22-09-2020**

### DESCRIPTION OF MATERIAL

<table>
<thead>
<tr>
<th>Depth in meter</th>
<th>Elevation in meter</th>
<th>USCS Symbol</th>
<th>USCS Symbol</th>
<th>DESCRIPTION OF MATERIAL</th>
<th>Field Density Test</th>
<th>Lab. Density Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td></td>
<td></td>
<td></td>
<td>Asphalt layer.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.5</td>
<td></td>
<td>GP</td>
<td></td>
<td>Aggregate base course, variegated, sub angular to sub rounded, fine to coarse, poorly graded GRAVEL with SAND, size (5-60mm), moist.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.78</td>
<td></td>
<td>ML</td>
<td>CL-ML</td>
<td>Grey, SILT with SAND, trace gravel, trace polythene pieces, trace cloth pieces, trace roots, moist.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Brown, SILTY CLAY with SAND, trace gravel, trace polythene pieces, trace cloth pieces, wet.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Remarks
- Seepage water encountered at 0.78 m depth.
APPENDIX-C

SUBSURFACE CHARACTERISTICS

**FIG. C-1** VARIATION OF FIELD SPT BLOWS WITH DEPTH

**FIG. C-2** VARIATION OF CORRECTED SPT BLOWS WITH DEPTH
FEASIBILITY STUDY AND TRANSACTION ADVISORY SERVICES,
'URBAN ROAD INITIATIVES IN KARACHI'
(SUB PROJECT- 1: LINK ROAD FROM KORANGI)
Variation of Field SPT Blows with Depth
FIELD SPT BLOWS ($N_s$)
FEASIBILITY STUDY AND TRANSACTION ADVISORY SERVICES,
'URBAN ROAD INITIATIVES IN KARACHI'
(SUB PROJECT- 1: LINK ROAD FROM KORANGI)
Variation of Corrected SPT Blows with Depth
CORRECTED SPT BLOWS ($N_{tp}$)

![Diagram of corrected SPT blows with depth](Image)

- BH-1
- BH-2
- BH-3
- BH-4
- BH-5
- BH-6
APPENDIX-D

LABORATORY TEST RESULTS

Table D – 1: Summary of Laboratory Test Results

Table D – 2: Summary of Field Density Tests
## Summary of Laboratory Test Results

<table>
<thead>
<tr>
<th>BH/TP No.</th>
<th>Sample No.</th>
<th>Location</th>
<th>Depth (mm)</th>
<th>N value</th>
<th>P value</th>
<th>MDR (%)</th>
<th>SP (%)</th>
<th>ML (%)</th>
<th>OMC (%)</th>
<th>CBR (%)</th>
<th>pH</th>
<th>Total Solids (%)</th>
<th>Chloride Content (ppm)</th>
<th>Sulphate Content (ppm)</th>
<th>Organic Matter (%)</th>
<th>Total Dissolved Solids (ppm)</th>
<th>Water pH</th>
</tr>
</thead>
<tbody>
<tr>
<td>BH-01</td>
<td>SPT-1</td>
<td>3.00</td>
<td>1.00</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>99</td>
<td>98</td>
<td>0.02</td>
<td>43</td>
<td>25</td>
<td>18</td>
<td>CL A-7-6 Lean Clay</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>UDS-1</td>
<td>6.50</td>
<td>3.76</td>
<td>100</td>
<td>96</td>
<td>63</td>
<td>33</td>
<td>24</td>
<td>0.002</td>
<td>23</td>
<td>12</td>
<td>7</td>
<td>SM A-2-4 Silty Sand</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>SPT-15</td>
<td>16.00</td>
<td>16.45</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>98</td>
<td>97</td>
<td>0.002</td>
<td>18</td>
<td>22</td>
<td>14</td>
<td>CL A-6 Lean Clay</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>WS-1</td>
<td>16.30</td>
<td>16.73</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>98</td>
<td>97</td>
<td>0.002</td>
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<td>22</td>
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<tr>
<td></td>
<td>WS-2</td>
<td>18.75</td>
<td>18.86</td>
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<td>14</td>
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<tr>
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<td>WS-3</td>
<td>21.49</td>
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<td>WS-13</td>
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<td>100</td>
<td>100</td>
<td>99</td>
<td>97</td>
<td>0.002</td>
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<td>14</td>
<td>Claystone</td>
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</tbody>
</table>

### Uniaxial Compression Test

<table>
<thead>
<tr>
<th>Location</th>
<th>Test Description</th>
<th>Material Classification</th>
<th>% Failure Type</th>
<th>% Failure Type</th>
<th>Failure Stress</th>
<th>Failure Strain</th>
<th>Chemical Analysis of Soil</th>
<th>Chemical Analysis of Water</th>
<th>pH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<td></td>
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</tbody>
</table>

### Chemical Analysis of Soil

<table>
<thead>
<tr>
<th>Location</th>
<th>Test Description</th>
<th>Material Classification</th>
<th>% Failure Type</th>
<th>% Failure Type</th>
<th>Failure Stress</th>
<th>Failure Strain</th>
<th>Chemical Analysis of Soil</th>
<th>Chemical Analysis of Water</th>
<th>pH</th>
</tr>
</thead>
<tbody>
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</table>

### Chemical Analysis of Water

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<th>Material Classification</th>
<th>% Failure Type</th>
<th>% Failure Type</th>
<th>Failure Stress</th>
<th>Failure Strain</th>
<th>Chemical Analysis of Soil</th>
<th>Chemical Analysis of Water</th>
<th>pH</th>
</tr>
</thead>
<tbody>
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</tr>
</tbody>
</table>
### Table D-1

**Summary of Laboratory Test Results**

<table>
<thead>
<tr>
<th>No.</th>
<th>Location</th>
<th>BH/TP No.</th>
<th>Sample No.</th>
<th>Depth (mm)</th>
<th>Natural Moisture Content (NMC)</th>
<th>Grains (% Passing)</th>
<th>Uniaxial Compression Test</th>
<th>Direct Shear Test</th>
<th>Modified AASHTO Compaction Test</th>
<th>Modified AASHTO Cubic Compaction Test</th>
<th>Material Classification</th>
<th>Material Description</th>
<th>Chemical Analysis of Soil</th>
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<tr>
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**Notes:**

- **Uniaxial Compression Test:** Material Description includes Unconfined Compression Test (Soil) and Unconfined Compression Test (Rock).
- **Direct Shear Test:** Material Description includes In-situ Dry Density, Chloride Content, and Sulfate Content.
- **Chemical Analysis of Soil:** Material Description includes pH, Organic Matter, and Sulphate Content.
- **Chemical Analysis of Water:** Material Description includes Chloride Content and Sulphate Content.
### Summary of Laboratory Test Results

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**Table D-1 Smarty Road from Korangi**
### Summary of Field Density Tests

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<th>Sr. No.</th>
<th>Location</th>
<th>Testpit No.</th>
<th>FDTs</th>
<th>Depth (m)</th>
<th>Natural Moisture Content (%)</th>
<th>Density</th>
<th>Modified AASHTO Compaction</th>
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<td>Bulk (kN/m³)</td>
<td>Dry (kN/m³)</td>
<td>Max. Dry Density (kN/m³)</td>
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DETAILED RESULT SHEETS
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<th>Location</th>
<th>MC%</th>
<th>DENSITY (g/cm³)</th>
<th>Specific Gravity</th>
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Tested By: Ikram Ullah
Checked By: Mahmood
Dated: 29.09.2020
### SUMMARY OF NMC BULK DENSITY TEST RESULTS

**Project:** TAS FOR 03 URBAN ROAD PROJECTS IN KARACHI  
**Location:**  
**Client:**  
**Lab. Ref:** 61/2020  
**SOIL TESTING SERVICE**

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<th>BH / TP No.</th>
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**Tested By:** Ikram Ullah  
**Checked By:** Mahmood  
**Dated:** 29.09.2020
# SUMMARY OF NMC BULK DENSITY TEST RESULTS

**Project:** TAS FOR THREE URBAN ROAD PROJECTS IN KARACHI  
**Location:** KARACHI  

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**Client:** SOIL TESTING SERVICES  
**Lab. Ref:** 64/20  

**Tested By:** Ikram Ullah  
**Checked By:** Mahmood  
**Dated:** 13.10.2020
# SOILCON
GEOTECHNICAL TESTING LABORATORIES
18-Km, Multan Road, Lahore. Ph: 042-37510942-43 Fax:042-37515267

## SUMMARY OF NMC BULK DENSITY TEST RESULTS

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<thead>
<tr>
<th>BH / TP No.</th>
<th>Sample No.</th>
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Client: SOIL TESTING SERVICES
Lab. Ref.: 61/20

Tested By: Ikram Ullah
Checked By: Mahmood
Dated: 09.10.2020
## SUMMARY OF NMC BULK DENSITY TEST RESULTS

**Project:** TAS FOR 03 URBAN ROAD PROJECTS IN KARACHI  
**Location:** PACKAGE-1  
**Client:** SOIL TESTING SERVICES  
**Lab. Ref:** 64/20

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**Tested By:** Ikram Ullah  
**Checked By:** Mahmood  
**Dated:** 15.10.2020
## SUMMARY OF FIELD DENSITY TEST

**Project:** TAS FOR 03 URBAN ROAD PROJECTS IN KARACHI  
**Location:** PACKAGE-I  

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**Client:** 
**Lab. Ref:** 64/2020  
**STA:** 

**Tested By:** IKRAM ULLAH  
**Checked By:** MAHMOOD  
**Dated:** 16.11.2020
SOILCON
GRAIN SIZE ANALYSIS

CLIENT
SOIL TESTING SERVICES

PROJECT
TAS FOR 03 URBAN ROADS IN KARACHI

SITE
PACKAGE-1

BORE HOLE
BH-1

SAMPLE
SPT-3

TYPE
DISTURBED

DEPTH (m)
3.00-3.45

SPECIMEN
1

DATE
08.10.2020

---

### Sieve Analysis

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LAB. REF. 6420

REMARKS:

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SOILCON
GRAN SIZE ANALYSIS

CLIENT
SOIL TESTING SERVICES

PROJECT
FEASIBILITY STUDY & TRANSACTION ADVISORY SERVICES

SITE
FOR THREE URBAN ROAD PROJECTS IN KARACHI

BORE HOLE
BH-1

SAMPLE
UDS-1

TYPE
DISTURBED

DEPTH (m)
6.50-7.40

SPECIMEN
1

DATE
12.10.2020

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LAB. REF. 64/2020

REMARKS:

_________________________
_________________________
_________________________
SOILCON
GRAIN SIZE ANALYSIS

CLIENT: SOIL TESTING SERVICES
PROJECT: TAS FOR 03 URBAN ROADS IN KARACHI
SITE: PACKAGE-1
BORE HOLE: BH-1
SAMPLE: SPT-15
TYPE: DISTURBED
DEPTH (m): 16.00-16.45
SPECIMEN: 1
DATE: 08.10.2020

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LAB. REF.: 64/20

REMARKS:
SOILCON

GRAIN SIZE ANALYSIS

CLIENT: SOIL TESTING SERVICE
PROJECT: TAS FOR 03 URBAN ROAD PROJECTS IN KARACHI
SITE: PACKAGE-1
BORE HOLE: BH-2
SAMPLE: SPT-2
TYPE: DISTURBED
DEPTH (m): 2.00-2.45
SPECIMEN: 1
DATE: 15.10.2020

SIEVE NO. | 3" | 2" | 1" 1/2 | 3/4" | 3/8" | 4 | 10 | 40 | 100 | 200
PASSING (%) | 100 | 100 | 100 | 100 | 100 | 100 | 99 | 84 | 58

LAB. REF.: 64/2020

REMARKS:
SOILCON

GRAIN SIZE ANALYSIS

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LAB. REF. 64/2020

REMARKS:
SOILCON
GRAIN SIZE ANALYSIS

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<tr>
<td>I.K. ULLAH</td>
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| LAB. REF. | 64/2020 |

| REMARKS: |
|----------|---------|
|          |         |

![NESPAG, Karachi]
SOILCON

GRAIN SIZE ANALYSIS

CLIENT: SOIL TESTING SERVICE
PROJECT: TAS FOR 03 URBAN ROAD PROJECTS IN KARACHI
SITE: PACKAGE-1
BORE HOLE: BH-2
SAMPLE: DS-1
TYPE: DISTURBED
DEPTH (m): 15.00-16.00
SPECIMEN: 1
DATE: 15.10.2020

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LAB. REF.: 64/2020

REMARKS:
SOILCON
GRAIN SIZE ANALYSIS

CLIENT: SOIL TESTING SERVICES
PROJECT: TAS FOR 03 URBAN ROADS IN KARACHI
SITE: PACKAGE-1
BORE HOLE: BH-3
SAMPLE: SPT-2
TYPE: DISTURBED
DEPTH (m): 2.00-2.45
SPECIMEN: 1
DATE: 08.10.2020

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<tbody>
<tr>
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LAB. REF. 64/20

REMARKS:
## Soilcon

### Grain Size Analysis

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</tr>
<tr>
<td>Site</td>
<td>For three urban road projects in Karachi</td>
</tr>
<tr>
<td>Bore Hole</td>
<td>BH-3</td>
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<td>Sample</td>
<td>UDS-1</td>
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<tr>
<td>Type</td>
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</tr>
<tr>
<td>Depth (m)</td>
<td>6.50-6.85</td>
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### Remarks:

[Signature]

[Stamp: Engineering Services Pakistan]
# SOILCON

## GRAIN SIZE ANALYSIS

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<tr>
<td>4</td>
<td>10</td>
<td>40</td>
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**Graph:**

- X-axis: Grain Diameter (mm)
- Y-axis: Passing (%)

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<th>3/4&quot;</th>
<th>3/8&quot;</th>
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**Laboratory Reference:** 64/20

**Remarks:**

[Signature]

[Stamp: NESPAK, Karachi]
SOILCON

GRAIN SIZE ANALYSIS

CLIENT
SOIL TESTING SERVICES

PROJECT
FEASIBILITY STUDY & TRANSACTION ADVISORY SERVICES

SITE
FOR THREE URBAN ROAD PROJECTS IN KARACHI

BORE HOLE
BH-3

SAMPLE
UDS-2

TYPE
DISTURBED

DEPTH (m)
15.50-17.00

SPECIMEN
1

DATE
12.10.2020

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<td>3/4&quot;</td>
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LAB. REF. 64/2020

REMARKS: 

__________________________
__________________________

[Diagram and table with soil grain size analysis data]
SOILCON
GRAIN SIZE ANALYSIS

CLIENT: SOIL TESTING SERVICES
PROJECT: FEASIBILITY STUDY & TRANSACTION ADVISORY SERVICES
SITE: FOR THREE URBAN ROAD PROJECTS IN KARACHI
BORE HOLE: BH-4
SAMPLE: UDS-1
TYPE: UNDISTURBED
DEPTH (m): 5.00-8.90
SPECIMEN: 1
DATE: 09.10.2020

COBBLES | GRAVEL | SAND | SILT | CLAY

<table>
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LAB. REF.: 61/2020

REMARKS:
SOILCON
GRAIN SIZE ANALYSIS

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<tr>
<td>IRFAN ULLAH</td>
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<td>PACKAGE-1</td>
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<td>SPT-9</td>
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<th>CLAY</th>
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<td>3/4&quot; 4&quot; 4&quot;</td>
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<td>100 100 100 100 100</td>
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</tbody>
</table>

LAB. REF. | 61/20 |

REMARKS:
Retained material on No.10 sieve was comprises of fossils and some organic material.
SOILCON

GRAIN SIZE ANALYSIS

CLIENT: SOIL TESTING SERVICES
PROJECT: FEASIBILITY STUDY & TRANSACTION ADVISORY SERVICES
SITE: FOR THREE URBAN ROAD PROJECTS IN KARACHI
BORE HOLE: BH-4
SAMPLE: UDS-2
TYPE: UNDISTURBED
DEPTH (m): 13.00-13.90
SPECIMEN: 1
DATE: 09.10.2020

COBBLES | GRAVEL | SAND | SILT | CLAY

3" | 2" | 1 1/2" | 3/4" | 3/8" | 4 | 10 | 20 | 40 | 60 | 100 | 200 | ASTM SIEVES

<table>
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<th>GRAIN DIAMETER (mm)</th>
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LAB. REF. 61/2020

REMARKS:
SOILCON

GRAIN SIZE ANALYSIS

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<tr>
<td>PROJECT</td>
<td>FEASIBILITY STUDY &amp; TRANSACTION ADVISORY SERVICES</td>
</tr>
<tr>
<td>SITE</td>
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</tr>
<tr>
<td>BORE HOLE</td>
<td>BH-4</td>
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<td>SAMPLE</td>
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<tr>
<td>3&quot;</td>
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<td>1 1/2</td>
<td>3/4&quot;</td>
<td>3/8&quot;</td>
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<th>ASTM SIEVES</th>
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<th>10</th>
<th>50</th>
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<tr>
<td>PASSING (%)</td>
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<td>100</td>
<td>100</td>
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SIEVE NO. 100 40 100 100 64 55 43 34

LAB. REF. 61/2020

REMARKS:

[Signature]

[Company Seal]
# Soilcon

## Grain Size Analysis

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<tbody>
<tr>
<td>Ikram Ullah</td>
<td>M. Ammood</td>
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**Client:** Soil Testing Service

**Project:** TAS for '03 Urban Road Projects in Karachi

**Site:** Package 1

**Bore Hole:** BH-F

**Sample:** SP7-3

**Type:** Disturbed

**Depth (m):** 3.00-3.45

**Specimen:** 1

**Date:** 15.10.2020

### Sieve Analysis

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<tbody>
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**Lab. Ref:** 64/2020

**Remarks:**

[Signature]

[Stamp: NESPAK, Karachi]
# SOILCON

## GRAIN SIZE ANALYSIS

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<tr>
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<td>3/8&quot;</td>
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<td>4</td>
<td>10</td>
<td>40</td>
<td>100</td>
<td>200</td>
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## Graph

- **Axis**:
  - X-axis: Grain Diameter (mm)
  - Y-axis: Passing (%)

## Table Data

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<tr>
<th>SIEVE NO.</th>
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<th>3/8&quot;</th>
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## Notes

- **LAB. REF.**: 64/2020

## Remarks:

- Additional comments or observations.

- [Shahrdar, Karachi]
SOILCON
GRAN SIZE ANALYSIS

CLIENT
SOIL TESTING SERVICE

PROJECT
TAS FOR 03 URBAN ROAD PROJECTS IN KARACHI

SITE
PACKAGE-1

BORE HOLE
BH-5

SAMPLE
UDS-3

TYPE
UNDISTURBED

DEPTH m
11.50-12.00

SPECIMEN
1

DATE
15.10.2020

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LAB. REF. 64/2020

REMARKS:

---

SIEVE NO. 3" 2" 1"1/2 3/4" 3/8" 4 10 40 100 200

PASSING (%) 100 100 100 100 100 100 99 98 97

---

ENGINEERING SERVICES PAKISTAN PVT LTD

NESPARK, Karachi
## SOILCON

### GRAIN SIZE ANALYSIS

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<thead>
<tr>
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### Grain Size Analysis Table

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<td>88</td>
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**SIEVE NO.** | **PASSING (%)**
---|---
3" | 100
2" | 100
1"1/2 | 100
3/4" | 100
1"4" | 100
4 | 91
10 | 89
40 | 88
100 | 83
200 | 

**LAB. REF.** | 64/2020

**REMARKS:**

---

---
SOILCON

GRAIN SIZE ANALYSIS

CLIENT: SOIL TESTING SERVICES
PROJECT: TAS FOR 02 URBAN ROADS IN KARACHI
SITE: PACKAGE-1
BORE HOLE: BH-6
SAMPLE: SPT-3
TYPE: DISTURBED
DEPTH (m): 3.00-3.45
SPECIMEN: 1
DATE: 29.09.2020

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<td>2&quot;</td>
<td>1&quot;/2</td>
<td>3/4&quot;</td>
<td>3/8&quot;</td>
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</table>

| PASSING (%) | 100 | 100 | 100 | 100 | 100 | 88  | 65  | 82  | 73  |

LAB. REF. 61/20

REMARKS:

---

[Diagram with grain size analysis data]
SOILCON
GRAIN SIZE ANALYSIS

CLIENT: SOIL TESTING SERVICES
PROJECT: TAS FOR 03 URBAN ROADS IN KARACHI
SITE: PACKAGE-1
BORE HOLE: BH-6
SAMPLE: UDS-1
TYPE: UNDISTURBED
DEPTH (m): 6.50-7.40
SPECIMEN: 1
DATE: 29.09.2020

<table>
<thead>
<tr>
<th>COBBLES</th>
<th>GRAVEL</th>
<th>SAND</th>
<th>SILT</th>
<th>CLAY</th>
</tr>
</thead>
<tbody>
<tr>
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<td>20</td>
<td>40</td>
<td>60</td>
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<tr>
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<th>3/4&quot;</th>
<th>3/8&quot;</th>
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<td>PASSING (%)</td>
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<td>100</td>
<td>99</td>
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<td>7</td>
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LAB. REF. 61/20

REMARKS:
SOILCON
GRAN SIZE ANALYSIS

CLIENT: SOIL TESTING SERVICES
PROJECT: TAS FOR 02 URBAN ROADS IN KARACHI
SITE: PACKAGE-1
BORE HOLE: BH.6
SAMPLE: UDS-2
TYPE: UNDISTURBED
DEPTH (m): 15.00-15.90
SPECIMEN: 1
DATE: 29.09.2020

COBBLES | GRAVEL | SAND | SILT | CLAY
<table>
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<th></th>
<th></th>
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<tbody>
<tr>
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<td></td>
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</tbody>
</table>

<table>
<thead>
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<th>2&quot;</th>
<th>1&quot;1/2</th>
<th>3/4&quot;</th>
<th>3/8&quot;</th>
<th>4</th>
<th>10</th>
<th>40</th>
<th>100</th>
<th>200</th>
</tr>
</thead>
<tbody>
<tr>
<td>PASSING (%)</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>98</td>
<td>91</td>
<td>78</td>
<td>71</td>
<td>42</td>
<td>35</td>
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</tr>
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</table>

LAB. REF.: 61/20

REMARKS:

[Diagram of grain size analysis graph]

[Signature]
SOILCON
GRAIN SIZE ANALYSIS

CLIENT: SOIL TESTING SERVICES
PROJECT: TAS FOR 03 URBAN ROADS IN KARACHI
SITE: PACKAGE-1
BORE HOLE: BH-6
SAMPLE: SPT-22
TYPE: DISTURBED
DEPTH(m): 24.00-24.45
SPECIMEN: 1
DATE: 29.09.2020

CUBBLES | GRAVEL | SAND | SILT | CLAY
--------|--------|------|------|------
3" | 2" | 3/4" | 3/8" | 4 | 10 | 20 | 40 | 60 | 100 | 200 | ASTM SIEVES

GRAIN DIAMETER (mm)

PASSENG (%) | 3" | 2" | 1 1/2 | 3/4" | 3/8" | 4 | 10 | 40 | 100 | 200
-------------|----|-----|------|------|------|---|----|----|-----|-----
100 | 100 | 100 | 100 | 100 | 100 | 62 | 59 | 57 | 55

LAB. REF: 61/20

REMARKS:

[Signature]

[Stamp]
# SOILCON

## GRAIN SIZE ANALYSIS

<table>
<thead>
<tr>
<th>Tested By</th>
<th>Checked By</th>
</tr>
</thead>
<tbody>
<tr>
<td>Imdad Ullah</td>
<td>M. M. N. G. H. D.</td>
</tr>
</tbody>
</table>

**Client:** SOIL TESTING SERVICE  
**Project:** TAS FOR 03 URBAN ROAD PROJECTS IN KARACHI  
**Site:** PACKAGE-1  
**Bore Hole:** TP-1  
**Sample:** CS-1  
**Type:** DISTURBED  
**Depth (m):** 0.28-0.63  
**Specimen:** 1  
**Date:** 15.10.2020

<table>
<thead>
<tr>
<th>Cobble</th>
<th>Gravel</th>
<th>Sand</th>
<th>Silt</th>
<th>Clay</th>
</tr>
</thead>
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<tr>
<td>3&quot;</td>
<td>2&quot;</td>
<td>1 1/2&quot;</td>
<td>3/4&quot;</td>
<td>3/8&quot;</td>
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<th>2&quot;</th>
<th>1 1/2&quot;</th>
<th>3/4&quot;</th>
<th>3/8&quot;</th>
<th>4</th>
<th>10</th>
<th>40</th>
<th>100</th>
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<tr>
<td>Passing (%)</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>99</td>
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**Lab. Ref.** 64/2020

**Remarks:**

---

[Engineering Services Pakistan]
# Soil Analysis

**Client:** SOIL TESTING SERVICE  
**Project:** TAS FOR 03 URBAN ROAD PROJECTS IN KARACHI  
**Site:** PACKAGE-1  
**Bore Hole:** TP-4  
**Sample:** CS-1  
**Type:** DISTURBED  
**Depth (m):** 0.00-1.78  
**Specimen:** 1  
**Date:** 15.10.2020

### Grain Size Analysis

<table>
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<tr>
<th>Sieve No.</th>
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<th>2&quot;</th>
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<th>3/8&quot;</th>
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<th>10</th>
<th>40</th>
<th>100</th>
<th>200</th>
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</thead>
<tbody>
<tr>
<td>Passing (%)</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>89</td>
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</table>

### Remarks:

[Signature]

**Lab. Ref.:** 64/2020

---

[Logo: NESPAK, Karachi]
SOILCON
GRAIN SIZE ANALYSIS

CLIENT: SOIL TESTING SERVICE
PROJECT: TAS FOR 02 URBAN ROAD PROJECTS IN KARACHI
SITE: PACKAGE-1
BORE HOLE: TP 5
SAMPLE: CS-1
TYPE: DISTURBED
DEPTH (m): 0.40-2.00
SPECIMEN: 1
DATE: 15.10.2020

<table>
<thead>
<tr>
<th>COBBLES</th>
<th>GRAVEL</th>
<th>SAND</th>
<th>SILT</th>
<th>CLAY</th>
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<tbody>
<tr>
<td>3&quot;</td>
<td>2&quot;</td>
<td>1&quot;1/2</td>
<td>3/4&quot;</td>
<td>3/8&quot;</td>
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<td>100</td>
</tr>
<tr>
<td>ASTM Sieves</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

![Soil Grain Size Analysis Graph](image)

SIEVE NO. 3" 2" 1"1/2 3/4" 3/8" 4 10 40 100 200
PASSING (%) 100 100 89 78 48 5 5 5 3 2

LAB. REF. 64/2020

REMARKS:

[Signature]

[Company Seal]

[Engineering Services Pakistan]

[Address: Karachi]
SOILCON
LIQUID & PLASTIC LIMIT
( ASTM D-4318 )

PROJECT: TAS FOR 03 URBAN ROAD PROJECTS IN KARACHI
LOCATION: PACKAGE-1
CLIENT: SOIL TESTING SERVICES

<table>
<thead>
<tr>
<th>BOREHOLE</th>
<th>SAMPLE</th>
<th>SPT-3</th>
<th>TYPE</th>
<th>DISTURBED</th>
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</thead>
<tbody>
<tr>
<td>BH-1</td>
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<td>3.00-3.45</td>
<td>DATE</td>
<td>08.10.2020</td>
</tr>
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</table>

### LIQUID LIMIT

<table>
<thead>
<tr>
<th>Number of Blows N</th>
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<th>19</th>
<th>24</th>
<th>30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moisture Content %</td>
<td>44.18</td>
<td>43.47</td>
<td>42.97</td>
<td>42.51</td>
</tr>
</tbody>
</table>

### PLASTIC LIMIT

| Moisture Content % | 24.97 | 25.01 | 25.05 |

### LIQUID LIMIT vs. PLASTIC LIMIT

<table>
<thead>
<tr>
<th>LIQUID LIMIT</th>
<th>PLASTIC LIMIT</th>
<th>PLASTICITY INDEX</th>
</tr>
</thead>
<tbody>
<tr>
<td>43</td>
<td>25</td>
<td>18</td>
</tr>
</tbody>
</table>

TESTED BY
MAHMOOD

CHECKED BY
IKRAM
LIQUID LIMIT

<table>
<thead>
<tr>
<th>Number of Blows N</th>
<th>17</th>
<th>21</th>
<th>26</th>
<th>31</th>
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</thead>
<tbody>
<tr>
<td>Moisture Content %</td>
<td>37.01</td>
<td>36.33</td>
<td>36.78</td>
<td>35.30</td>
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</tbody>
</table>

PLASTIC LIMIT

| Moisture Content % | 22.03 | 22.07 | 22.11 |

<table>
<thead>
<tr>
<th>LIQUID LIMIT</th>
<th>PLASTIC LIMIT</th>
<th>PLASTICITY INDEX</th>
</tr>
</thead>
<tbody>
<tr>
<td>36</td>
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<td>14</td>
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</table>

![Graph showing relationship between moisture content and number of blows](image-url)
**LIQUID LIMIT**

<table>
<thead>
<tr>
<th>Number of Blows N</th>
<th>10</th>
<th>Moisture Content %</th>
<th>23.24</th>
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Further readings are not possible.

**PLASTIC LIMIT**

<table>
<thead>
<tr>
<th>Moisture Content %</th>
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</table>

<table>
<thead>
<tr>
<th>LIQUID LIMIT</th>
<th>PLASTIC LIMIT</th>
<th>PLASTICITY INDEX</th>
</tr>
</thead>
</table>

**Graph**

- X-axis: Number of Blows (N)
- Y-axis: Moisture Content (%)

**Tested By**

MAHMOOD

**Checked By**

IKRAM
SOILCON
LIQUID & PLASTIC LIMIT
(AS T M D - 4 3 1 8 )

PROJECT: TAS FOR 03 URBAN ROAD PROJECTS IN KARACHI
LOCATION: PACKAGE-1
CLIENT: SOIL TESTING SERVICES
BOREHOLE: BH 1
SAMPLE: UDS-2
DEPTH: 11.50-12.00
DATE: 15.10.2020

LIQUID LIMIT

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<th>Number of Blows N</th>
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<td>Moisture Content %</td>
<td>21.88</td>
<td>41.46</td>
<td>40.89</td>
<td>40.52</td>
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</table>

PLASTIC LIMIT

| Moisture Content % | 24.02 | 24.05 | 24.08 |

<table>
<thead>
<tr>
<th>LIQUID LIMIT</th>
<th>PLASTIC LIMIT</th>
<th>PLASTICITY INDEX</th>
</tr>
</thead>
<tbody>
<tr>
<td>41</td>
<td>24</td>
<td>17</td>
</tr>
</tbody>
</table>

![Graph showing moisture content versus number of blows]

TESTED BY: MAHMOOD
CHECKED BY: IKRAM
SOILCON
LIQUID & PLASTIC LIMIT
( ASTM D-4318 )

<table>
<thead>
<tr>
<th>PROJECT</th>
<th>FEASIBILITY STUDY &amp; TRANSACTION ADVISORY SERVICES FOR THREE URB</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOCATION</td>
<td>ROAD PROJECT IN KARACHI</td>
</tr>
<tr>
<td>CLIENT</td>
<td>SOIL TESTING SERVICES</td>
</tr>
<tr>
<td>BOREHOLE</td>
<td>BH-3</td>
</tr>
<tr>
<td>SAMPLE</td>
<td>SPT-11</td>
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<td>TYPE</td>
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<tr>
<td>DEPTH m</td>
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<tr>
<td>DATE</td>
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**LIQUID LIMIT**

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<th>Number of Blows N</th>
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<th>27</th>
<th>31</th>
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<tbody>
<tr>
<td>Moisture Content %</td>
<td>49.31</td>
<td>48.60</td>
<td>48.01</td>
<td>47.53</td>
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**PLASTIC LIMIT**

| Moisture Content % | 26.15 | 26.19 | 26.23 |

<table>
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<th>PLASTICITY INDEX</th>
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<td>48</td>
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</table>

![Graph showing the relationship between moisture content and number of blows (N)]

**TESTED BY**
MAHMOOD

**CHECKED BY**
IKRAM

[Signature]

[Stamp: NESPAK, Karachi]
**SOILCON**

**LIQUID & PLASTIC LIMIT**

(ASTM D-4318)

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>LOCATION</td>
<td>PACKAGE-1</td>
</tr>
<tr>
<td>CLIENT</td>
<td>SOIL TESTING SERVICES</td>
</tr>
<tr>
<td>BOREHOLE</td>
<td>BH-4</td>
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<td>61/2020</td>
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<tr>
<td>SAMPLE</td>
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<tr>
<td>SPT-9</td>
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### LIQUID LIMIT

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<th>20</th>
<th>25</th>
<th>30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moisture Content %</td>
<td>35.82</td>
<td>35.26</td>
<td>34.73</td>
<td>34.38</td>
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</table>

### PLASTIC LIMIT

| Moisture Content % | 20.80 | 20.84 | 20.89 |

### LIQUID LIMIT | PLASTIC LIMIT | PLASTICITY INDEX
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>35</td>
<td>21</td>
<td>14</td>
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</tbody>
</table>

![Graph showing relationship between moisture content and number of blows.

**TESTED BY**

MAHMOOD

**CHECKED BY**

IKRAM

[Stamp: NESPAK, Karachi]
SOILCON
LIQUID & PLASTIC LIMIT
( ASTM D - 4318 )

PROJECT
FEASIBILITY STUDY & TRANSACTION ADVISORY SERVICES FOR THREE URB
LOCATION
ROAD PROJECT IN KARACHI
CLIENT
SOIL TESTING SERVICES
BOREHOLE
BH-4
SAMPLE
UDS-3
TYPE
UNDISTURBED
LAB. REF.
61/2020
DEPTH m
16.00-16.50
DATE
12.10.2020

LIQUID LIMIT

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<th>31</th>
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<tr>
<td>Moisture Content %</td>
<td>33.47</td>
<td>32.81</td>
<td>32.29</td>
<td>31.96</td>
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</table>

PLASTIC LIMIT

| Moisture Content % | 20.21 | 20.25 | 20.29 |

<table>
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<th>PLASTIC LIMIT</th>
<th>PLASTICITY INDEX</th>
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</thead>
<tbody>
<tr>
<td>33</td>
<td>20</td>
<td>13</td>
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</tbody>
</table>

![Graph showing moisture content vs. number of blows]

TESTED BY
MAHMOOD

CHECKED BY
IKRAM

[Stamp: NESPAK, Karachi]
## SOILCON

**LIQUID & PLASTIC LIMIT**  
( ASTM D - 4318 )

<table>
<thead>
<tr>
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<tbody>
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<td>PACKAGE-1</td>
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<tr>
<td>CLIENT</td>
<td>SOIL TESTING SERVICES</td>
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<tr>
<td>BOREHOLE</td>
<td>BH- 4</td>
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### LIQUID LIMIT

<table>
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<th>25</th>
<th>30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moisture Content %</td>
<td>42.00</td>
<td>41.40</td>
<td>40.78</td>
<td>40.37</td>
</tr>
</tbody>
</table>

### PLASTIC LIMIT

| Moisture Content % | 23.97 | 24.01 | 24.05 |

### LIQUID LIMIT & PLASTIC LIMIT

<table>
<thead>
<tr>
<th>LIQUID LIMIT</th>
<th>PLASTIC LIMIT</th>
<th>PLASTICITY INDEX</th>
</tr>
</thead>
<tbody>
<tr>
<td>41</td>
<td>24</td>
<td>17</td>
</tr>
</tbody>
</table>

![Graph of Moisture Content vs Number of Blows](image)

**TESTED BY**  
MAHMOOD  

**CHECKED BY**  
IKRAM
SOILCON
LIQUID & PLASTIC LIMIT
(ASTM D - 4318)

PROJECT: TAS FOR 03 URBAN ROAD PROJECTS IN KARACHI
LOCATION: PACKAGE-1
CLIENT: SOIL TESTING SERVICES

<table>
<thead>
<tr>
<th>BOREHOLE</th>
<th>SAMPLE</th>
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<th>TYPE</th>
<th>DISTURBED</th>
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<tbody>
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<td>DEPTH m</td>
<td>3.00-3.45</td>
<td>DATE</td>
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<td></td>
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<td>15.10.2020</td>
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LIQUID LIMIT

<table>
<thead>
<tr>
<th>Number of Blows N</th>
<th>19</th>
<th>23</th>
<th>28</th>
<th>32</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moisture Content %</td>
<td>34.15</td>
<td>33.53</td>
<td>32.94</td>
<td>32.61</td>
</tr>
</tbody>
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PLASTIC LIMIT

| Moisture Content % | 20.21 | 20.25 | 20.29 |  |

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<th>LIQUID LIMIT</th>
<th>PLASTIC LIMIT</th>
<th>PLASTICITY INDEX</th>
</tr>
</thead>
<tbody>
<tr>
<td>33</td>
<td>20</td>
<td>13</td>
</tr>
</tbody>
</table>

![Graph showing the relationship between moisture content and number of blows.](image)

TESTED BY: MAHMOOD
CHECKED BY: IKRAM
SOILCON
LIQUID & PLASTIC LIMIT
(ASTM D-4318)

PROJECT: TAS FOR 03 URBAN ROAD PROJECTS IN KARACHI
LOCATION: PACKAGE-1
CLIENT: SOIL TESTING SERVICES

BOREHOLE: BH-5
SAMPLE: UDS-3
LAB. REF.: 64/2020
DEPTH: 11.50-12.00
DATE: 15.10.2020

<table>
<thead>
<tr>
<th>Number of Blows N</th>
<th>17</th>
<th>21</th>
<th>26</th>
<th>30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moisture Content %</td>
<td>43.55</td>
<td>42.92</td>
<td>42.41</td>
<td>42.08</td>
</tr>
</tbody>
</table>

PLASTIC LIMIT

| Moisture Content % | 24.68 | 24.72 | 24.76 |

<table>
<thead>
<tr>
<th>LIQUID LIMIT</th>
<th>PLASTIC LIMIT</th>
<th>PLASTICITY INDEX</th>
</tr>
</thead>
<tbody>
<tr>
<td>43</td>
<td>26</td>
<td>18</td>
</tr>
</tbody>
</table>

![Graph showing moisture content vs. number of blows](image)

TESTED BY: MAHMOOD
CHECKED BY: IKRAM

[Signature]
[Signature]
SOILCON
LIQUID & PLASTIC LIMIT
( ASTM D - 4318 )

PROJECT  TAS FOR 03 URBAN ROAD PROJECTS IN KARACHI
LOCATION  PACKAGE-1
CLIENT  SOIL TESTING SERVICES
BOREHOLE  BH-5
LAB. REF.  64/2020
SAMPLE
DEPTH m
SPT-15  16.00-16.45
TYPE  DISTURBED
DATE  15.10.2020

LIQUID LIMIT

<table>
<thead>
<tr>
<th>Number of Blows N</th>
<th>18</th>
<th>22</th>
<th>26</th>
<th>30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moisture Content %</td>
<td>26.15</td>
<td>25.63</td>
<td>25.17</td>
<td>24.78</td>
</tr>
</tbody>
</table>

PLASTIC LIMIT

| Moisture Content % | 17.19 | 17.23 | 17.27 |

<table>
<thead>
<tr>
<th>LIQUID LIMIT</th>
<th>PLASTIC LIMIT</th>
<th>PLASTICITY INDEX</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>17</td>
<td>8</td>
</tr>
</tbody>
</table>

![Graph showing relationship between Number of Blows (N) and Moisture Content %]

TESTED BY  MAHMOOD
CHECKED BY  IKRAM

NSPAK, KARACHI
SOILCON
LIQUID & PLASTIC LIMIT
(AS TM D - 4318)

PROJECT: TAS FOR 03 URBAN ROAD PROJECTS IN KARACHI
LOCATION: PACKAGE-1
CLIENT: SOIL TESTING SERVICES

BOREHOLE: BH-6
SAMPLE: DEPTH m
SPT-3: 3.00-3.45
TYPE: DISTURBED
LAB. REF.: 61/2020
DATE: 29.09.2020

LIQUID LIMIT

<table>
<thead>
<tr>
<th>Number of Blows N</th>
<th>16</th>
<th>20</th>
<th>25</th>
<th>30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moisture Content %</td>
<td>28.64</td>
<td>28.18</td>
<td>27.65</td>
<td>27.20</td>
</tr>
</tbody>
</table>

PLASTIC LIMIT

| Moisture Content % | 19.71 | 19.76 | 19.81 |

<table>
<thead>
<tr>
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<th>PLASTIC LIMIT</th>
<th>PLASTICITY INDEX</th>
</tr>
</thead>
<tbody>
<tr>
<td>28</td>
<td>20</td>
<td>6</td>
</tr>
</tbody>
</table>

![Graph showing moisture content vs. number of blows]

TESTED BY: MAHMOOD
CHECKED BY: IKRAM

[Stamp: NESPAK, Karachi]
SOILCON
LIQUID & PLASTIC LIMIT
(ASTM D-4318)

PROJECT: TAS FOR 03 URBAN ROAD PROJECTS IN KARACHI
LOCATION: PACKAGE-1
CLIENT: SOIL TESTING SERVICES

<table>
<thead>
<tr>
<th>BOREHOLE</th>
<th>SAMPLE</th>
<th>SPT-22</th>
<th>TYPE</th>
<th>DISTURBED</th>
</tr>
</thead>
<tbody>
<tr>
<td>BH-6</td>
<td>DEPTH m</td>
<td>24.00-24.45</td>
<td>DATE</td>
<td>29.09.2020</td>
</tr>
<tr>
<td>LAB. REF.</td>
<td>61/2020</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

LIQUID LIMIT

<table>
<thead>
<tr>
<th>Number of Blows N</th>
<th>16</th>
<th>21</th>
<th>26</th>
<th>30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moisture Content %</td>
<td>35.36</td>
<td>34.70</td>
<td>34.13</td>
<td>33.71</td>
</tr>
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</table>

PLASTIC LIMIT

| Moisture Content % | 20.97 | 21.01 | 21.05 |

<table>
<thead>
<tr>
<th>LIQUID LIMIT</th>
<th>PLASTIC LIMIT</th>
<th>PLASTICITY INDEX</th>
</tr>
</thead>
<tbody>
<tr>
<td>34</td>
<td>21</td>
<td>13</td>
</tr>
</tbody>
</table>

![Graph showing relationship between moisture content and number of blows](image)

TESTED BY: MAHMOOD
CHECKED BY: IKRAM

[Stamp: NESPAK, Karachi]
SOILCON
LIQUID & PLASTIC LIMIT
( ASTM D - 4318 )

PROJECT: TAS FOR 03 URBAN ROAD PROJECTS IN KARACHI
LOCATION: PACKAGE-1
CLIENT: SOIL TESTING SERVICES
BOREHOLE: TP-1
LAB. REF.: 64/2020

<table>
<thead>
<tr>
<th>DEPTH m</th>
<th>CS-1</th>
<th>TYPE</th>
<th>DISTURBED</th>
<th>DATE</th>
</tr>
</thead>
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<tr>
<td>0.26-0.63</td>
<td>0</td>
<td></td>
<td>15.10.2020</td>
<td></td>
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</tbody>
</table>

LIQUID LIMIT

<table>
<thead>
<tr>
<th>Number of Blows N</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moisture Content %</td>
<td>22.53</td>
</tr>
</tbody>
</table>

Further readings are not possible

PLASTIC LIMIT

| Moisture Content % |

| LIQUID LIMIT | PLASTIC LIMIT | PLASTICITY INDEX |

![Graph showing liquid limit and plastic limit]

Number of Blows (N)

| Moisture Content % |

TESTED BY: MAHMOOD
CHECKED BY: IKRAM
UNIAXIAL COMPRESSION TEST

Project: Consultancy Services for Feasibility Study and Transaction Advisory Services (TAS) for Three Urban Roads in Karachi Package 1: Link Road at Korangi & Interchange at ICI Bridge (Korangi)  
Job No. 3879  
Dated: 21/9/2020  
Client: NESPAK (Pvt) Ltd.

BH/TP No. BH-1  
Sample No. WS-1  
Depth (m) 16.30-16.73

Height = 10.16 cm  
Diameter = 5.08 cm  
Bulk Density = 26.6 kN/m³  
Moisture Content = 9.83 %

Uniaxial Compression Strength = 1925 kPa

Test Method: ASTM D7012

![Graph showing stress-strain relationship](chart.png)
UNIAXIAL COMPRESSION TEST

Project: Consultancy Services for Feasibility Study and Transaction Advisory Services (TAS) for Three Urban Roads in Karachi Package 1: Link Road at Korangi & Interchange at ICI Bridge (Korangi)

Client: NESPAK (Pvt) Ltd.

Job No. 3879
Dated: 21/9/2020

BH/TP No. BH-6
Sample No. WS-2
Depth (m) 18.75-18.86

Height = 10.16 cm
Diameter = 5.08 cm
Bulk Density = 24.6 kN/m³
Moisture Content = 12.35 %

Uniaxial Compression Strength = 590 kPa

Test Method: ASTM D7012
UNIAXIAL COMPRESSION TEST

Project: Consultancy Services for Feasibility Study and Transaction Advisory Services (TAS) for Three Urban Roads in Karachi Package 1: Link Road at Korangi & Interchange at ICI Bridge (Korangi)

Client: NESPAK (Pvt) Ltd.

Job No. 3879  
Dated: 21/9/2020

BH/TP No. BH-01  
Sample No. WS-4  
Depth (m) 21.48-21.67

Height = 9.652 cm  
Diameter = 4.826 cm  
Bulk Density = 23.7 kN/m³  
Moisture Content = 9.39%

Uniaxial Compression Strength = 147 kPa

Test Method: ASTM D7012

![Graph showing axial stress versus axial strain]
UNIAXIAL COMPRESSION TEST

Project: Consultancy Services for Feasibility Study and Transaction Advisory Services (TAS) for Three Urban Roads in Karachi Package 1: Link Road at Korangi & Interchange at ICI Bridge (Korangi)
Client: NESPAK (Pvt) Ltd.
Job No. 3879
Dated: 21/9/2020

BH/TP No. BH-Ø1
Sample No. WS-7
Depth (m) 25.05-25.24

Height = 8.636 cm
Diameter = 4.318 cm
Bulk Density = 26.4 kN/m³
Moisture Content = 9.39 %

Uniaxial Compression Strength = 571 kPa

Test Method: ASTM D7012
UNCONFINED COMPRESSION TEST

PROJECT: TAS FOR THREE URBAN ROAD IN KARACHI
LOCATION: PACKAGE-1
LAB REF. 64/2020
DATE: 15.10.2020
SAMPLE DESCRIPTION:

SOILCON
GEO TECHNICAL TESTING LABORATORIES, 18-Km,
MULTAN ROAD, LAHORE

BH NO
BH-02
SAMPLE NO
UDS-2
DEPTH m
11.50-12.00
CLIENT
SOIL TESTING SERVICE

Specimen Conditions

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diameter Average</td>
<td>4.52 cm</td>
</tr>
<tr>
<td>Area Average</td>
<td>16.04 cm²</td>
</tr>
<tr>
<td>Height</td>
<td>9.17 cm</td>
</tr>
<tr>
<td>Volume</td>
<td>147.16 cm³</td>
</tr>
<tr>
<td>Weight Wet</td>
<td>290.17 g</td>
</tr>
<tr>
<td>Water Content</td>
<td>25.18 %</td>
</tr>
<tr>
<td>Dry Density</td>
<td>1.575 g/cm³</td>
</tr>
<tr>
<td>P.R Factor</td>
<td>0.9312 Kg/div.</td>
</tr>
<tr>
<td>Compressive Strength</td>
<td>0.95 Kg/cm²</td>
</tr>
<tr>
<td>Strain</td>
<td>9.27 %</td>
</tr>
</tbody>
</table>

Failure Sketches

Front

Rear

<table>
<thead>
<tr>
<th>Deformation Dial Reading</th>
<th>Unit Strain %</th>
<th>Compressive Strength (Kg/sq.cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>100</td>
<td>1.09</td>
<td>0.11</td>
</tr>
<tr>
<td>200</td>
<td>2.18</td>
<td>0.23</td>
</tr>
<tr>
<td>300</td>
<td>3.27</td>
<td>0.34</td>
</tr>
<tr>
<td>500</td>
<td>5.45</td>
<td>0.55</td>
</tr>
<tr>
<td>700</td>
<td>7.63</td>
<td>0.75</td>
</tr>
<tr>
<td>850</td>
<td>9.27</td>
<td>0.95</td>
</tr>
<tr>
<td>900</td>
<td>9.81</td>
<td>0.84</td>
</tr>
</tbody>
</table>

Remarks:

Tested By: Aizmat
Checked By: Mahmood

Engineering Services Pakistan Limited

[Stamp]
UNIAXIAL COMPRESSION TEST

Project: Consultancy Services for Feasibility Study and Transaction Advisory Services (TAS) for Three Urban Roads in Karachi Package 1: Link Road at Korangi & Interchange at ICI Bridge (Korangi)

Job No.: 3879
Dated: 25/9/2020

Client: NESPAK (Pvt) Ltd.

BH/TP No.: BH-02
Sample No.: WS-2
Depth (m): 20.60-20.82

Height = 10.16 cm
Diameter = 5.08 cm
Bulk Density = 22.4 kN/m³
Moisture Content = 15.90 %

Uniaxial Compression Strength = 53 kPa

Test Method: ASTM D7012

![Graph showing uniaxial compression test results](image)
UNIAXIAL COMPRESSION TEST

Project: Consultancy Services for Feasibility Study and Transaction Advisory Services (TAS) for Three Urban Roads in Karachi Package 1: Link Road at Korangi & Interchange at ICI Bridge (Korangi)

Client: NESPAK (Pvt) Ltd.

Job No. 3879
Dated: 25/9/2020

BH/TP No. BH-02
Sample No. WS-7
Depth (m) 23.57-23.73

Height = 10.16 cm
Diameter = 5.08 cm
Bulk Density = 21.7 kN/m³
Moisture Content = 12.05 %

Uniaxial Compression Strength = 292 kPa

Test Method: ASTM D7012
UNIAXIAL COMPRESSION TEST

Project: Consultancy Services for Feasibility Study and Transaction Advisory Services (TAS) for Three Urban Roads in Karachi Package 1: Link Road at Korangi & Interchange at ICI Bridge (Korangi)

Client: NESPAK (Pvt) Ltd.

Job No. 3879
Dated: 25/9/2020

BH/TP No. BH-02
Sample No. WS-13
Depth (m) 28.13-28.24

Height = 10.16 cm
Diameter = 5.08 cm
Bulk Density = 20.5 kN/m³
Moisture Content = 6.89 %

Uniaxial Compression Strength = 260 kPa

Test Method: ASTM D7012
UNCONFINED COMPRESSION TEST

PROJECT: TAS FOR 03 URBAN ROAD PROJECTS
LOCATION: KARACHI
LAB REF: 61/2020
DATE: 09.10.2020

Specimen Conditions

<table>
<thead>
<tr>
<th>Diameter Average</th>
<th>Area Average</th>
<th>Height</th>
<th>Volume</th>
<th>Weight Wet</th>
<th>Water Content</th>
<th>Dry Density</th>
<th>P.R Factor</th>
<th>Compressive Strength</th>
<th>Strain</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.86 cm</td>
<td>11.75 cm²</td>
<td>7.925 cm</td>
<td>92.78 cm³</td>
<td>181.83 g</td>
<td>17.21 %</td>
<td>1.672 g/cm³</td>
<td>0.1422 Kg/div.</td>
<td>0.93 Kg/cm²</td>
<td>3.79 %</td>
</tr>
</tbody>
</table>

Deformation Dial Reading | Unit Strain % | Compressive Strength (Kg/sq.cm)
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>50</td>
<td>0.63</td>
<td>0.11</td>
</tr>
<tr>
<td>100</td>
<td>1.26</td>
<td>0.25</td>
</tr>
<tr>
<td>150</td>
<td>1.89</td>
<td>0.40</td>
</tr>
<tr>
<td>200</td>
<td>2.52</td>
<td>0.60</td>
</tr>
<tr>
<td>250</td>
<td>3.15</td>
<td>0.77</td>
</tr>
<tr>
<td>300</td>
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<td>0.93</td>
</tr>
<tr>
<td>350</td>
<td>4.42</td>
<td>0.91</td>
</tr>
</tbody>
</table>

COMPR. STRENGTH (Kg/sq.cm) vs UNIT STRAIN (%)

Remarks: 

Tested By: 
Checked By:

NESPAX, Karachi
UNIAXIAL COMPRESSION TEST

Project: Consultancy Services for Feasibility Study and Transaction Advisory Services (TAS) for Three Urban Roads in Karachi Package 1: Link Road at Korangi & Interchange at ICI Bridge (Korangi)

Client: NESPAK (Pvt) Ltd.

Job No. 3879
Dated: 21/9/2020

BH/TP No. BH-4
Sample No. WS-1
Depth (m) 23.0-23.40

Height = 10.16 cm
Diameter = 5.08 cm
Bulk Density = 24.8 kN/m³
Moisture Content = 9.55%

Uniaxial Compression Strength = 1114 kPa

Test Method: ASTM D7012
UNIAXIAL COMPRESSION TEST

Project: Consultancy Services for Feasibility Study and Transaction Advisory Services (TAS) for Three Urban Roads in Karachi Package 1: Link Road at Korangi & Interchange at ICI Bridge (Korangi)

Client: NESPAK (Pvt) Ltd.

Job No. 3879
Dated: 21/9/2020

BH/TP No. BH-4
Sample No. WS-4
Depth (m) 24.80-25.0

Height = 10.16 cm
Diameter = 5.08 cm
Bulk Density = 25.0 kN/m³
Moisture Content = 10.46 %

Uniaxial Compression Strength = 863 kPa

Test Method: ASTM D7012
UNCONFINED COMPRESSION TEST

PROJECT: TAS FOR THREE URBAN ROAD IN KARACHI
LOCATION: PACKAGE-I
LAB REF: 64/2020
DATE: 15.10.2020

BH NO: BH-05
SAMPLE NO: UDS-3
DEPTH m: 11.50-12.00
CLIENT: SOIL TESTING SERVICE

Specimen Conditions

<table>
<thead>
<tr>
<th>Diameter Average</th>
<th>4.52</th>
<th>cm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area Average</td>
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<td>cm²</td>
</tr>
<tr>
<td>Height</td>
<td>9.17</td>
<td>cm</td>
</tr>
<tr>
<td>Volume</td>
<td>147.16</td>
<td>cm³</td>
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<tr>
<td>Weight Wet</td>
<td>283.33</td>
<td>g</td>
</tr>
<tr>
<td>Water Content</td>
<td>25.76</td>
<td>%</td>
</tr>
<tr>
<td>Dry Density</td>
<td>1.531</td>
<td>g/cm³</td>
</tr>
<tr>
<td>P.R Factor</td>
<td>0.9312</td>
<td>Kg/div.</td>
</tr>
<tr>
<td>Compressive Strength</td>
<td>0.81</td>
<td>Kg/cm²</td>
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<tr>
<td>Strain</td>
<td>7.09</td>
<td>%</td>
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Deformation Dial Reading

<table>
<thead>
<tr>
<th>Unit Strain %</th>
<th>Compressive Strength (Kg/sq.cm)</th>
</tr>
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<tbody>
<tr>
<td>0</td>
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<tr>
<td>100</td>
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<td>200</td>
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</tr>
<tr>
<td>650</td>
<td>0.81</td>
</tr>
<tr>
<td>700</td>
<td>0.75</td>
</tr>
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</table>

Compressive Strength vs Unit Strain

FAILURE SKETCHES

Front

Rear

Remarks:

Tested By: Azmat
Checked By: Mahmood
UNIAXIAL COMPRESSION TEST

Project: Consultancy Services for Feasibility Study and Transaction Advisory Services (TAS) for Three Urban Roads in Karachi Package 1: Link Road at Korangi & Interchange at ICI Bridge (Korangi)

Client: NESPAK (Pvt) Ltd.

BH/TP No. BH-5
Sample No. WS-1
Depth (m) 16.36-16.57

Height = 10.16 cm
Diameter = 5.08 cm
Bulk Density = 22.1 kN/m³
Moisture Content = 12.18 %

Uniaxial Compression Strength = 165 kPa

Test Method: ASTM D7012
UNIAXIAL COMPRESSION TEST

Project: Consultancy Services for Feasibility Study and Transaction Advisory Services (TAS) for Three Urban Roads in Karachi Package 1: Link Road at Korangi & Interchange at ICI Bridge (korangi)

Client: NESPAK (Pvt) Ltd.

Job No. 3879
Dated: 25/9/2020

BH/TP No. BH-5
Sample No. WS-6
Depth (m) 20.46-20.64

Height = 10.16 cm
Diameter = 5.08 cm
Bulk Density = 22.2 kNm³
Moisture Content = 10.37 %

Uniaxial Compression Strength = 348 kPa

Test Method: ASTM D7012

Axial stress (kPa)
0 50 100 150 200 250 300 350 400
Axial strain (%) 0.0 2.0 4.0 6.0 8.0 10.0 12.0

signed by:

* Geo Engg Dept UET Lia*
UNIAXIAL COMPRESSION TEST

Project: Consultancy Services for Feasibility Study and Transaction Advisory Services (TAS) for Three Urban Roads in Karachi Package 1: Link Road at Korangi & Interchange at ICI Bridge (Korangi)

Job No. 3879

Dated: 15/9/2020

Client: NESPAK (Pvt) Ltd.

BH/TP No. BH-6
Sample No. WS-1

Depth (m) 26.15 - 26.32

Height = 9.652 cm
Diameter = 4.826 cm

Bulk Density = 23.3 kN/m³

Moisture Content = 10.72 %

Uniaxial Compression Strength = 48 kPa

Test Method: ASTM D7012

[Graph showing stress-strain relationship]
UNIAXIAL COMPRESSION TEST

Project: Consultancy Services for Feasibility Study and Transaction Advisory Services (TAS) for Three Urban Roads in Karachi Package 1: Link Road at Korangi & Interchange at ICI Bridge (Korangi)

Job No. 3879

Dated: 15/9/2020

Client: NESPAK (Pvt) Ltd.

BH/TP No. BH-6
Sample No. WS-3
Depth (m) 28.10 - 28.21

Height = 10.16 cm
Diameter = 5.08 cm
Bulk Density = 25.2 kN/m³
Moisture Content = 5.24%

Uniaxial Compression Strength = 600 kPa

Test Method: ASTM D7012
SOILCON
DIRECT SHEAR TEST ASTM - D3080

<table>
<thead>
<tr>
<th>CLIENT</th>
<th>SOIL TESTING SERVICES</th>
</tr>
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<tbody>
<tr>
<td>PROJECT</td>
<td>TAS FOR 03 URBAN ROADS IN KARACHI</td>
</tr>
<tr>
<td>SITE</td>
<td>KARACHI</td>
</tr>
<tr>
<td>BORE HOLE</td>
<td>BH-01</td>
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<tr>
<td>SAMPLE</td>
<td>UDS-4</td>
</tr>
<tr>
<td>SPECIMEN</td>
<td>1-2-3</td>
</tr>
<tr>
<td>TYPE</td>
<td>UNDISTURBED</td>
</tr>
<tr>
<td>DEPTH (m)</td>
<td>6.50-7.40</td>
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<tr>
<td>DATE</td>
<td>14.10.2020</td>
</tr>
</tbody>
</table>

**Initial Values**

<table>
<thead>
<tr>
<th>Dry density</th>
<th>m.c.</th>
<th>Def.silt</th>
<th>Normal stress</th>
<th>Height</th>
<th>Vertical Displacement</th>
<th>tc</th>
<th>Shear Stress</th>
<th>Horizontal Displacement</th>
<th>Vertical Displacement</th>
</tr>
</thead>
<tbody>
<tr>
<td>g/m³</td>
<td>%</td>
<td>mm/min</td>
<td>MPa</td>
<td>mm</td>
<td>mm</td>
<td></td>
<td>MPa</td>
<td>mm</td>
<td>mm</td>
</tr>
<tr>
<td>1.812</td>
<td>13.39</td>
<td>0.020</td>
<td>0.039</td>
<td>19.93</td>
<td>0.070</td>
<td>4</td>
<td>0.036</td>
<td>2.4</td>
<td>0.274</td>
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<tr>
<td>1.810</td>
<td>14.07</td>
<td>0.020</td>
<td>0.079</td>
<td>19.87</td>
<td>0.134</td>
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<td>0.060</td>
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<td>1.808</td>
<td>14.74</td>
<td>0.020</td>
<td>0.118</td>
<td>19.75</td>
<td>0.206</td>
<td>4</td>
<td>0.088</td>
<td>2.8</td>
<td>0.020</td>
</tr>
</tbody>
</table>

**Values at beginning of shear cycle**

**Failure Values**

- Sample height: 20 mm
- Area: 31.22 cm²
- Volume: 62.44 cm³
- Specimens: 3

**Lab. Ref.:** 64/2020

**REMARKS**

- Angle of Internal Friction: 37.3 Degree
- Cohesion: 0 MPa
SOILCON
DIRECT SHEAR TEST ASTM - D3080

CLIENT: SOIL TESTING SERVICE
PROJECT: TAS FOR 03 URBAN ROAD PROJECTS IN KARACHI
SITE: PACKAGE-1
BORE HOLE: BH-2
SAMPLE: UDS-1
SPECIMEN: 1-2-3
TYPE: UNDISTURBED
DEPTH (m): 7.50-8.40
DATE: 15.10.2020

Initial Values | Values at beginning of shear cycle | Failure Values
---|---|---
Dry density (g/cm³) | M.C. | Def. Rate | Normal Stress (MPa) | Height | Vertical Displacement (mm) | Tc | Shear Stress (MPa) | Horizontal Displacement (mm) | Vertical Displacement (mm)
1.638 | 10.65 | 0.020 | 0.039 | 10.67 | 0.134 | 4 | 0.029 | 4.2 | -0.056
1.644 | 10.61 | 0.020 | 0.078 | 19.75 | 0.250 | 4 | 0.059 | 4.4 | -0.174
1.649 | 10.81 | 0.020 | 0.118 | 19.63 | 0.374 | 4 | 0.088 | 4.6 | -0.214

Sample height: 20 mm
Area: 31.22 cm²
Volume: 62.44 cm³
Specimens: 3

Lab. Ref.: 84/2020

REMARKS

Angle of Internal Friction = 35.8 Degree
Cohesion = 0 MPa
# SOILCON

**DIRECT SHEAR TEST ASTM - D3080**

<table>
<thead>
<tr>
<th>CLIENT</th>
<th>SOIL TESTING SERVICES</th>
</tr>
</thead>
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<tr>
<td>PROJECT</td>
<td>TAS FOR 03 URBAN ROADS IN KARACHI</td>
</tr>
<tr>
<td>SITE</td>
<td>KARACHI</td>
</tr>
<tr>
<td>BORE HOLE</td>
<td>BH 2</td>
</tr>
<tr>
<td>SAMPLE</td>
<td>UDS-1</td>
</tr>
<tr>
<td>SPECIMEN</td>
<td>1-2-3</td>
</tr>
<tr>
<td>TYPE</td>
<td>UNDISTURBED</td>
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<tr>
<td>DEPTH (m)</td>
<td>0.50-6.66</td>
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## Initial Values vs Values at beginning of shear cycle

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<th>Dry density</th>
<th>m.c.</th>
<th>Def rate</th>
<th>Normal stress</th>
<th>Height</th>
<th>Vertical Displacement</th>
<th>tc</th>
<th>Shear Stress</th>
<th>Horizontal Displacement</th>
<th>Vertical Displacement</th>
</tr>
</thead>
<tbody>
<tr>
<td>gr/cm³</td>
<td>%</td>
<td>mm/min</td>
<td>Mpa</td>
<td>mm</td>
<td>mm</td>
<td>hrs</td>
<td>MPa</td>
<td>mm</td>
<td>mm</td>
</tr>
<tr>
<td>1.530</td>
<td>20.66</td>
<td>0.020</td>
<td>0.039</td>
<td>19.96</td>
<td>0.008</td>
<td>4</td>
<td>0.028</td>
<td>2.8</td>
<td>-0.020</td>
</tr>
<tr>
<td>1.550</td>
<td>20.66</td>
<td>0.020</td>
<td>0.078</td>
<td>19.93</td>
<td>0.008</td>
<td>4</td>
<td>0.056</td>
<td>2.8</td>
<td>0.110</td>
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<tr>
<td>1.570</td>
<td>20.80</td>
<td>0.020</td>
<td>0.118</td>
<td>19.90</td>
<td>0.104</td>
<td>4</td>
<td>0.084</td>
<td>2.8</td>
<td>0.170</td>
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</tbody>
</table>

## Failure Values

- **Sample height**: 20 mm
- **Area**: 31.22 cm²
- **Volume**: 62.44 cm³
- **Specimens**: 3

## Remarks
- Lab. Ref.: 64/2020

## Angle of Internal Friction
- Angle of Internal Friction = 35.5 Degree
- Cohesion = 0 MPa
SOILCON
DIRECT SHEAR TEST ASTM - D3080

CLIENT
SOIL TESTING SERVICES

SITE
KARACHI

BORE HOLE
BH-01

SAMPLE
UDS-1

SPECIMEN
1-2-3

TYPE
UNDISTURBED

DEPTH (m)
5.00-6.99

DATE
13.10.2020

<table>
<thead>
<tr>
<th>Operator</th>
<th>Checked by</th>
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<tbody>
<tr>
<td>N S Ahmad</td>
<td>Mahbub</td>
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<table>
<thead>
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<th>Initial Values</th>
<th>Values at beginning of shear cycle</th>
<th>Failure Values</th>
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</thead>
<tbody>
<tr>
<td>Dry density</td>
<td>Density / %</td>
<td>Normal stress</td>
</tr>
<tr>
<td>g/cm³</td>
<td>%</td>
<td>mm/min</td>
</tr>
<tr>
<td>1.557</td>
<td>15.29</td>
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<td>1.772</td>
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<td>0.020</td>
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<tr>
<td>1.764</td>
<td>15.52</td>
<td>0.020</td>
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Sample height 20 mm

Area 31.22 cm²

Volume 62.44 cm³

Specimens 3

Lab. Ref: 51/2020

Remarks

Angle of Internal Friction = 35.4 Degree

Cohesion = 0 MPa

NESPRAK, Karachi
SOILCON
DIRECT SHEAR TEST ASTM - D3080

CLIENT
SOIL TESTING SERVICES

PROJECT
TAS FOR 03 URBAN ROADS IN KARACHI

SITE
KARACHI

BORE HOLE
BH-4

SAMPLE
UDS-2

SPECIMEN
1-2-3

TYPE
UNDISTURBED

DEPTH (m)
19.00-19.90

DATE
13.10.2020

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<thead>
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<th>Failure Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry density</td>
<td>1.653 g/cm³</td>
<td>m.c. 19.35 %</td>
</tr>
<tr>
<td>Dry density</td>
<td>1.662 g/cm³</td>
<td>m.c. 19.43 %</td>
</tr>
<tr>
<td>Dry density</td>
<td>1.662 g/cm³</td>
<td>m.c. 19.51 %</td>
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Sample height 20 mm
Area 31.22 cm²
Volume 62.44 cm³
Specimens 3

Lab. Ref: 01/2020

REMARKS

Angle of Internal Friction = 36.1 Degree
Cohesion = 0 MPa
SOILCON
DIRECT SHEAR TEST ASTM - D3080

CLIENT: SOIL TESTING SERVICE
PROJECT: TAS FOR 03 URBAN ROAD PROJECTS IN KARACHI
SITE: PACKAGE-1
BORE HOLE: BH-25
SAMPLE: UDS-2
SPECIMEN: 1-2-3
DEPTH (m): 0.03-0.90
DATE: 15.10.2020

<table>
<thead>
<tr>
<th>Operator</th>
<th>Checked by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nauman</td>
<td>Mohsin</td>
</tr>
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Initial Values

<table>
<thead>
<tr>
<th>Dry density</th>
<th>m.c.</th>
<th>Def. rate</th>
<th>Normal stress</th>
<th>Height</th>
<th>Vertical Displacement</th>
<th>TC</th>
<th>Shear Stress</th>
<th>Horizontal Displacement</th>
<th>Vertical Displacement</th>
</tr>
</thead>
<tbody>
<tr>
<td>g/cm³</td>
<td>%</td>
<td>mm/min</td>
<td>Mpa</td>
<td>mm</td>
<td>mm</td>
<td></td>
<td>MPa</td>
<td>mm</td>
<td>mm</td>
</tr>
<tr>
<td>1.546</td>
<td>22.07</td>
<td>0.020</td>
<td>0.039</td>
<td>19.55</td>
<td>0.452</td>
<td>4</td>
<td>0.025</td>
<td>4.0</td>
<td>-0.158</td>
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<td>1.554</td>
<td>22.29</td>
<td>0.020</td>
<td>0.076</td>
<td>19.13</td>
<td>0.870</td>
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<td>1.555</td>
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</table>

Sample height: 20 mm
Area: 31.22 cm²
Volume: 62.44 cm³
Specimens: 3

Lab. Ref: 64/2020

REMARKS

Angle of Internal Friction = 34.8 Degree
Cohesion = 0 MPa
SOILCON
DIRECT SHEAR TEST ASTM - D3080

CLIENT: SOIL TESTING SERVICES
PROJECT: TAS FOR 03 URBAN ROADS IN KARACHI
SITE: PACKAGE 1
BORE HOLE: BH-06
SAMPLE: UNDISTURBED
SPECIMEN: 1-2-3
TYPE: UNDISTURBED
DEPTH (m): 15.00-15.90
DATE: 29.09.2020

Initial Values

<table>
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<tr>
<th>Dry density (g/cm³)</th>
<th>m.o.</th>
<th>Def. rate</th>
<th>Normal stress (Mpa)</th>
<th>Height (mm)</th>
<th>Vertical Displacement (mm)</th>
<th>tc (hrs)</th>
<th>Shear Stress (MPa)</th>
<th>Horizontal Displacement (mm)</th>
<th>Vertical Displacement (mm)</th>
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</thead>
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<td>19.94</td>
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<tr>
<td>1.456</td>
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<td>0.118</td>
<td>19.90</td>
<td>0.100</td>
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<td>4</td>
<td>0.125</td>
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<td>-0.110</td>
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Sample height: 20 mm
Area: 31.22 cm²
Volume: 62.44 cm³
Specimens: 3

Lab. Ref: 61/2020

REMARKS

Angle of Internal Friction = 35.2 Degree
Cohesion = 0 MPa
SOILCON

DIRECT SHEAR TEST ASTM - D3080

CLIENT
SOIL TESTING SERVICES

PROJECT
TAS FOR 03 URBAN ROADS IN KARACHI

SITE
PACKAGE-1

BORE HOLE
BH-C6

SAMPLE
UDS-1

SPECIMEN
1-2-3

TYPE
UNDISTURBED

DEPTH (m)
6.50-7.40

DATE
29.09.2020

<table>
<thead>
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<th>Initial Values</th>
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<th>Failure Values</th>
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<td></td>
<td>Dry density</td>
<td>m.c.</td>
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<tr>
<td></td>
<td>g/m³</td>
<td>%</td>
</tr>
<tr>
<td>1.438</td>
<td>28.21</td>
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<tr>
<td>1.433</td>
<td>28.41</td>
<td>0.020</td>
</tr>
<tr>
<td>1.448</td>
<td>28.21</td>
<td>0.020</td>
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</table>

Sample height 20 mm
Area 31.22 cm²
Volume 62.44 cm³
Specimens 3

Lab. Ref: 61/2020

REMARKS

Angle of Internal Friction = 35.1 Degree
Cohesion = 0 MPa
To,
M/s: Soil Testing Service,
Karachi.

Subject: NON TESTED SAMPLE(S).

It is submitted that the following is the detail of non-tested samples of TAS for 03 Urban Road Projects in Karachi (package 1 & 2):

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>BH / TP #</th>
<th>Sample No.</th>
<th>Depth (m)</th>
<th>Test Required</th>
<th>Reason</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>02</td>
<td>BH-1</td>
<td>UDS-1</td>
<td>650-7.40</td>
<td>Direct Shear</td>
<td>Due to clayey and gravelly strata</td>
<td></td>
</tr>
</tbody>
</table>

Submitted for kind information please.

(Ghulam Mahmood Butt)
Supervisor, SOILCON
To,

M/s: Soil Testing Service,
Karachi.

Subject: NON TESTED SAMPLE(S).

It is submitted that the following is the detail of non-tested samples of TAS for 03 Urban Road Projects in Karachi (LTP-6):

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>BH / TP #</th>
<th>Sample No.</th>
<th>Depth (m)</th>
<th>Test Required</th>
<th>Reason</th>
<th>Remarks</th>
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<tbody>
<tr>
<td>01</td>
<td>BH-3</td>
<td>UDS-2</td>
<td>16.50-17.00</td>
<td>Direct Shear</td>
<td>Due to clayey strata</td>
<td>Package-1</td>
</tr>
</tbody>
</table>

Submitted for kind information please.

(Ghulam Mahmood Butt)
Supervisor, SOILCON
**SOILCON GEOTECHNICAL TESTING LABORATORIES**
18-Km Multan Road Lahore, Ph.No: 042-7510942-3  Fax No: 7510944

**Compaction Test**

- **Volume of Mould:** 941 cm³
- **Drop:** 18 inch
- **Wt of Hammer:** 10 lbs
- **Depth (m):** 0.26-0.63

**Table:**

<table>
<thead>
<tr>
<th>Optimum Moisture Content (%)</th>
<th>14.57</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Dry Density</td>
<td>1.773 g/cm³</td>
</tr>
</tbody>
</table>

**Project:** TAS FOR 03 URBAN ROAD PROJECTS IN KARACHI

**Location:** KARACHI

**Checked By:** Ikram
**Dated:** 10.10.2020
**LAB. REF:** 64/2020

**REMARKS:**

---

[Signature]
### C.B.R. TEST

<table>
<thead>
<tr>
<th>No. of Blows per Layer</th>
<th>65</th>
<th>30</th>
<th>10</th>
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<tbody>
<tr>
<td>CBR Value at 0.1 in</td>
<td>%</td>
<td>%</td>
<td>%</td>
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<tr>
<td>CBR Value at 0.2 in</td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>Dry Density g/cm³</td>
<td>1.773</td>
<td>1.684</td>
<td>1.595</td>
</tr>
<tr>
<td>Moisture Content</td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>Absorption</td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>Swelling</td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
</tbody>
</table>

### Graph

- **Y-axis:** C.B.R Value %
- **X-axis:** Dry Density g/cu.cm

### Project Details

- **PROJECT:** TAS FOR 03 URBAN ROAD PROJECTS IN KARACHI
- **LOCATION:** KARACHI
- **TP/ BH NO.:** TP-1
- **SAMPLE NO.:** CS-1
- **DEPTH (m):** 0.26-0.63
- **LAB REF. NO.:** 64/2020
- **DATE:** 15.10.2020

### Signatures

- **TESTED BY:** Azmat
- **CHECKED BY:** Mahmood
Test Method: Modified AASHTO T-180 (Method A)
Dia of Mould: 4.0 inch
No of Blows: 25
No of Layers: 5
Test Pit No: TP-4
Sample No: CS-1

Volume of Mould: 941 cm³
Drop: 18 inch
Wt of Hammer: 10 lbs
Depth (m): 0.00-1.78

### Optimum Moisture Content ( % )
<table>
<thead>
<tr>
<th>Optimum Moisture Content</th>
<th>14.37</th>
</tr>
</thead>
</table>

### Maximum Dry Density (g/cm³)
| Maximum Dry Density | 1.771 g/cm³ |

### Project Details
- **Project:** TAS FOR 03 URBAN ROAD PROJECTS IN KARACHI
- **Location:** KARACHI
- **Client:** SOIL TESTING SERVICE

### Test Details
- **Tested By:** Mahmood
- **Checked By:** Ilkram
- **Dated:** 10.10.2020
- **LAB. REF:** 64/2020

**REMARKS:**

---

![Stamp Image]
<table>
<thead>
<tr>
<th>No.of Blows per Layer</th>
<th>65</th>
<th>30</th>
<th>10</th>
</tr>
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<tbody>
<tr>
<td>CBR Value at 0.1 in</td>
<td>%</td>
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</tr>
<tr>
<td>CBR Value at 0.2 in</td>
<td>%</td>
<td>26.3</td>
<td>15.8</td>
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<tr>
<td>Dry Density</td>
<td>g/cm³</td>
<td>1.770</td>
<td>1.683</td>
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<tr>
<td>Absorption</td>
<td>%</td>
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<td>5.50</td>
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<td>Swelling</td>
<td>%</td>
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<th>MODIFIED</th>
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<td>M.D.D. g/cu.cm</td>
<td>1.771</td>
</tr>
<tr>
<td>O.M.C %</td>
<td>14.37</td>
</tr>
</tbody>
</table>

![Graph](image)

**PROJECT:** TAS FOR 03 URBAN ROAD PROJECTS IN KARACHI
**LOCATION:** KARACHI
**CLIENT:** SOIL TESTING SERVICE
**TP/ BH NO:** TP-64
**SAMPLE NO:** CS
**DEPTH (m):** 0.00-1.78
**DATE:** 15.10.2020
**LAB REF. NO:** 64/2020
**TESTED BY:** MAHMOOD

**Signature:** IKRAM ULLAH
SOILCON GEOTECHNICAL TESTING LABORATORIES
18-Km Mullan Road Lahore, Ph.No: 042-7510942-3 Fax No: 7510944

Test Method: Modified AASHTO T-180 (Method A)
Dia of Mould: 4.0 inch
No of Blows: 25
No of Layers: 5
Test Pit No: TP-5
Sample No: CS-1

Volume of Mould: 941 cm³
Drop: 18 inch
Wt of Hammer: 10 lbs
Depth (m): 0.40-2.00

Optimum Moisture Content (%): 14.78
Maximum Dry Density: 1.717 g/cm³

Project: TAS FOR 03 URBAN ROAD PROJECTS IN KARACHI
Location: KARACHI
Client: SOIL TESTING SERVICE

Tested By: Mahmood
Checked By: Ikram
Dated: 10.10.2020
LAB. REF: 64/2020

REMARKS:

---

NESPARK, Karachi
### C.B.R. TEST (AASHTO T-193)

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<th>No. of Blows per Layer</th>
<th>65</th>
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<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBR Value at 0.1 in</td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>CBR Value at 0.2 in</td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>Dry Density g/cm³</td>
<td>1.717</td>
<td>1.632</td>
<td>1.544</td>
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<tr>
<td>Moisture Content %</td>
<td>14.54</td>
<td>14.54</td>
<td>14.54</td>
</tr>
<tr>
<td>Absorption %</td>
<td>4.41</td>
<td>6.61</td>
<td>8.14</td>
</tr>
<tr>
<td>Swelling %</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

### Graph

![Graph showing CBR value against dry density](image)

### Project Details

**PROJECT:** TAS FOR 03 URBAN ROAD PROJECTS IN KARACHI

**LOCATION:** KARACHI

**TP/ BH NO:** TP-5

**SAMPLE NO:** CS-1

**DATE:** 15.10.2020

**DEPHT (m):** 0.40-2.00

**TESTED BY:**

- MAHMOOD
- IKRAM ULLAH
## SUMMARY OF CHEMICAL TEST RESULTS

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<th>BH / TP #</th>
<th>Sample #</th>
<th>Depth (m)</th>
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<th>Chloride Contents %</th>
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**Tested By:** HAMZA  
**Checked By:** UMAIR  
**Dated:** 09.10.2020
# SUMMARY OF CHEMICAL TEST RESULTS

**Project:** TAS FOR 03 URBAN ROAD PROJECTS IN KARACHI  
**Location:** KARACHI  
**SOIL TESTING SERVICE**  
Lab. Ref: 64/2020

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Tested By: HAMZA  
Checked By: UMAIR  
Dated: 22.10.2020
## Summary of Chemical Test Results

### Project: Tas for Three Urban Road Projects in Karachi

### Location: Karachi

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**Tested By:** HAMZA  
**Checked By:** UMAIR  
**Dated:** 09.10.2020
## SUMMARY OF CHEMICAL TEST RESULTS

**Project:** TAS FOR 03 URBAN ROAD PROJECTS IN KARACHI  
**Location:** KARACHI

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**SOIL TESTING SERVICE**  
Lab. Ref: 61/2020

**Tested By:** HAMZA  
**Checked By:** UMAIR  
**Dated:** 29.09.2020
# SUMMARY OF CHEMICAL TEST RESULTS

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**Tested By:** HAMZA

**Checked By:** UMAIR

**Dated:** 09.10.2020
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Tested By: HAMZA  
Checked By: UMAIR  
Dated: 09.10.2020
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Tested By: HAMZA  
Checked By: UMAIR  
Dated: 22.10.2020
# SUMMARY OF CHEMICAL TEST RESULTS

**Project:** TAS FOR 03 URBAN ROAD PROJECTS IN KARACHI  
**Location:** KARACHI  
**SOIL TESTING SERVICE**  
Lab. Ref: 61/2020

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**Tested By:** HAMZA  
**Checked By:** UMAIR  
**Dated:** 29.09.2020
APPENDIX-E

FOUNDATION RECOMMENDATIONS
FEASIBILITY STUDY AND TRANSACTION ADVISORY SERVICES FOR URBAN ROAD INITIATIVE PROJECT
Bridge on Malir River

Allowable Load Carrying Capacity Curves for Piles under Compression Loading

NOTES:
1 - Group efficiency factor ($\eta$) has not been considered during development of pile load carrying capacity curves. The group efficiency factor must be selected from the inset chart on this figure.
2 - The selected pile capacity must be verified by performing at least one full scale (3 x Design Load / $\eta$) pile load test.
3 - Load test should be performed as per relevant ASTM Standard.
4 - The provided capacity curves are only valid for preliminary level design of structures.

GROUP EFFICIENCY FACTOR

Diameter of Piles = 760 mm
Diameter of Piles = 1000 mm
Diameter of Piles = 1200 mm
Diameter of Piles = 1500 mm
FEASIBILITY STUDY AND TRANSACTION ADVISORY SERVICES FOR URBAN ROAD INITIATIVE PROJECT
Bridge on Malir River

Ultimate Load Carrying Capacity Curves for Piles under Compression Loading

NOTES:
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FEASIBILITY STUDY AND TRANSACTION ADVISORY SERVICES FOR URBAN ROAD INITIATIVE PROJECT
Bridge on Malir River

Allowable Load Carrying Capacity Curves for Piles under Tensile Loading

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3 - Load test should be performed as per relevant ASTM Standard.
4 - The provided capacity curves are only valid for preliminary level design of structures.
FEASIBILITY STUDY AND TRANSACTION ADVISORY SERVICES FOR URBAN ROAD INITIATIVE PROJECT
Bridge on Malir River

Ultimate Load Carrying Capacity Curves for Piles under Tensile Loading

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4 - The provided capacity curves are only valid for preliminary level design of structures.
### FEASIBILITY STUDY AND TRANSACTION ADVISORY SERVICES FOR URBAN ROAD INITIATIVE PROJECT

Bridge on Malir River

<table>
<thead>
<tr>
<th>Pile Diameter below NSL (m)</th>
<th>Pile Diameter = 760 mm</th>
<th>Pile Diameter = 1000 mm</th>
<th>Pile Diameter = 1200 mm</th>
<th>Pile Diameter = 1500 mm</th>
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<tr>
<td>Horizontal Soil Spring Stiffness at Pile Tip (kH)</td>
<td>Vertical Soil Spring Stiffness at Pile Tip (kV)</td>
<td>Horizontal Soil Spring Stiffness at Pile Tip (kH)</td>
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**NOTE:** The provided soil springs are only valid for preliminary level design of structures.
FEASIBILITY STUDY AND TRANSACTION ADVISORY SERVICES FOR URBAN ROAD INITIATIVE PROJECT
(Light Pole at Bridge on Malir River)

FOUNDATION PROPORTIONING CURVE FOR SQUARE FOUNDATION

NOTES:
1 - Tolerable Settlement = 25 mm
2 - Minimum Depth of Foundation \( (D_F) = 1.0 \) m below NSL
3 - Minimum Thickness of Select Fill = 1.0 m below foundation base
4 - Select fill should be A-3 or better material as per AASHTO soil classification.
5 - Select fill should be placed and compacted in layers appropriate to the size and type of compaction equipment to at least 95% of modified AASHTO maximum dry density.
6 - If any loose soil/soft pocket/fill material is encountered at the base of the foundation excavation, it should be completely removed and backfilled with select fill material.
7 - This capacity curve is tentative and can only be used for preliminary design of structures. Moreover, geotechnical investigations must be carried out at the specific location of structures to confirm the available bearing capacity.
FEASIBILITY STUDY AND TRANSACTION ADVISORY SERVICES
URBAN ROAD INITIATIVES IN KARACHI
Culvert under Road for Light Traffic at RD 1+400 KM

Allowable Load Carrying Capacity Curves for Piles under Compression Loading

NOTES:
1 - Group efficiency factor ($\eta$) has not been considered during development of pile load carrying capacity curves. The group efficiency factor must be selected from the inset chart on this figure.
2 - The selected pile capacity must be verified by performing at least one full scale ($3 \times \text{Design Load} / \eta$) pile load test.
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FEASIBILITY STUDY AND TRANSACTION ADVISORY SERVICES
URBAN ROAD INITIATIVES IN KARACHI
Culvert under Road for Light Traffic at RD 1+400 KM

Ultimate Load Carrying Capacity Curves for Piles under Compression Loading

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3 - Load test should be performed as per relevant ASTM Standard.
4 - The provided capacity curves are only valid for preliminary level design of structures.

Legend:
- Diameter of Piles = 760 mm
- Diameter of Piles = 1000 mm
- Diameter of Piles = 1200 mm
FEASIBILITY STUDY AND TRANSACTION ADVISORY SERVICES
URBAN ROAD INITIATIVES IN KARACHI
Culvert under Road for Light Traffic at RD 1+400 KM

Allowable Load Carrying Capacity Curves for Piles under Tensile Loading

NOTES:

1 - Group efficiency factor (η) has not been considered during development of pile load carrying capacity curves. The group efficiency factor must be selected from the inset chart on this figure.
2 - The selected pile capacity must be verified by performing at least one full scale (3 x Design Load / η) pile load test.
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Diameter of Piles = 760 mm
- Diameter of Piles = 1000 mm
- Diameter of Piles = 1200 mm
FEASIBILITY STUDY AND TRANSACTION ADVISORY SERVICES
URBAN ROAD INITIATIVES IN KARACHI
Culvert under Road for Light Traffic at RD 1+400 KM

Ultimate Load Carrying Capacity Curves for Piles under Tensile Loading

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Fig. E-10
### Soil Spring Stiffnesses

<table>
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<tr>
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<th>Pile Diameter = 1000 mm</th>
<th>Pile Diameter = 1200 mm</th>
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<tr>
<td><strong>Pile Length below NSL (m)</strong></td>
<td><strong>Horizontal Soil Spring Stiffness (K_{h Horiz})</strong></td>
<td><strong>Vertical Soil Spring Stiffness (K_{v Vert})</strong></td>
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<td>kN/m³</td>
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**NOTE:** The provided soil springs are only valid for preliminary level design of structures.
FEASIBILITY STUDY AND TRANSACTION ADVISORY SERVICES
URBAN ROAD INITIATIVES IN KARACHI

(Light Pole & Retaining Wall at RD 1+ 400 KM)

FOUNDATION PROPORTIONING CURVES FOR STRIP & SQUARE FOUNDATION

NOTES:
1 - Tolerable Settlement = 25 mm
2 - Minimum Depth of Foundation ($D_F$) = 1.0 m below NSL
3 - If any loose soil/soft pocket/fill material is encountered at the base of the foundation excavation, it should be completely removed and backfilled with select fill material.
4 - The capacity curves are tentative and can only be used for preliminary design of structures. Moreover, geotechnical investigations must be carried out at the specific location of structures to confirm the available bearing capacity.
NOTES:
1 - Group efficiency factor ($\eta$) has not been considered during development of pile load carrying capacity curves. The group efficiency factor must be selected from the inset chart on this figure.
2 - The selected pile capacity must be verified by performing at least one full scale ($3 \times \text{Design Load} / \eta$) pile load test.
3 - Load test should be performed as per relevant ASTM Standard.
4 - The provided capacity curves are only valid for preliminary level design of structures.
FEASIBILITY STUDY AND TRANSACTION ADVISORY SERVICES
URBAN ROAD INITIATIVES IN KARACHI
Culvert / Bridge and Retaining Wall at RD 2+300 KM

Ultimate Load Carrying Capacity Curves for Piles under Compression Loading

NOTES:
1 - Group efficiency factor (η) has not been considered during development of pile load carrying capacity curves. The group efficiency factor must be selected from the inset chart on this figure.
2 - The selected pile capacity must be verified by performing at least one full scale (3 x Design Load / η) pile load test.
3 - Load test should be performed as per relevant ASTM Standard.
4 - The provided capacity curves are only valid for preliminary level design of structures.

GROUP EFFICIENCY FACTOR

Diameter of Piles = 760 mm
Diameter of Piles = 1000 mm
Diameter of Piles = 1200 mm
Diameter of Piles = 1500 mm
FEASIBILITY STUDY AND TRANSACTION ADVISORY SERVICES
URBAN ROAD INITIATIVES IN KARACHI
Culvert / Bridge and Retaining Wall at RD 2+300 KM

Allowable Load Carrying Capacity Curves for Piles under Tensile Loading

NOTES:
1 - Group efficiency factor (η) has not been considered during development of pile load carrying capacity curves. The group efficiency factor must be selected from the inset chart on this figure.
2 - The selected pile capacity must be verified by performing at least one full scale (3 x Design Load / η) pile load test.
3 - Load test should be performed as per relevant ASTM Standard.
4 - The provided capacity curves are only valid for preliminary level design of structures.
FEASIBILITY STUDY AND TRANSACTION ADVISORY SERVICES
URBAN ROAD INITIATIVES IN KARACHI
Culvert / Bridge and Retaining Wall at RD 2+300 KM

Ultimate Load Carrying Capacity Curves for Piles under Tensile Loading

NOTES:
1 - Group efficiency factor ($\eta$) has not been considered during development of pile load carrying capacity curves. The group efficiency factor must be selected from the inset chart on this figure.
2 - The selected pile capacity must be verified by performing at least one full scale (3 x Design Load / $\eta$) pile load test.
3 - Load test should be performed as per relevant ASTM Standard.
4 - The provided capacity curves are only valid for preliminary level design of structures.
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<th>Soil Spring Stiffnesses</th>
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NOTE: The provided soil springs are only valid for preliminary level design of structures.
FEASIBILITY STUDY AND TRANSACTION ADVISORY SERVICES
URBAN ROAD INITIATIVES IN KARACHI

(Light Poles at RD 2+300 KM)

FOUNDATION PROPORTIONING CURVES FOR SQUARE FOUNDATION

NOTES:
1 - Tolerable Settlement = 25 mm
2 - Minimum Depth of Foundation \((D_F) = 1.0\) m below NSL
3 - Minimum Thickness of Select Fill = 1.5 m below foundation base
4 - Select fill should be A-3 or better material as per AASHTO soil classification.
5 - Select fill should be placed and compacted in layers appropriate to the type and size of compaction equipment.
6 - If any loose soil/soft pocket/fill material is encountered at the base of the foundation excavation, it should be completely removed and backfilled with select fill material.
7 - The capacity curve is tentative and can only be used for preliminary design of structures. Moreover, geotechnical investigations must be carried out at the specific location of structures to confirm the available bearing capacity.

Net Allowable Bearing Pressure (kPa)

Foundation Width, \(B_F\) (m)
FEASIBILITY STUDY AND TRANSACTION ADVISORY SERVICES FOR URBAN ROAD INITIATIVE PROJECT
Bridge / Culvert near BH-6

ALLOWABLE LOAD CARRYING CAPACITY CURVES FOR PILES UNDER COMPRESSION LOADING

NOTES:
1 - Group efficiency factor (\( \eta \)) has not been considered during development of pile load carrying capacity curves. The group efficiency factor must be selected from the inset chart on this figure.
2 - The selected pile capacity must be verified by performing at least one full scale (3 x Design Load / \( \eta \)) pile load test.
3 - Load test should be performed as per relevant ASTM Standard.
4 - The provided capacity curves are only valid for preliminary level design of structures.
FEASIBILITY STUDY AND TRANSACTION ADVISORY SERVICES FOR URBAN ROAD INITIATIVE PROJECT  
Bridge/Culvert near BH-6

Ultimate Load Carrying Capacity Curves for Piles under Compression Loading

NOTES:
1 - Group efficiency factor (η) has not been considered during development of pile load carrying capacity curves. The group efficiency factor must be selected from the inset chart on this figure.
2 - The selected pile capacity must be verified by performing at least one full scale (3 x Design Load / η ) pile load test.
3 - Load test should be performed as per relevant ASTM Standard.
4 - The provided capacity curves are only valid for preliminary level design of structures.
FEASIBILITY STUDY AND TRANSACTION ADVISORY SERVICES FOR URBAN ROAD INITIATIVE PROJECT
Bridge / Culvert near BH-6

Allowable Load Carrying Capacity Curves for Piles under Tensile Loading

NOTES:
1 - Group efficiency factor ($\eta$) has not been considered during development of pile load carrying capacity curves. The group efficiency factor must be selected from the inset chart on this figure.
2 - The selected pile capacity must be verified by performing at least one full scale ($3 \times$ Design Load / $\eta$) pile load test.
3 - Load test should be performed as per relevant ASTM Standard.
4 - The provided capacity curves are only valid for preliminary level design of structures.
FEASIBILITY STUDY AND TRANSACTION ADVISORY SERVICES FOR URBAN ROAD INITIATIVE PROJECT
Bridge / Culvert near BH-6

Ultimate Load Carrying Capacity Curves for Piles under Tensile Loading

NOTES:
1 - Group efficiency factor (η) has not been considered during development of pile load carrying capacity curves. The group efficiency factor must be selected from the inset chart on this figure.
2 - The selected pile capacity must be verified by performing at least one full scale (3 x Design Load / η) pile load test.
3 - Load test should be performed as per relevant ASTM Standard.
4 - The provided capacity curves are only valid for preliminary level design of structures.

Diameter of Piles = 760 mm
- Diameter of Piles = 900 mm
### Horizontal Soil Spring Stiffnesses

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**NOTE:** The provided soil springs are only valid for preliminary level design of structures.
FEASIBILITY STUDY AND TRANSACTION ADVISORY SERVICES FOR URBAN ROAD INITIATIVE PROJECT
(Light Pole & Retaining Wall near RD 4+500 Road - 2)

FOUNDATION PROPORTIONING CURVES FOR STRIP / SQUARE FOUNDATION

NOTES:
1 - Tolerable Settlement = 25 mm
2 - Minimum Depth of Foundation ($D_F$) = 1.0 m below NSL
3 - Minimum Thickness of Select Fill = 1.0 m below foundation base
4 - Select fill should be A-3 material as per AASHTO soil classification.
5 - Select fill should be placed and compacted in layers appropriate to the size and type of compaction equipment to at least 95% of modified AASHTO maximum dry density.
6 - If any loose soil/soft pocket/fill material is encountered at the base of the foundation excavation, it should be completely removed and backfilled with select fill material.
7 - The capacity curves are tentative and can only be used for preliminary design of structures. Moreover, geotechnical investigations must be carried out at the specific location of structures to confirm the available bearing capacity.
APPENDIX-F

SITE PHOTOGRAPHS
FEASIBILITY STUDY AND TRANSACTION ADVISORY SERVICES,
‘URBAN ROAD INITIATIVES IN KARACHI’
(SUB PROJECT- 1: LINK ROAD FROM KORANGI)

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Plate-2: Location of BH-05
Plate-3: Performance of Standard Penetration Test (SPT)

Plate-4: A View of Preserved Soil Samples
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Plate-6: Performance of Field Density Test at TP-05
Plate-7: A View of Core box at BH-05
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Feasibility Study and Transaction Advisory Services, 'Urban Road Initiatives in Karachi'
Sub Project 1: Link Road for Korangi

Design Criteria

December 2020
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Design Criteria for Sub-Project 1, “Link Road For Korangi”

1 Introduction

1.1 Background

Karachi is the largest city, main seaport and the financial center of Pakistan, as well as the capital of the province of Sindh. The metropolitan area of Karachi is spread over 3,500 sq km and has an estimated population of over 18 million. It is one of the world's largest cities in terms of population. It is Pakistan's premier center for banking, industry, economic activity and trade and is home to Pakistan's largest corporations, including those involved in textiles, shipping, automotive, entertainment, the arts, fashion, advertising, publishing, software development and medical research.

The commercial activities generate large volume of traffic within the city. Considerable volume of heavy freight traffic is generated to and from the Karachi Port and Korangi Industrial Area to the rest of the country.

In 1947 Karachi was populated on an area of 83 sq. km. which has presently expanded to 2500 sq. km. Due to the growth in population and the size of the city, the developments led to phenomenal increase in the road vehicles population.

The tremendous increase in population, industrialization and commercial activities in the city has resulted in rapid increase in all kinds of motorized traffic, and it became imperative to avert further aggravation of the problems of the residents.

Karachi maintains a 7,000 km road network. This limited road space combined with poor maintenance, delayed repair work, poor quality construction, and absence of essential support functions creates problems in satisfying the traffic demand. There are many places where large numbers of commuters move at the same time from one location to another, however, the access roads and links offer very few choices and hence there is considerable congestion on the roads specially during the peak hours.

The urban transport needs of a city are cyclic in nature and largely depend on the travel behavior of the citizens. Although the trips made by private and para transit vehicles are increasing, the noticeable feature is that the buses/minibuses still continue to cater to over 50% of the travel demand.

To mitigate the traffic congestion problems and provide quick and safe access to the commuters of Karachi, the local Government of Sindh has initiated three (03) urban road projects under Public Private Partnership (PPP) mode. These three projects are:

a) Sub-project 1: Link Road from Korangi (From KPT Interchange to PAF Airmen Academy),
b) Sub-project 2: Expressway from Mauripur Road (End of Lyari Expressway) to Y Junction (Kakapir Rd/Mauripur Rd Intersection), and

c) Sub-project 3: Interchange at ICI Bridge/Intersection.

In this regard, Government of Sindh has appointed the consortium led by the KPMG (Lead and Financial Consultant), NESPAK (Technical Consultant) and LEX FIRMA (Legal Consultant) to conduct the Feasibility study and Transaction advisory services to implement the Urban Road Initiative Projects in Karachi.

1.2 Report Purpose

This document provides information related to the design basis, which has been adopted/formulated by different engineering design specialties to finalize technical data, assumptions, codes of practice, methods and procedures for Sub-Project 1, “Link Road for Korangi” of Feasibility Study & Transaction Advisory Services, Urban Road Initiatives in Karachi by Local Government & HTP Department, GOS.

1.3 Brief of Sub Project 1, “Link Road for Korangi”

The Local Government & HTP Department, GoS has conceived Sub-project 1 (Link road for Korangi) as an alternate to route through existing causeway. Under the scheme, a bridge is proposed over Malir River as an alternate to the existing causeway and an expressway is proposed along the left bank of Malir River up to PAF Airmen Golf Club with connection to Korangi Creek Road.

Korangi Crossing Road is the main entrance to Korangi creek and the adjoining residential and industrial areas for the traffic from Qayyumabad, DHA and beyond. An Irish causeway across Malir River serves the traffic to / from this densely populated built up area. Several important educational institutions and major are located in the close vicinity. The existing road also provides access to Korangi Industrial Area.

During rainy season, existing causeway flooded under the water which leads to the disruption in the vehicular movement. In addition, traffic congestion has also been observed due to Korangi Industrial Area, major health care facilities, and educational Institutions.

Considering the above, proposed link road to Korangi and the new bridge on Malir River will be an alternate direct access route serving the Industrial and Commercial traffic to / from these areas.

1.4 Project Location and Proposed Alignment

- Project Location is shown in Figure 1
- Proposed Alignment is shown in Figure 2
Figure 1: Project Location
Figure 2: Proposed Alignment
2 Topographic Survey

2.1 Introduction

Details of locations of survey control network, instruments used, measurement details, position fixation, coordinates and layout of the above defined scope of works is given hereunder.

2.2 Extents of The Project Site

Project area for which survey carried out includes Korangi Area, Bhittai Colony and allied structures as shown in Figure-1.

2.3 Scope of Survey Work

Survey is required to obtain basic information regarding topography, terrain, drainage pattern, profile etc. of the project area.

The survey detail is inclusive of, but not limited to the elements listed below;

- Site Reconnaissance visit of the Project area.
- Establishment of survey Bench Marks (BM) in the project area.
- Topographic survey of entire project area.
- Inventory of existing structures.
- Processing of the observed data.
- Preparation of Topographic Survey Map / Sheets & related report.

Following methodology has been adopted for the above works:

2.4 Work Plan and Site Reconnaissance Visit

A comprehensive work plan has been established and implemented in the field by qualified survey team during execution of survey works.

Site reconnaissance survey of the project area has been carried out to assess the field conditions and general topography to finalize the survey activities/implementation plan.

2.5 Establishment of Survey Bench Mark (Bm)

Establishment of local control points is an essential activity which is to be carried out prior to actual commencement of surveying and mapping of the project area. New technology Global Navigation Satellite System (GNSS) makes it more efficient and effective to establish a primary control bench mark.

Often National Geodetic Survey (NGS) vertical control is not readily available in the project area, thus the new procedures allow for establishing a vertical height efficiently, and economically using GNSS.
Next activity is selection of a project control point and utilization of vertical data derived from GNSS observation processed through Online Positioning User Service (OPUS) as our primary control benchmark.

The values obtained in World Geographic System (WGS) can easily be transferred to local or Universal Transverse Mercator (UTM) Systems. Bench Mark has been used as a reference point for further establishment of horizontal and vertical control network, within the project area, to carry out the topographical and cross-sectional survey work.

The coordinates and location of established control points are presented in Table-1 and Table-2 in WGS-84 and UTM coordinate system respectively and shown in Figure-3.

2.6 Selection of Control Points Location

Quality is a characteristic of comparable things that allows us to decide that one thing is better than another. In the context of geographic data, the ultimate standard of quality is the degree to which a data set is fit for its effective use.

Selection of location for control points (Established Bench Marks) based on three elements i.e. stability for the soil conditions encountered for each point set, safety of the established point and ample clear view to the sky, which are crucial for GNSS observations. In order to mitigate errors and to increase accuracy, the control network has been planned and designed to form triangles wherever possible.

2.7 Establishment of Horizontal and Vertical Control Networks

Horizontal and vertical project control survey has been established for the project, whenever feasible, the horizontal and vertical control is based on high-precision GNSS observations.

In order to achieve maximum possible accuracy and minimal spatial variations in both horizontal and vertical planes, control network has been established by using state of the art "GNSS" equipment encompassing the entire project area.

For base line computation, three (3) GNSS instruments have been used simultaneously. To receive the signals from satellite, the receiver should have minimum obstructions like building, trees, power lines etc., around it.

In case of weakening of signals due to unfavorable weather conditions like rainfall, clouds and vehicle noise, the observations have repeatedly been noted till obtaining satisfactory readings/data.

For all time observations, at least four (4) satellites should be available with Geometric Dilution of Precision/Position Dilution of Precision (GDOP/PDOP) value of less than five (5).
The availability of satellites and GDOP value can be known in advance with the help of computer program for given time, date and point of observations. Each instrument is set to work at least 30 minutes for simultaneous observations.

Out of three (3) receivers, one acted as reference (for which coordinates of the observing point are known) and the other two (2) as rovers (coordinates to be computed). The observed point coordinates served as reference for further observing points to make a triangle or large polygon.

Control Points (CPs) have been engraved at the permanent structures.

### Table-1: List of Control Points Coordinates in World Geographic System (WGS) 84

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Control Point</th>
<th>Latitude (DMS)</th>
<th>Longitude (DMS)</th>
<th>Elevation (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>P1/CP01</td>
<td>24° 49’ 35.114” N</td>
<td>67° 5’ 12.971” E</td>
<td>11.304</td>
</tr>
<tr>
<td>2</td>
<td>P1/CP02</td>
<td>24° 49’ 26.292” N</td>
<td>67° 5’ 29.806” E</td>
<td>6.123</td>
</tr>
<tr>
<td>3</td>
<td>P1/CP03</td>
<td>24° 49’ 15.604” N</td>
<td>67° 6’ 2.461” E</td>
<td>10.620</td>
</tr>
<tr>
<td>4</td>
<td>P1/CP04</td>
<td>24° 48’ 52.947” N</td>
<td>67° 6’ 43.882” E</td>
<td>5.996</td>
</tr>
<tr>
<td>5</td>
<td>P1/CP05</td>
<td>24° 48’ 45.311” N</td>
<td>67° 6’ 57.809” E</td>
<td>6.652</td>
</tr>
<tr>
<td>6</td>
<td>P1/CP06</td>
<td>24° 48’ 25.770” N</td>
<td>67° 6’ 9.382” E</td>
<td>8.787</td>
</tr>
</tbody>
</table>

### Table 1: List of Control Points in WGS 84

### Table-2: List of Control Points Coordinates in Universal Transverse Mercator (UTM) Zone 42N

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Control Point</th>
<th>Easting (m)</th>
<th>Northing (m)</th>
<th>Elevation (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>P1/CP01</td>
<td>306659.546</td>
<td>2747083.353</td>
<td>11.304</td>
</tr>
<tr>
<td>2</td>
<td>P1/CP02</td>
<td>307128.469</td>
<td>2746805.285</td>
<td>6.123</td>
</tr>
<tr>
<td>3</td>
<td>P1/CP03</td>
<td>308040.860</td>
<td>2746463.647</td>
<td>10.620</td>
</tr>
<tr>
<td>4</td>
<td>P1/CP04</td>
<td>309194.364</td>
<td>2745750.390</td>
<td>5.996</td>
</tr>
<tr>
<td>5</td>
<td>P1/CP05</td>
<td>309582.223</td>
<td>2745510.044</td>
<td>6.652</td>
</tr>
<tr>
<td>6</td>
<td>P1/CP06</td>
<td>308213.902</td>
<td>2744927.617</td>
<td>8.787</td>
</tr>
</tbody>
</table>

### Table 2: List of Control Points in UTM Zone 42N
The accuracy of the survey control points in static mode is as follows:

- Horizontal .................. ± 3 mm +1 ppm RMS
- Vertical...................... ± 5 mm +1 ppm RMS

2.8 Instruments Used

Leica Viva GS 10, GS 15 and Trimble R2, R9 have been used to establish the control points. Also, these systems with one base and receivers (rovers) have been used to collect the survey data in RTK mode.

The topographic survey has been carried out by using the GNSS in Real Time Kinematic (RTK) mode. The base station placed on the known control point and the rover has been used for collecting the survey points. The accuracy of the GNSS equipment in RTK mode is as follows:

- Horizontal .................. ± 10 mm +1 ppm RMS
- Vertical...................... ± 20 mm +1 ppm RMS

2.9 Measurement Units

The linear measurement units used in survey and mapping work are in metric system of units and the angular measurement are in degrees, minutes and second of arc.

2.10 Field Data Processing

The data observed downloaded to laptop which always remain available with survey team at the survey site. The data has been processed and checked at the site for quality and gaps, if any. The GPS baselines have been processed using Leica Geo Office (LGO) and Trimble Business Centre (TBC) software. The default acceptance criteria for baselines have been used in LGO & TBC. Any baseline not fulfilling the acceptance criteria has been repeated. As the GNSS reading is based upon the WGS-84, the data has been converted into UTM Zone 42.

2.11 Software Used

All the observed data has been processed using LGO, TBC and ArcGIS software which are widely used for field data processing. AutoCAD and Eagle Point software have been used for preparation of the topographic survey layouts using the field survey data.

2.12 Data Post Processing and Production of Drawings

The observed data has been digitized using AutoCAD software in the form of lines and polygons. The digitization of features has been done in different AutoCAD layers. The feature layers have unique style and symbols so that these can be distinguished from other features.
Figure 3: Location Map of Established Survey Bench Marks
3 Geotechnical Investigations/Studies

3.1 Introduction

Geotechnical investigations are aimed at revealing the general subsurface soil / rock types at the site for the purpose of efficient and cost-effective feasibility level design of proposed development works.

The following Sections provide our work plan and methodology for undertaking the conceived geotechnical investigations.

3.2 Planning

The subsoil / rock investigations have been planned through execution of boreholes, excavation of test pits, field testing and sampling followed by appropriate laboratory testing for the purpose of feasibility level design of proposed development works. The investigations have been planned in such a way as to provide sufficient information about the condition and the strength of various substrata.

3.3 Field Investigations

After finalization of scope of work, a specialist drilling Contractor has been engaged on the basis of competitive bidding as per PPRA Rules. Upon award of work, the field investigations have been directly supervised by NESPAK staff on full time basis. The Contractor mobilize to the site with straight rotary drilling / percussion boring equipment along with all necessary allied accessories for testing and sampling.

The following field investigations have been envisaged / planned to be carried out:

- Execution of boreholes up to a maximum depth of 40 m below NSL or up to rock strike level, whichever is met earlier, by straight rotary drilling / percussion boring method including backfilling of boreholes to their original position by cement: sand: bentonite mix.
- Continuous core drilling (NX size in general) in bedrock up to a minimum depth of 3 m below rock strike level, including preservation of core samples in core boxes, waxing of core samples, photography of rock cores and transportation of core samples to the laboratory.
- Performance of standard penetration tests (SPTs) in the boreholes in overburden soils, generally at 1 m depth interval, including collection and preservation of split-barrel samples as per ASTM D - 1586.
- Collection of relatively undisturbed soil samples (UDS) from boreholes through Shelby/Denison/Pitcher sampler.
- Excavation of test pits up to a maximum depth of 2 m or up to subgrade, whichever is met earlier, exposing of road / pavement layers and back
of pits to their original condition along with collection of bulk composite samples, wherever considered necessary.

- Performance of field density tests (FDTs) through sand replacement method at the selected horizons in test pits.
- Collection of groundwater sample, if encountered in the boreholes/test pits.
- Logging of boreholes/test pits
- After completion of the field investigations, the site shall be restored to the condition existing before the work started, including backfilling of boreholes with cement-sand-bentonite slurry, unless otherwise directed.
- Establishment of coordinates and ground elevation of all the boreholes and test pits using Total Station.

### 3.4 Laboratory Testing

The laboratory testing has been carried out at an approved laboratory. Selected representative samples of soil/rock and water obtained during site investigations will be subjected to appropriate laboratory tests to evaluate the following engineering properties:

- Classification
- Shear strength of soil/rock
- Moisture-density relationship
- Compressibility characteristics
- Chemical characteristics
- Other relevant engineering characteristics

### 3.5 Analysis and Report

After completion of the field work, subsurface soil/rock profiles be developed for each project site, separately on the basis of the information obtained from boreholes. These shall be studied in conjunction with the laboratory test results and state-of-the-art literature, to formulate soil/rock parameters. The following pertinent engineering studies shall be carried out on the basis of the formulated parameters and the field and the laboratory investigation data:

- Evaluation of subsurface materials and subsurface soil/rock profiles
- Considerations for appropriate foundation system
- Bearing capacity analysis
- Settlement analysis
- Geotechnical recommendations for feasibility level design of foundations
- Geotechnical recommendations for feasibility level design of road network
- Aggressivity of subsoils/rocks and groundwater on buried R.C. works
- and any special measures required for their protection
These studies shall be summarized in the form of comprehensive geotechnical investigation report for each project site, separately. The reports shall include but not limited to a general description of the site and field activities, location of all boreholes & test pits, groundwater elevation measurements, disturbed/undisturbed soil sample details, rock core details, field/laboratory test results and geotechnical recommendations for feasibility level design of foundations and road network.

3.6 Geotechnical Design Criteria / Parameters

The foundations of all the structures and road network should meet the following design criteria:

- These should be safe against shear failure of the supporting ground. A factor of safety of 3.0 will be adopted for this purpose during bearing capacity evaluation of shallow foundations. However, a safety factor of 2.5 will be considered during pile load carrying capacity evaluation.
- All the foundations should not settle excessively under the service loads. A limit of 25 mm will be put on the total settlement of strip / square foundations and 50 mm on the total settlement of mat foundations. Similarly, the angular distortion between the edge and the center of the foundations should not exceed 1/500.
- The soil for sub-grade and embankment construction should be at least A-3/A-4 type as per AASHTO soil classification and minimum CBR value of 7 and 5 respectively at 95% Modified AASHTO density.

3.7 Geotechnical Investigation Report

Based on above criteria, Geotechnical Investigation Report has been prepared and shall be submitted accordingly.
4 Infrastructure Development Works

4.1 Introduction

The design of Link road to Korangi is based on a set design criterion that represent the best internationally accepted engineering practice. At the same time, the specific local site conditions have also been effectively considered in the interpretation of these criteria.

As such the design criteria represent the performance objective, while satisfying the economic constraints.

4.2 Reference Documents

Design parameters for this project are based principally on the following guideline documents:

- AASHTO Guide for Design of Pavement Structures 1993

4.3 Cross-sectional Elements

4.3.1 Lane Width

Lane width : 3.5 meters

The Contractor shall provide road widening considering the AASHTO requirement for largest vehicle, where deemed necessary, during the detailed design stage after due consultation with the Independent Engineer/GOS.

4.3.2 Shoulder Width

- Link road to Korangi Creek, a high-speed road

Outer Shoulder : 3.0 meters
Inner shoulder : 1.2 meters

4.3.3 Cross-Slope

The cross-slope of the alignment has been taken as 2% for the main carriageway, and 2.5% for the shoulder. The cross slope is kept towards sea side.

4.3.4 Vertical Clearance

The vertical clearance of the structures from the road level has been taken as minimum 5.1 meters.
4.4 Geometric Design Criteria

Interstate Semi-Trailer, WB 20, have been used as the design vehicle. However, during the detailed design stage the Contractor shall confirm the same from the Independent Engineer/GOS.

4.4.1 Design Speed

Following design speed have been considered;

- Link road to Korangi Creek : 90 kph
- Korangi Bridge : 80 kph
- At Interchanges : 30 to 40 kph.

However, during the detail design stage the Contractor shall confirm the same from the Independent Engineer/GOS.

4.4.2 Design Elements

The curve radii and the sight distances adopted for the geometric design of the project is given in Table-3 below:

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Description (m)</th>
<th>Speed KPH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>30</td>
</tr>
<tr>
<td>1</td>
<td>Stopping sight distance (m)</td>
<td>35</td>
</tr>
<tr>
<td>2</td>
<td>Passing sight distance (m)</td>
<td>120</td>
</tr>
<tr>
<td>3</td>
<td>Minimum Curve Radius (m)</td>
<td>22</td>
</tr>
<tr>
<td>4</td>
<td>Maximum super-elevation rate</td>
<td>4%</td>
</tr>
<tr>
<td>5</td>
<td>Minimum K (at Crest) for SSD</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Minimum K (at Sag) for SSD</td>
<td>6</td>
</tr>
<tr>
<td>6</td>
<td>Minimum K (at Crest) for PSD</td>
<td>17</td>
</tr>
</tbody>
</table>

Table 3: Design Elements

The maximum upgrade gradient for this project has been taken as 4.5%.

4.5 Pavement Design

4.5.1 Flexible Pavement

The road flexible pavement is a layered structure to distribute concentrated loads to the sub-grade. The performance of pavement structure is directly related to the physical properties and conditions of the roadbed soils and traffic. The pavement can be expected to carry from time of construction to the time of terminal
service-ability. The pavement, which is the vital component in the road design, must be structurally sound and should be economical and cost effective at the same time. Realistic assessments of traffic and soil properties are necessary to design the technically sound and economical pavement.

4.5.2 Design Procedure

The following procedure has been adopted for the design of the flexible pavement structure for the road:

- The traffic data has been projected for 20 years using the traffic growth factors obtained from different studies.
- Projected traffic has been converted in to equivalent standard axle load (ESAL’s) using standard ESA factors recommended by AASHTO and NTRC.
- The cumulative standard axle load has been computed. For the design load calculations and total cumulative standard, axle load has been multiplied with directional distribution factor and lane factor recommended by AASHTO Guide for Design of Pavement Structure 1993.
- Designed California Bearing Ratio (CBR) value has been taken as 10%.
- The flexible pavement design has been finalized by using the AASHTO Guide for Design of Pavement Structures. The governing factors for pavement design are Equivalent Standard Axle Load (ESALs) and CBR values of sub grade soil.
- Finally, the pavement section has been finalized by using AASHTO Guide for Design of Pavement Structures 1993.

4.5.3 Design Life

The design life for flexible pavement has been taken as 20 years.

4.5.4 Design Parameters

Following parameters have been used to analyze the pavement structure.

- Reliability (%)
- Overall standard deviation
- Initial Serviceability (Po)
- Terminal Serviceability (Pt)
- Subgrade CBR %
- Resilient Modulus (psi)
- Drainage Coefficient (m)
- Layer Coefficients

Using the above inputs and design equation as per AASHTO guidelines layer thicknesses in a flexible pavement have been determined.
5 Structural Works

5.1 Introduction

This structural design criteria describes the details and design parameters considered for Sub Project-1 of Urban Road Initiative project. The Sub Project-1 mainly includes the construction of Korangi Bridge near the existing Korangi crossing road, Link road to Korangi and Link road to Pakistan Refinery Ltd. (PRL).

Following structures are to be built in this sub-project:

- 3 + 3 Lane Bridge approximately 0.9 km length over Malir River (between Korangi Causeway and Jam Sadiq Bridge) along with all guide bunds (considering the recommendations of Hydraulic Physical / Mathematical Model Study Report of Malir River provided by the GoS).
- 2 lane Flyover over Korangi Bridge
- Culverts
- Single Span Bridges.
- Multi-span Bridge at RD 2+300KM on Road 2.

Vehicle loads and its associated parameters will be considered from West Pakistan Highway Code 1967 and Seismic analysis will be carried out as per code requirements (AASHTO/ UBC 97).

The flyovers are categorized under "Other Bridges" (non-essential) since there are alternative routes available to the area served.

Abutments have been planned keeping the height that will allow maintenance work to be carried out underneath.

The Contractor to be hired by the Employer/GOS for this project should keep in mind to set the top levels of all structures in such a way, so as to keep the bearing pads above high flood or tide level.

Spans of bridges with pre-cast girders have been planned for fast-track construction and Box girders have also been planned wherever required.

5.2 Earthwork

The Earthwork will be carried out as per Geotechnical Investigation Report and Roads/Structural drawings for flyover and other structures.

5.3 Foundation

5.3.1 For Flyovers

Successful bidder shall arrange for confirmatory soil investigation before proceeding with the detailed design and construction works. However,
diameter of 760mm, 900mm, 1200mm and 1500mm have been assumed for the preliminary designing purpose at this stage as per recommendations of available Geo-Technical Investigation Report carried out by NESPAK and as per space & load requirements. Furthermore, for detailed design of all structural components of bridge and allied facilities shall be based on the results / recommendations of confirmatory Geo-Technical investigation to be carried out by the successful bidder.

5.3.2 For Pole Foundations (Max 15m high)

Spread foundation for at grade locations of pole have been planned at 1.0m depth below NSL/ FRL as per recommendations of Geo-Technical Investigation Report carried out by NESPAK, with select fill of 1.0m as per recommendations of Geo technical Investigation Report.

5.4 Superstructure

5.4.1 Flyovers

The super-structure for flyovers comprises pre-cast pre-stressed girders; however, some portions of superstructure at the curvature will be continuous box girders. All girders will be simply supported on laminated elastomeric bearings resting on reinforced concrete transoms.

5.5 Loading

5.5.1 Types of Loads

- **Dead Loads**
  - Structural Dead Weight : Reinforced Concrete = 24 KN/m3
  - Earth Fill : Compacted Soil = 19 KN/m3
  - Wearing Surfaces (50+50) mm : Load Carpeting = 23 KN/m3
    
    *(50mm Future Provision has been kept in design)*
  - Soil Fill : Compacted Soil = 19 KN/m3
  - Concrete Barrier Load : Reinforced Concrete = 24 KN/m3
    
    *(As per actual)*
  - Foot Path Load : Concrete/Fill/planks =24/19 KN/m3
    
    *(As per actual)*

- **Transient Loads**
    
    *(Except vehicular load, all loads will be applied in accordance with AASHTO LRFD Bridge Design Specifications 2012; such as)*
- **Vehicular Dynamic Load Allowance (WPHC)**
- **Live Load Surcharge**
- **Tractive force**
- **Centrifugal force**
- **Pedestrian Load**: 3.6 kN/m²

### Environmental Loads: Ref: AASHTO LRFD 2012

- **Seismic Loads**
  - **Seismic Zone**: 2B as per BCP 2007
  - **Soil Profile Type**: As per GT report
  - **PGA**: 0.20 g

- **Wind Loads**: N/A
  Since Seismic analysis is governing the design, therefore case of wind load needs not to be considered for flyover concrete structure, however, pole foundation has been designed for wind loading.
  - **Basic wind speed (Fastest mile)**: 100mph
  - **Exposure**: AS per location
  - **Wind Importance factor (Iw)**: 1.0

- **Water Loads**: Water loads shall be applied as per AASHTO LRFD article 3.7 wherever required.

- **Equipment Loads**: N/A
- **Piping Loads**: N/A
- **Construction Loads**: As per actual

### 5.6 Limit States Used

- **Bridge Design**
  - **STRENGTH – I**: Normal vehicular use of Bridge.
  - **EXTREME – I**: Including load due to earthquake.
  - **SERVICE – I**: Normal operational use of bridge.

- **Other Structures’ Design**
  - **Strength Combinations**: As per UBC-97
  - **Alternate Basic Load Combinations**: As per UBC-97
5.7 Construction Materials

5.7.1 Concrete

All concrete shall be tested in accordance with ASTM standards C31, C39, C172 & specifications and the minimum cylinder specified strength of concrete at 28 days shall be as per Table 4 below.

<table>
<thead>
<tr>
<th>Class* (NESPAK standard)</th>
<th>Min. Cylinder crushing strength At 28 days (MPA.)</th>
<th>Equivalent NHA class</th>
</tr>
</thead>
<tbody>
<tr>
<td>A2</td>
<td>42 MPa</td>
<td>D2</td>
</tr>
<tr>
<td>A1</td>
<td>35 MPa</td>
<td>D1</td>
</tr>
<tr>
<td>A</td>
<td>28 MPa</td>
<td>A3</td>
</tr>
<tr>
<td>B</td>
<td>21 MPa</td>
<td>A1</td>
</tr>
<tr>
<td>C</td>
<td>17 MPa</td>
<td>B</td>
</tr>
<tr>
<td>D</td>
<td>08 MPa</td>
<td>-</td>
</tr>
<tr>
<td>E</td>
<td>05 MPa</td>
<td>Lean Concrete</td>
</tr>
</tbody>
</table>

*Concrete strengths shall be as per NESPAK’s standard specifications.
**Maximum Aggregate Size shall be 20 mm

Class of concrete along with type of cement for different structures shall be as follows unless noted otherwise in the Preliminary design drawings.

<table>
<thead>
<tr>
<th>Type of Construction/Structure</th>
<th>Class</th>
<th>CLASS* (Proposed as per NESPAK Specifications)</th>
<th>Equivalent NHA Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-cast I-Girders/Box Girders</td>
<td>A2</td>
<td>Ordinary Portland Cement</td>
<td>D2</td>
</tr>
<tr>
<td>Deck, Pre-cast Planks, Approach slab, diaphragm, Barrier, shear key</td>
<td>A</td>
<td>Ordinary Portland Cement</td>
<td>A3</td>
</tr>
<tr>
<td>Columns of Bridge</td>
<td>A1</td>
<td>Ordinary Portland Cement</td>
<td>D1</td>
</tr>
<tr>
<td>Piles, Pile caps and Abutments</td>
<td>A1</td>
<td>Modified Cement with Fly ash</td>
<td>D1</td>
</tr>
<tr>
<td>Retaining walls, Abutments</td>
<td>A</td>
<td>Ordinary Portland Cement</td>
<td>A3</td>
</tr>
<tr>
<td>Fill</td>
<td>C/D</td>
<td>Ordinary Portland Cement</td>
<td>B</td>
</tr>
<tr>
<td>Lean Concrete</td>
<td>E</td>
<td>Ordinary Portland Cement</td>
<td>Lean Concrete</td>
</tr>
</tbody>
</table>

Table 4: Concrete Strength

Table 5: Cement Type
5.7.2 Reinforcement

Reinforcing steel shall comply with ASTM A706. ASTM A615 grade 60 reinforcement shall be permitted if:

- The actual yield strength based on mill tests does not exceed $f_y$ by more than 18,000 psi; and
- the ratio of the actual tensile strength to the actual yield strength is not less than 1.25.

All pre-stressing steel shall conform to ASTM 416 and the ultimate tensile strength of pre-stressing steel shall not be less than 1860 MPa.

5.7.3 Cement

Type of Cement shall be as follows

Modified Portland Cement with the following limitations shall be used for all concrete works (below ground), except for transoms, girders and deck slab where Ordinary Portland Cement shall be used.

20 to 30% modified Portland cement shall be replaced with fly ash (or as per manufacturer’s recommendations) meeting the requirements of ASTM C618. Percentage of fly ash shall be fixed after a successful mix design for required strength of concrete.

- $C_3A$ shall neither be less than 5% nor more than 8%
- $C_4AF + 2C_3A$ shall be less than or equal to 25%
- $AL_2O_3$ shall be less than or equal to 6%

Ordinary Portland Cement conforming to ASTM C 150 and meeting the above requirements may also be used in lieu of modified cement.

All concreting shall be done by Batching Plant and no hand mixing shall be done.

5.8 Special Considerations in Design

a. Modified Portland Cement: Minimum 5ksi (35 MPa) concrete cylindrical strength has been considered with 20 to 30% cement to be replaced with fly ash (or as per manufacturer’s recommendations), meeting the requirements of ASTM C618, for components below ground considering the high chloride and sulphate contents as given in chemical test reports of soil and water carried out by NESPAK.

b. Cracking of Bridge decks have been observed to be one of the major problems in prestressed concrete bridges.
Polypropylene fibers have been proposed in the bridge deck to cater for the fatigue crack formation due to vehicular live load and shrinkage & temperature cracks. The fibers provide the three-dimensional reinforcement to increase impact resistance, toughness, ability to delay crack initiations and crack propagation.

Polypropylene fibers shall extend the service life of the deck and decrease the maintenance cost and traffic inconvenience for reparation.

5.9 Design Methods

- USD : Concrete elements
- WSD : Checking Bearing Capacity, Design of Bearings and Stress analysis of Pre-stressed Girders

5.10 Codes and Standards

- AASHTO LRFD Standard Design Specifications for Highway Bridges 2012
- Building Code of Pakistan (Seismic Provisions-2007)
- American Concrete Institute ACI 318 Building Code requirements for Reinforced Concrete
- American Institute of Steel Construction Specifications AISC.

5.11 Software Used

- CSi BRIDGE 20
- SAP 2000
- SAFE
- In house developed Software and Excel Sheets
6 Electrical System

6.1 Introduction

This section provides information related to the basic design guidelines for Electrical, which has been adopted / formulated to finalize technical data, design assumptions, codes of practice, methods and procedures.

6.2 Applicable Codes and Standards

The design, manufacturing, installation and commissioning of all Electrical systems shall conform to the following international and local standards / codes:

- IEC - International Electro technical Commission
- EN - European Standards
- BSI - British Standards Institutions
- NEC - National Electric Code
- IEEE - Institute of Electrical and Electronics Engineers
- ANSI - American National Standards Institute
- ASA - American Standards Association
- NEMA - National Electrical Manufacturers Association
- ISO - International Standards Organization
- DIN - Deutsche Industrie Normen (German Industrial Standards)
- ANSI/TIA/EIA - Commercial Building Telecommunications Cabling & Pathways
- Local Electrical Inspector’s requirement/regulations
- Local Explosives Inspector’s requirements/regulations

Following specialized standards shall be adhered for the related scope of work:

- BS 7671 - IEE wiring Regulation (latest edition)
- ESNA - Illuminating Engineering Society of North America (latest edition)
- BS EN 12464 - Lighting of work places
- BS EN 13201 - Road lighting
- CIE 115 - Lighting of Roads for Motor & Pedestrian Traffic

The electrical products/material used in this project shall be approved to meet the applicable standards by one of the independent test laboratories including following:

- KEMA
- CESI
- ASTM
- UL or other similar laboratories
6.3 Power Supply Data

Power supply shall be 0.4 kV, 3 Phase 50 Hz with neutral plus protective conductor. The characteristics of the supply are as follows:

- Power supply voltage: LT 415 V
- Frequency: 50 Hz
- Rated voltage of equipment: 400 V, 3 Phase, 230 V, 1 Phase
- Required power factor: 0.9 or higher
- Permissible fluctuation in rated voltage of equipment: ± 10%
- Permissible fluctuation in Frequency: ±2%
- Power Supply System: Neutral Directly / Solidly Earthed

6.4 Climatic Conditions:

The electrical power supply and all needed equipment and systems shall be suitable for operation in the ambient conditions, designed for easy operation and shall be purchased new. Switchgear / DBs and all other equipment shall be suitable for the project ambient conditions. Also, applicable derating factors shall be considered while selecting the equipment.

- Temperature
  - Indoor: 45°C (max) and 0°C (min)
  - Outdoor: 50°C (max) and 0°C (min)
- Relative Humidity: ±90%

Surface treatment of equipment, stainless steel, heavy duty plastic and proper enclosures shall be used. Due to the environmental conditions, equipment shall be properly classified & IP rated accordingly. Moreover, high performance epoxy paint / marine paint shall be applied as an additional protection on the equipment / lighting columns.

6.5 Design Provision

- Maximum allowed design voltage: 4% of line voltage
- drop from power source up to final load: +20%
- Spare capacity for future expansion: TT
- Earthing System: Plate type / rod type
- Earth Electrode: Insulated/Bare stranded Copper bare
- Earth conductor: IP 42 for indoor areas
- Degree of Protection: IP 54 for indoor damp Areas
  - IP 65 for outdoor areas
6.6 Scope Outlines

The Electrical scope mainly encompasses the following:

a) Low Voltage Power supply from utility
b) Low voltage power distribution network for Road lighting
c) Road lighting
d) Earthing system

6.6.1 Low Voltage Power supply from Utility

It is envisaged that the estimated power demand of the project will be approximately 150 kW, including the road network power supply requirements. However, the final power system demand of the project shall be calculated by the Detail designer based on actual power demand of the road and accordingly the necessary provision would be ensured in the existing K Electric’s system.

In this regard, it is proposed that the power supply connection at low voltage (415V) shall be taken from K-Electric’s pole /pad mounted transformer, located near the project premises.

There shall be six 415/230V Low voltage power supply intakes from K.E’s network to cater the low voltage supply at various locations specified in the preliminary design drawings and mentioned below

- MLTOD-1
- MLTOD-2
- MLTOD-3
- MLTOD-4
- MLTOD-5
- MLTOD-6

The further distribution of Utility’s power supply is shown in Table-6 below:

<table>
<thead>
<tr>
<th>Low Tension Outdoor Distributors</th>
<th>Loads Fed</th>
</tr>
</thead>
<tbody>
<tr>
<td>MLTOD -1</td>
<td>Road lighting for Korangi Bridge</td>
</tr>
<tr>
<td>MLTOD -2</td>
<td>Road lighting for Korangi Bridge</td>
</tr>
<tr>
<td>MLTOD -3</td>
<td>Road lighting for Link Road to Korangi Creek</td>
</tr>
<tr>
<td>MLTOD -4</td>
<td>Road lighting for Link Road to Korangi Creek</td>
</tr>
<tr>
<td>MLTOD -5</td>
<td>Road lighting for Link Road to Korangi Creek</td>
</tr>
<tr>
<td>MLTOD -6</td>
<td>Road lighting for Link Road to PRL</td>
</tr>
</tbody>
</table>

*Table 6: Distribution of Power Supply*
The location of Low-Tension Outdoor Distributors marked on the preliminary design drawing is tentative. The Detail designer is advised to design the Low voltage network by investigating services, emphasizing the quality of supply and safe operation of equipment as per the international and local standards.

6.6.2 Low Voltage power distribution network for Road lighting

The power supply from the above-mentioned Low-Tension Outdoor Distributors is further routed / distributed to nine Sub main Low-Tension Outdoor Distributors (SLTOD) at various locations specified in the preliminary design drawings and mentioned below:

- SLTOD-1
- SLTOD-2
- SLTOD-4
- SLTOD-5
- SLTOD-7
- SLTOD-8
- SLTOD-10
- SLTOD-11
- SLTOD-13

The locations of Sub main Low-Tension Outdoor Distributors marked on the preliminary design drawings are tentative. The Low voltage (0.415kV) power distribution from the above shall be designed to feed the road lighting poles installed on bridges, expressway & interchanges etc. in the entire project.

6.6.3 Road lighting:

Road lighting shall be designed as per international standards and local regulations, for all roads through Sub main Low-Tension Outdoor Distributors located at appropriate places.

The light fixtures shall be LED, pole mounted type. Lights provided shall be dust proof/ corrosion resistant, IP rated with cover where necessary and the lux levels shall be as per BS EN 13201-2, CIE 115 & BS 5489-1.

The average road surface luminance (L in cd/m²), the overall uniformity of the luminance (Uo), the longitudinal uniformity of the luminance (Ul), the threshold increment (TI) and the surround ratio (SR) shall be calculated and measured in accordance with ME2 lighting Class (as per Table 1a of EN 13201-2) or M2 lighting Class (as per Table 2 of CIE 115) whichever is applicable.

The light fixtures shall be contactor controlled through timer switches and sensors, directly from the relevant Sub main LT Outdoor Distributor.
6.6.4 Earthing System:

The Earthing scheme shall be in accordance with IEC 60634 based on TT system, with the star point at the supply source connected directly to earth.

Dedicated earthing protection shall be provided separately to all Low-Tension Outdoor Distributors, lighting poles, and any metallic structure including all electrical equipment's and apparatus in the entire project.

Continuity of protective earthing circuit must be observed. Removal of any equipment due to maintenance reason shall not interrupt the earthing circuit.

The Earthing system shall mainly comprise of the following components:

- Earth continuity conductors (ECC)
- Earth connecting point (ECP)
- Earthing leads
- Earth electrodes with concrete inspection pit having suitable type C.I cover

All accessories necessary for the satisfactory operation of the associated electrical system.