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1. Bathymetric Study;
2. Climatic Data;
3. Geotechnical Investigation Report;
4. Seawater Intake Drawings;
5. Geography & Topography Survey;
6. Water Sample Report; and
7. Environmental Impact Assessment Report

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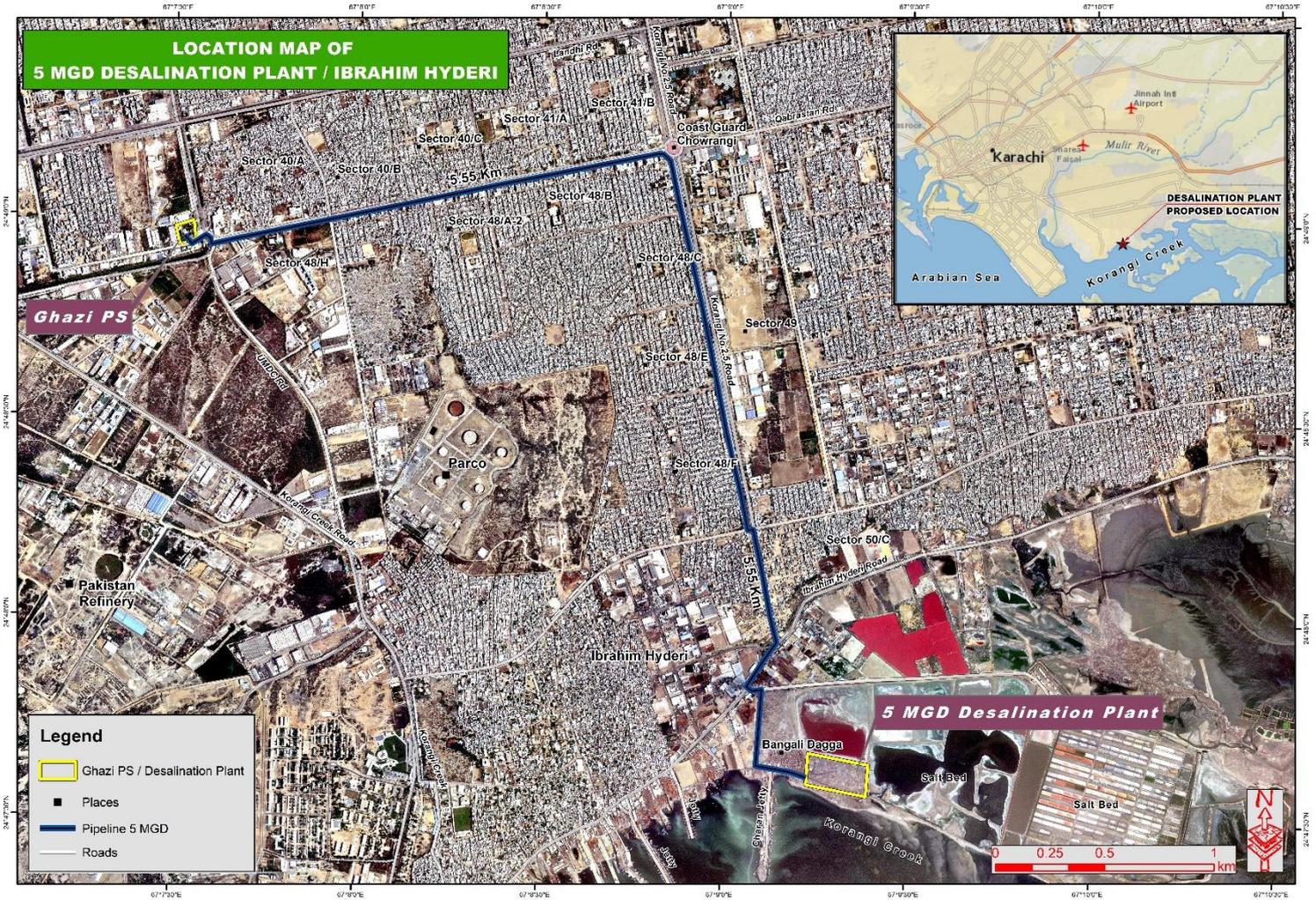
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This Disclaimer Statement is to be read in conjunction with, and forms part of, the RFP Documents.

"5 MGD DESALINATION PLANT AT IBRAHIM HYDERI"



GEOGRAPHY & TOPOGRAPHY SURVEY

Karachi Water & Sewerage Board (KW&SB).

INTRODUCTION

General

This Report is being submitted after the completion of detailed topographic survey of selected site location for "**5 MGD Desalination Plant at Ibrahim Hyderi**" project under the supervision of **Karachi Water & Sewerage Board (KW&SB)**. The survey report reflects the complete topography of selected desalination plant site, and conveyance route of treated water, through pipeline from selected site plant to Ghazi Pumping Station via Coast Guard Chowrangi. The topographic survey covers alignment details of proposed route which includes all major tracks, crossing streets, electrical poles, telephone poles, light poles, manholes, nullahs that comes along the proposed route. This resultant mapping integrated through a comprehensive Geographic Information System and AutoCAD drawing files.

Geographical Location

The proposed desalination plant site is located in District Korangi at Korangi Creek near small town of Bangali Dagga, in north east of Ibrahim Hyderi, Karachi. The latitude and longitude of the project site is $24^{\circ}47'37.39''\text{N}$, $67^{\circ} 9'18.94''\text{E}$ respectively. In a north direction of the proposed desalination plant, salt beds are found, and in south it has Korange Creek & Charran Jetty in east it has Korangi Creek and in west some industrial plots are found. Proposed desalination plant site is approachable through Korangi Crossing Road after Nasir Jump Bus stop, double metalled road of Landhi starts at left side, on opposite corner the building of Indus Hospital is situated. After travelling approx 4 km on Landhi Road towards Landhi after deputy commissioner office, at right hand side, a double metalled road crosses the Landhi road. This road leads to the Creek Road by crossing the Coast Guard Chowrangi. After turning a right hand side at Creek Road, Fidatiqa International Kanta is present here. In opposite direction a kacha track is found here, which leads to the proposed plant site. A detailed Geographical Map is attached here as figure-1.

Topographic Survey

Surveying is considered a vital link in the process of obtaining quality engineering in the planning and design of projects. Primary emphasis was placed on the surveys for obtaining a accurate information regarding the existing ground features for the selected desalination site and for the proposed water pipeline route. Every effort, therefore, was made to conduct the engineering



surveys in a professional manner. An initial planning for survey was essential as other studies and investigations depend on the availability of accurate topographic maps of the area depicting all essential existing features.

To collect the precise measurement of the area, a comprehensive program for land survey was scheduled in the month of July. But due to the unfavorable weather condition, the schedule was disturbed many time.

In August, 2022 six field crew was mobilized to carried out the topographic survey of desalination plant project.

Methodology

Construction planning near the sea shore directly effects with the regular rise and fall of the sea waters. To keep this in mind **Chart Datum** has selected for the whole project. Trimble Differential GPS solution has used to transfer the survey datum from Marina club to project site, as the TCI has already permanent BM installed in Marina club for our some other projects.

Trimble R8s GNSS, Positioning is as follows;

- | | | |
|-----------------|-----------------------------|-----------------------------|
| ➤ STATIC | H: 3.0 mm + 0.5 ppm | V: 10.0 mm + 1.0 ppm |
| ➤ RTK | H: 10.0 mm + 1.0 ppm | V: 20.0 mm + 1.0 ppm |

Horizontal & Vertical Control

Port Qasim Authority's (PQA) chart datum is the reference datum for the vertical control. While **Universal Transverse Mercator (UTM)** conformal projection that is uses 2 - dimensional Cartesian coordinates system has used to obtain and plot survey data.

For traversing or baseline processing Trimble differential GPS was used in static mode for 2 hours on each control points. **Trimble Business Center** was used for post processing of the observed points. These points were then used for the detailed topographic survey. To maintain the vertical accuracy double leveling was carried out to transfer the accurate vertical reference to the control points in first survey order form. **Nikon 32x** level machine was used along with standard quality and compatible metric leveling staves. The traversing errors and corrections was adjusted at site. Then, corrected references were used for detailed topographic survey.

Topographic Survey of Desalination Plant Site

KW&SB intends to setup a water desalination plant near the sea shore of Karachi city. For this purpose, at the shore of Korangi Creek near a small goth of Bangali Degga, a land parcel of around 10 acres was selected with the consultation of KW&SB. At first the location was identify during the desktop study, later reconnaissance site visit was carried out along with client's representatives.

To maintain the contour interval of 0.1 m intermediate and 0.5 m index, the spot survey with grid size of 1m x 1m was carried out. Electronic distance measurement (EDM) total station of *SOKKIA CX 105c* was used to carried out the spot levelling, *Easting Northing* and *Elevation* were observed at each spot point and stored in the surveying machine. Later the stored data was download and processed in the office and used to developed the contours. Contour map of proposed desalination plant site is attached as figure - 2 Sheet -1.

Topographic Survey of Water Pipeline Route

The proposed route for water pipeline from desalination plant to Ghazi Pumping Station is passing through the Creek Road, Coast Guard Chowrangi, Korangi Qabristan Road and then Ghazi Pumping Station is about 5.5 km in length. Detailed cross section of the proposed routes was carried out at an interval of 50 m for a width of property to property on both sides by covering the double carriage way. All existing ground features though out the proposed route was observed during the survey and marked in the drawing these includes (electric poles, telephone poles, light poles, manholes / chambers, connecting streets etc. Open drains / nullah were also observed during survey with their invert level and show on the drawing.

ESTABLISHMENT OF PERMENANT BENCH MARKS

Permanent Concrete Benchmarks (BM) were established, inside project boundary for

future reference. The locations of benchmark were selected at such places, which are not susceptible to disturbance or damage. The location, bearings and levels of BM, were determined and shown on layout drawings. Total 4 permanent BMs had been established for future use. List of BM is as under ;

LIST OF PERMENANT BENCHMARKS

1. BM-1	<i>E 313599.474</i>	<i>N 2743280.774</i>	<i>Z 4.249</i>
2. BM-2	<i>E 313648.262</i>	<i>N 2743416.130</i>	<i>Z 4.288</i>
3. BM-3	<i>E 310554.338</i>	<i>N 2745844.218</i>	<i>Z 5.654</i>
4. BM-4	<i>E 310547.837</i>	<i>N 2745865.310</i>	<i>Z 6.307</i>

SURVEY INSTRUMENTS

The following survey instruments has used for the baseline and topographic survey of water desalination plant project.

✓ Survey Teams	✓ 1No
✓ Survey Crew	✓ 6 No
✓ DGPS (Trimble)	✓ 1 Sets
✓ Total Stations (SOKKIA CX 105c)	✓ 1No
✓ Survey Vehicles	✓ 2 No
✓ HandHeld GPS (Garmin)	✓ 2 No
✓ Level Machines (NIKON 32x)	✓ 1 No
✓ Alien Computing Machine	✓ 1 No

SOFTWARE USED

Following software had been used for data processing and map making.

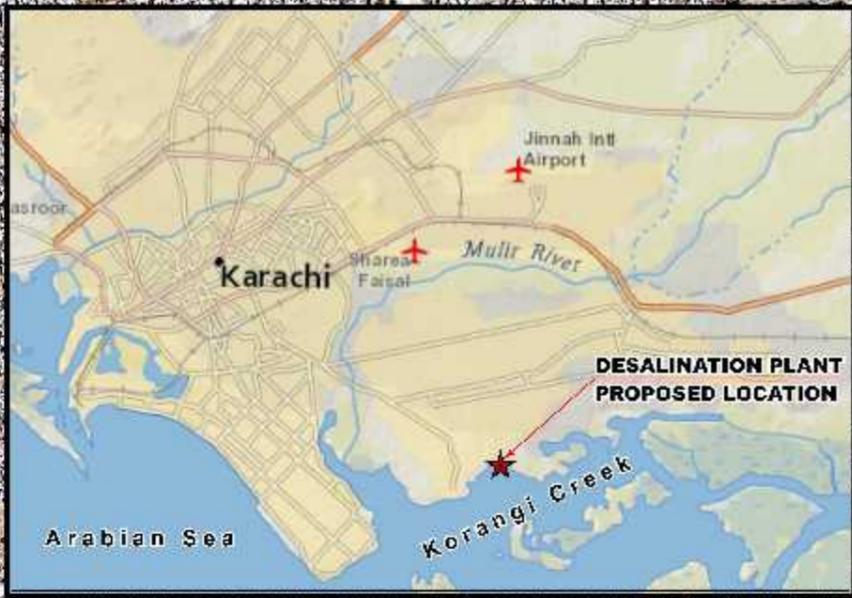
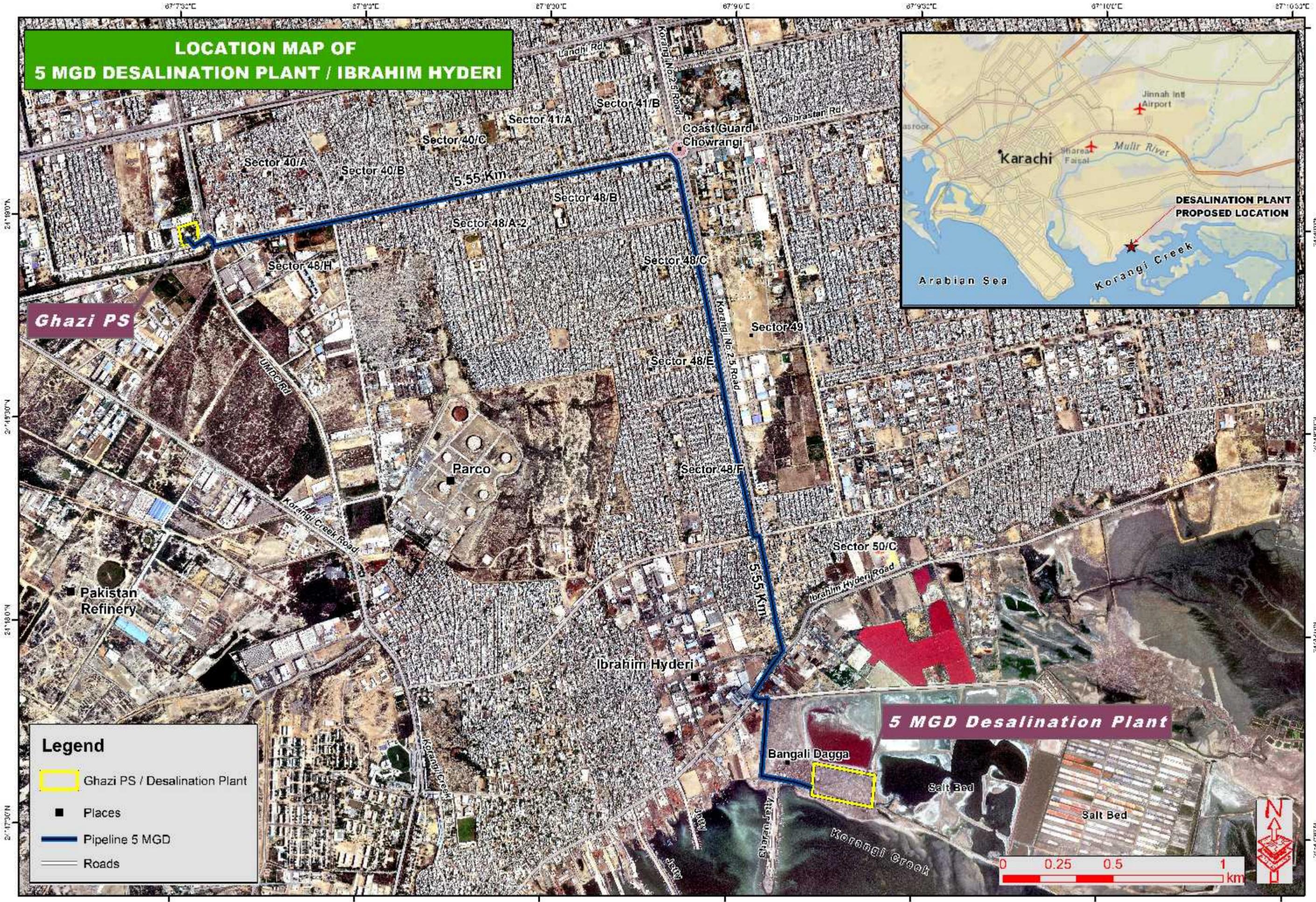
✓ AutoCAD Civil 3D	it was used for data processing and contour generating and drawing developing.
✓ Global Mapper 13	It was used for data interchanging from one file type to another file type.
✓ Google Earth Pro	It was used for mainly in survey planning and for field navigation.
✓ ArcGIS 10.6	It was used for developing geographical map making.
✓ Erdas Imagine 9.2	It was used for pan sharpening the satellite image and for base map making.
✓ Trimble Business Center	It was used for GPS data processing.

SURVEY TEAM AT WORK



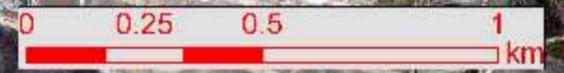


LOCATION MAP OF 5 MGD DESALINATION PLANT / IBRAHIM HYDERI



Legend

- Ghazi PS / Desalination Plant
- Places
- Pipeline 5 MGD
- Roads

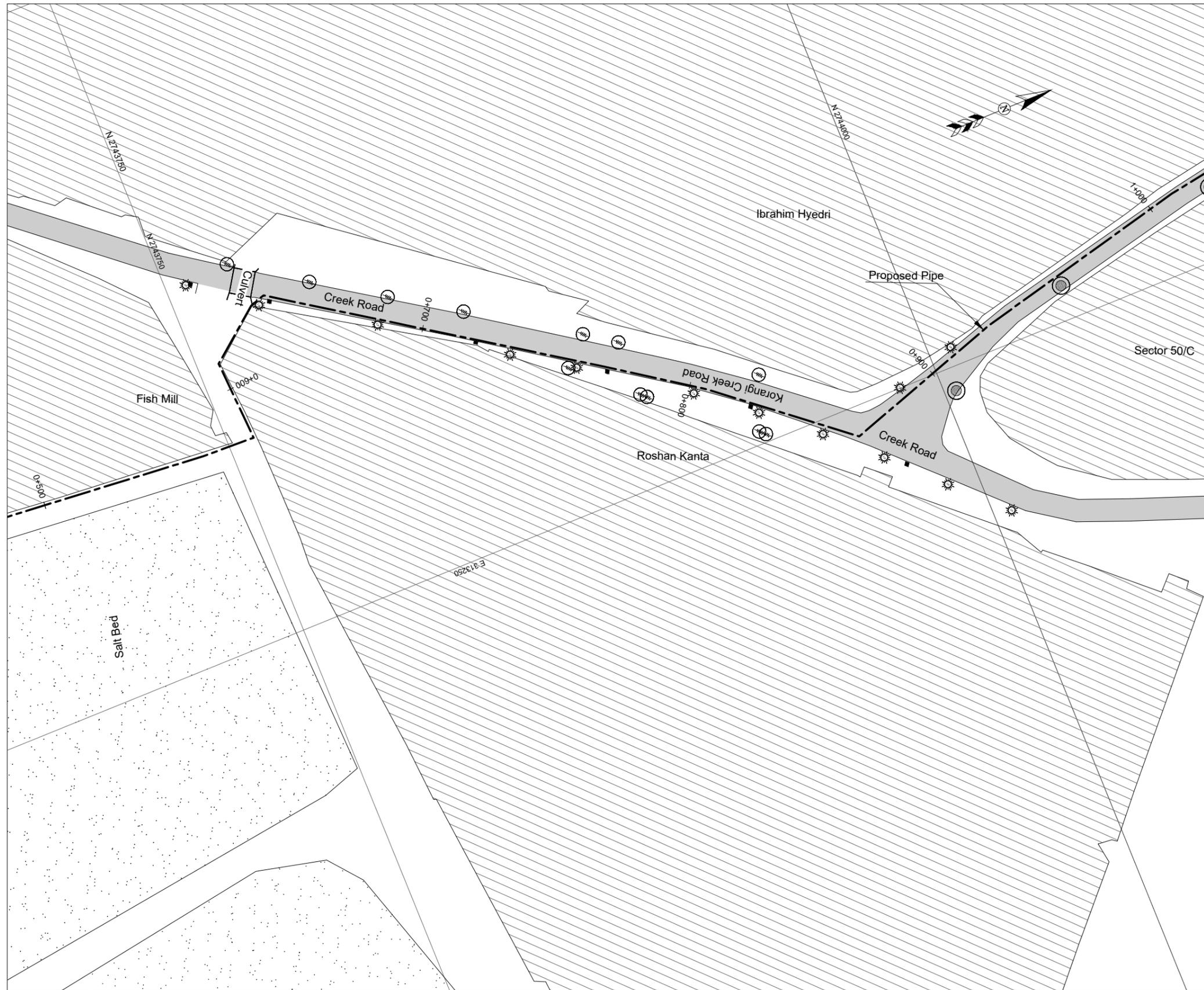




LEGEND:-

	Manhole
	Telephone Pole
	Electric Pole
	Light Pole
	Proposed Pipe
	Property
	Roads
	Salt Bed
	Nala / Water
	Chamber

Project :	
5 MGD DESALINATION PLANT	
Contract :	
Consultants :	
Techno-Consult International (Pvt.) Ltd.	
Drawing Title :	
TOPOGRAPHIC MAP OF 5MGD DESIGN 0+000 to 0+500	
Designed By :	Date : August 2022
Drawn By :	Sheet : 1 / 11
Checked By :	Drg No :
Approved By :	



LEGEND:-

	Manhole
	Telephone Pole
	Electric Pole
	Light Pole
	Proposed Pipe
	Property
	Roads
	Salt Bed
	Nala / Water
	Chamber

Project :

5 MGD DESALINATION PLANT

Contract :

Consultants :



Techno-Consult International (Pvt.) Ltd.

Drawing Title :

**TOPOGRAPHIC MAP OF 5MGD DESIGN
0+500 to 1+000**

Designed By :

Date : August 2022

Drawn By :

Sheet : 2 / 11

Checked By :

Drg No :

Approved By :



LEGEND:-

	Manhole
	Telephone Pole
	Electric Pole
	Light Pole
	Proposed Pipe
	Property
	Roads
	Salt Bed
	Nala / Water
	Chamber

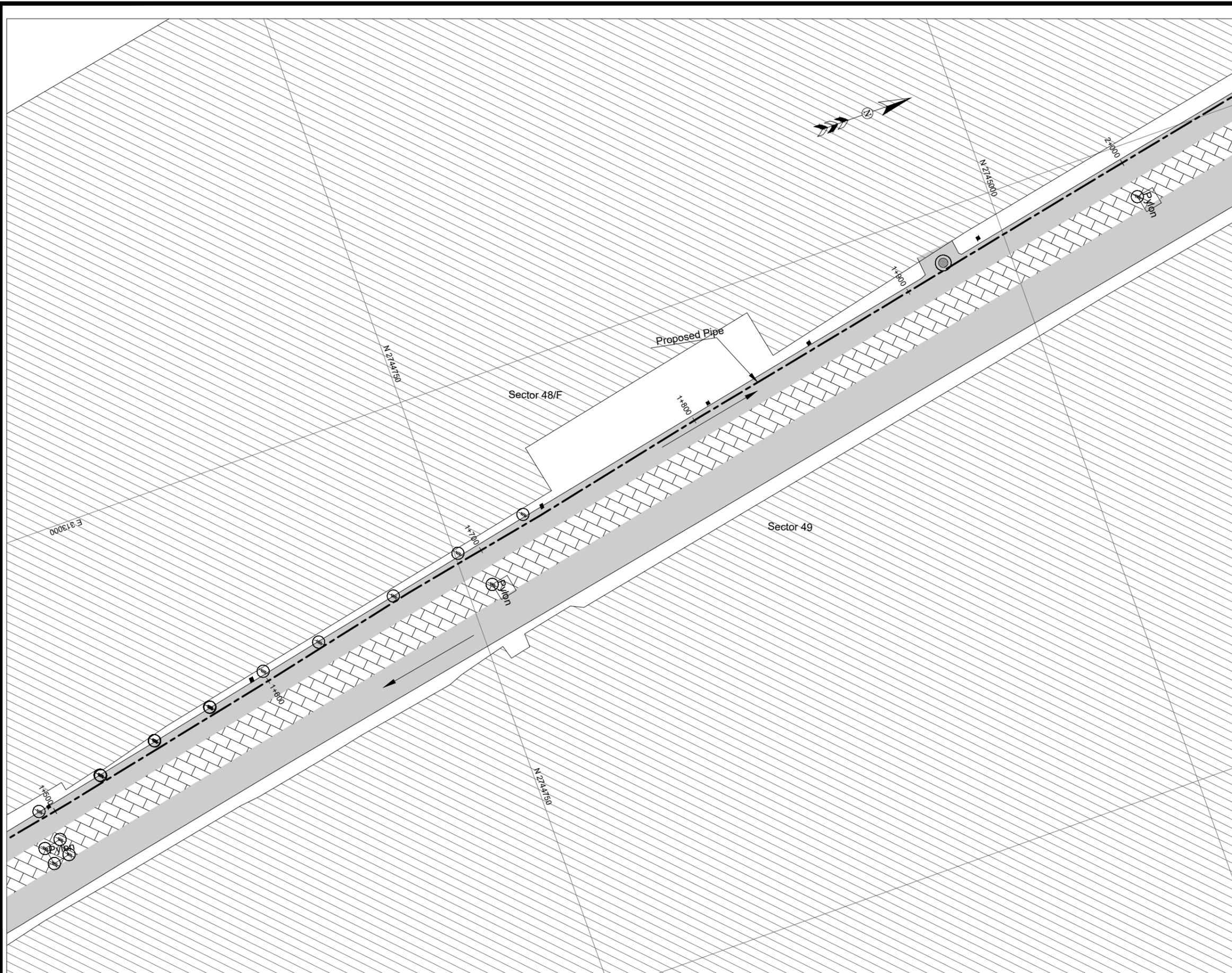
Project : **5 MGD DESALINATION PLANT AT IBRAHIM HYDERI**

Contract : ----

Consultants :  **Techno-Consult International**

Drawing Title : **TOPOGRAPHIC MAP OF 5MGD DESIGN 1+000 TO 1+500**

Designed By :	Date : August 2022
Drawn By :	Sheet : 3 / 11
Checked By :	Drg No :
Approved By :	



LEGEND:-

	Manhole
	Telephone Pole
	Electric Pole
	Light Pole
	Proposed Pipe
	Property
	Roads
	Salt Bed
	Nala / Water
	Chamber

5 MGD DESALINATION PLANT

Contract : ----

Consultants : **Techno-Consult International (Pvt.) Ltd.**

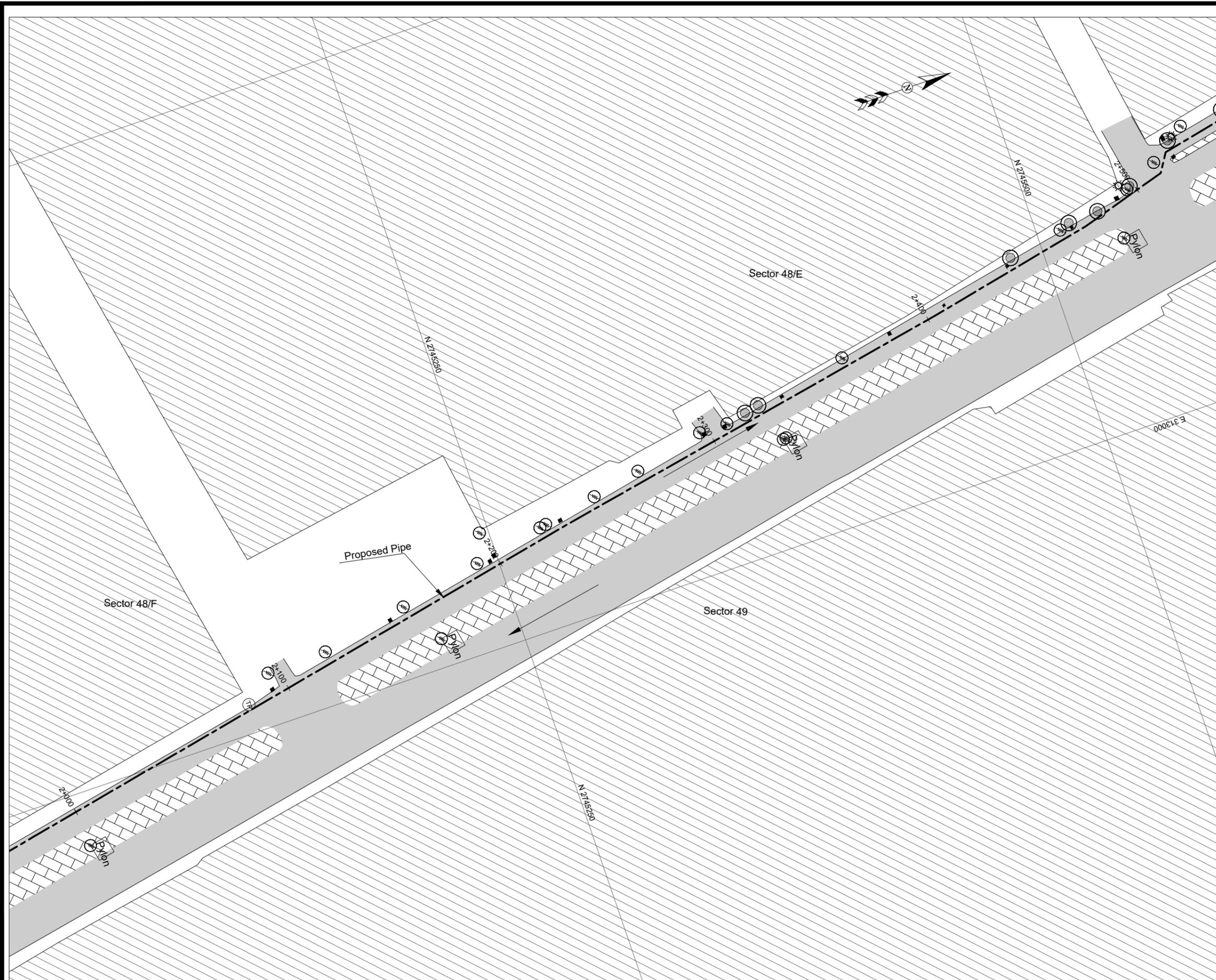
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1+500 TO 2+000**

Designed By : _____ Date : August 2022

Drawn By : _____ Sheet : 4 / 11

Checked By : _____ Drg No : _____

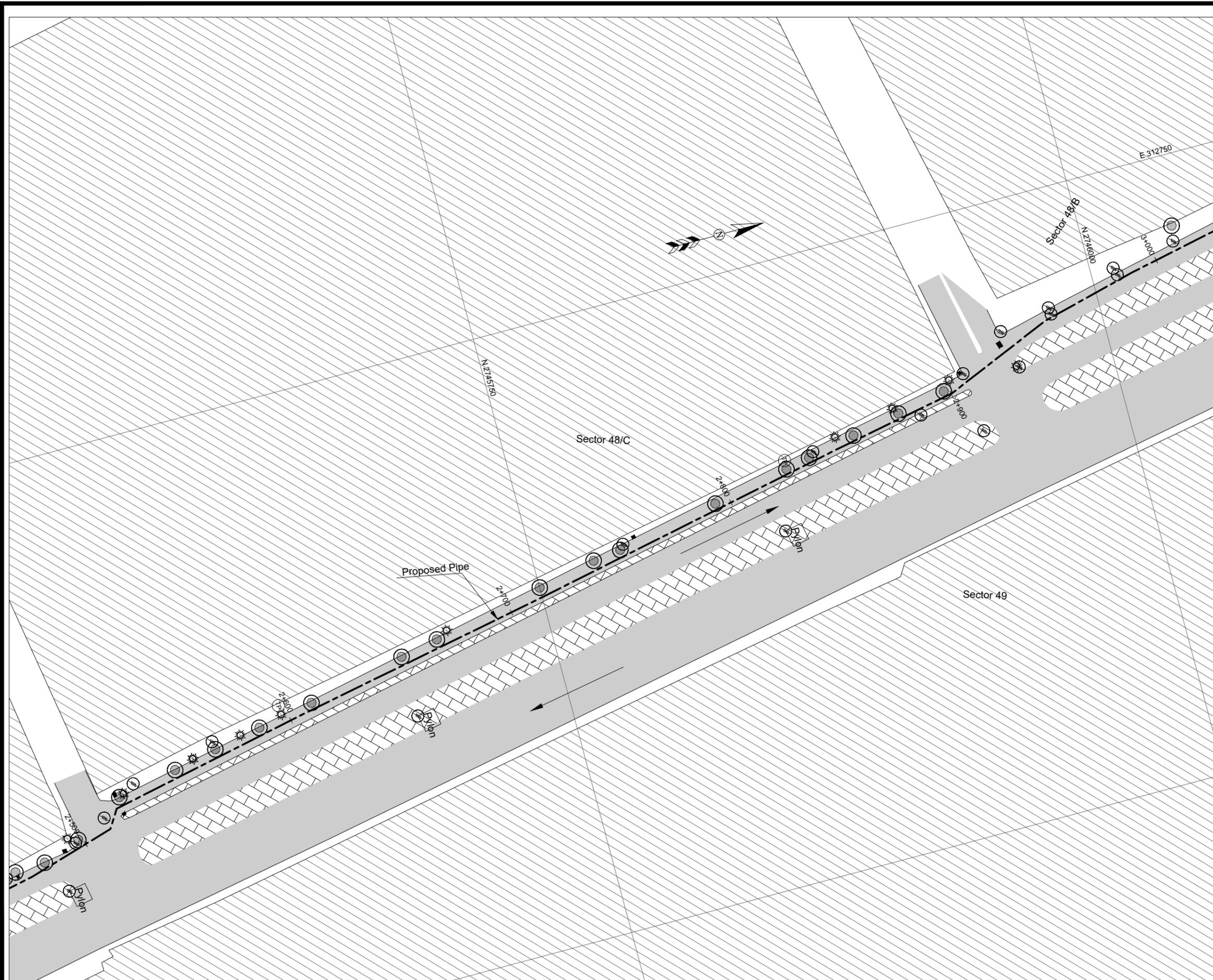
Approved By : _____



LEGEND:-

	Manhole
	Telephone Pole
	Electric Pole
	Light Pole
	Proposed Pipe
	Property
	Roads
	Salt Bed
	Nala / Water
	Chamber

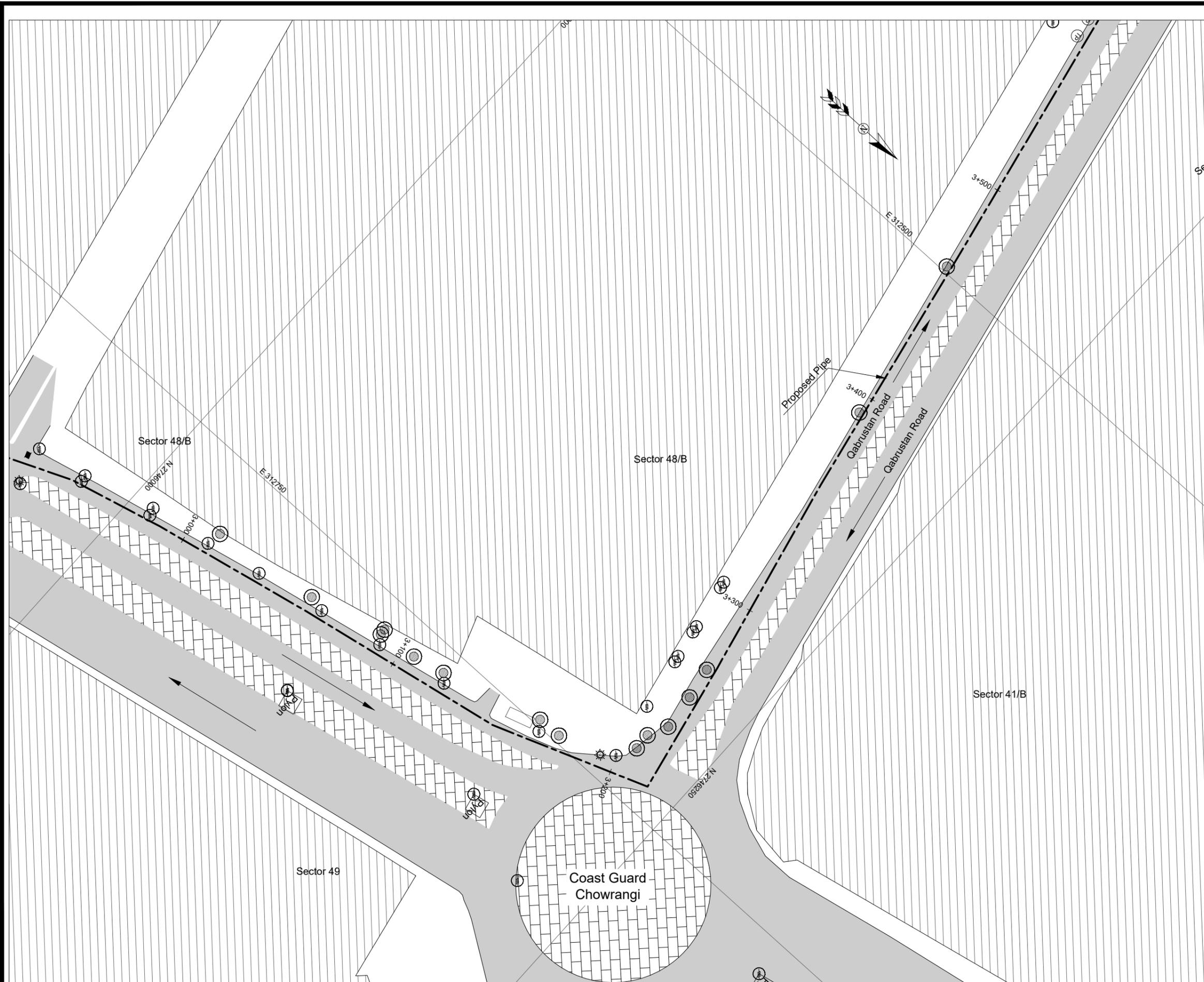
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5 MGD DESALINATION PLANT	
Contract : -----	
Consultants :	
Drawing Title :	
TOPOGRAPHIC MAP OF 5MGD DESIGN 2000 TO 2+500	
Designed By :	Date : August 2022
Drawn By :	Sheet : 5 / 11
Checked By :	Drg No :
Approved By :	



LEGEND:-

	Manhole
	Telephone Pole
	Electric Pole
	Light Pole
	Proposed Pipe
	Property
	Roads
	Salt Bed
	Nala / Water
	Chamber

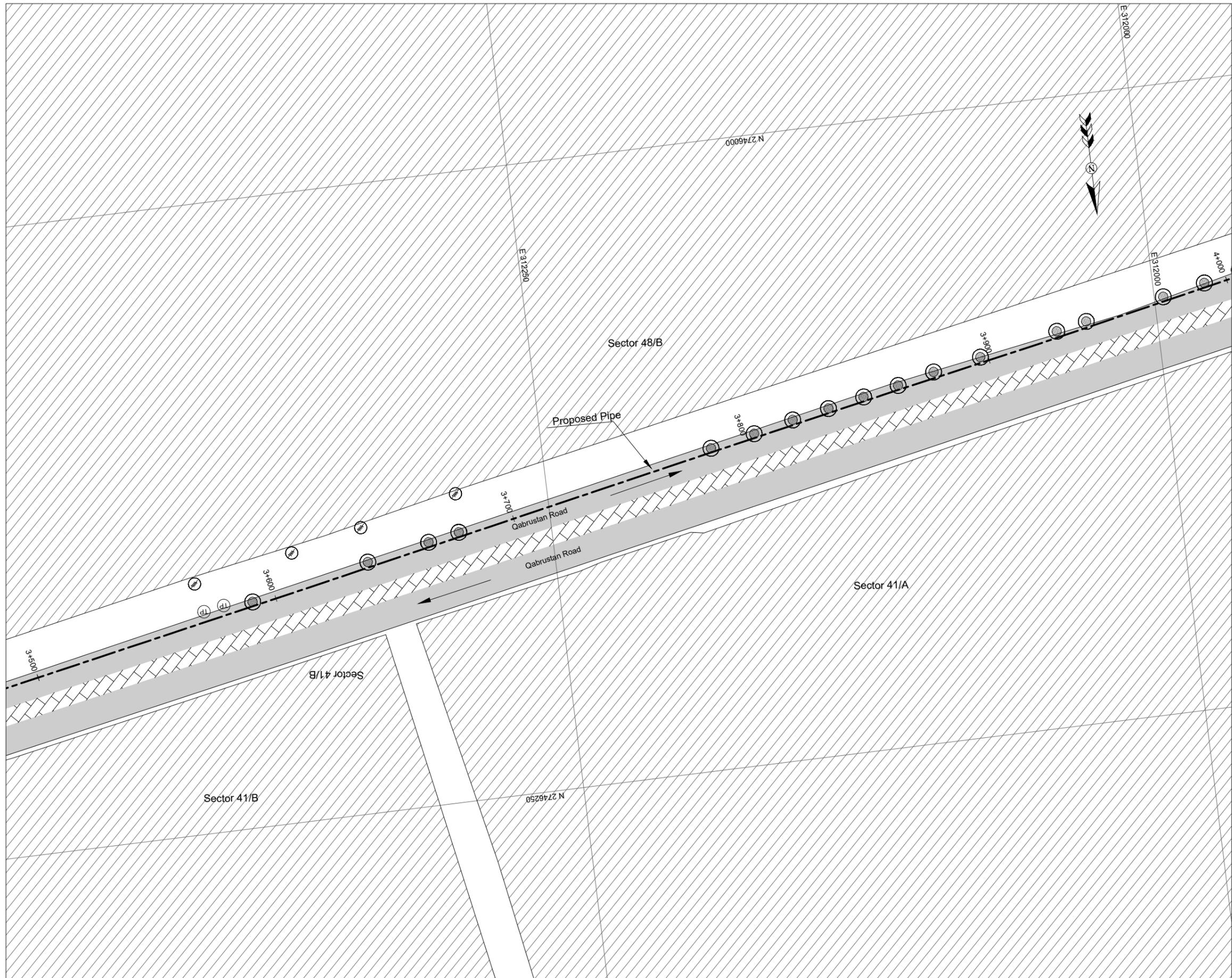
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5 MGD DESALINATION PLANT	
Contract : -----	
Consultants :	
Drawing Title :	
TOPOGRAPHIC MAP OF 5MGD DESIGN 2+500 TO 3+000	
Designed By :	Date : August 2022
Drawn By :	Sheet : 6 / 11
Checked By :	Drg No :
Approved By :	



LEGEND:-

	Manhole
	Telephone Pole
	Electric Pole
	Light Pole
	Proposed Pipe
	Property
	Roads
	Salt Bed
	Nala / Water
	Chamber

Project :	
5 MGD DESALINATION PLANT	
Contract : -----	
Consultants :	
Drawing Title :	
TOPOGRAPHIC MAP OF 5MGD DESIGN 3+000 TO 3+500	
Designed By :	Date : August 2022
Drawn By :	Sheet : 7 / 11
Checked By :	Drg No :
Approved By :	



LEGEND:-

	Manhole
	Telephone Pole
	Electric Pole
	Light Pole
	Proposed Pipe
	Property
	Roads
	Salt Bed
	Nala / Water
	Chamber

Project :	
5 MGD DESALINATION PLANT	
Contract : -----	
Consultants :	
Drawing Title :	
TOPOGRAPHIC MAP OF 5MGD DESIGN 3+500 TO 4+000	
Designed By :	Date : August 2022
Drawn By :	Sheet : 8 / 11
Checked By :	Drg No :
Approved By :	



LEGEND:-

	Manhole
	Telephone Pole
	Electric Pole
	Light Pole
	Proposed Pipe
	Property
	Roads
	Salt Bed
	Nala / Water
	Chamber

Project : **5 MGD DESALINATION PLANT**

Contract : ----

Consultants : **Techno-Consult International Pvt. Ltd.**

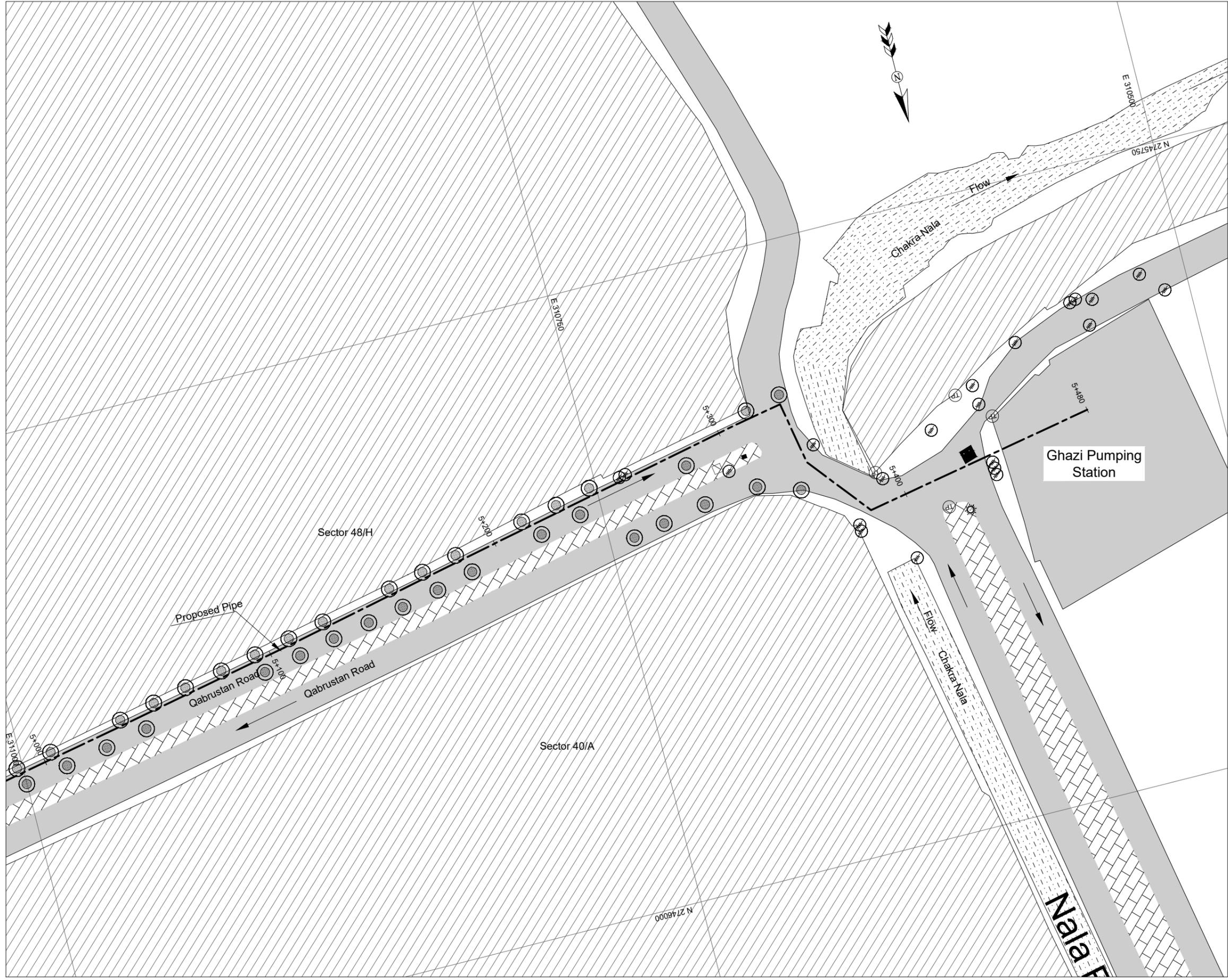
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4+000 TO 4+500**

Designed By : _____ Date : August 2022

Drawn By : _____ Sheet : 9 / 11

Checked By : _____ Drg No : _____

Approved By : _____



LEGEND:-

	Manhole
	Telephone Pole
	Electric Pole
	Light Pole
	Proposed Pipe
	Property
	Roads
	Salt Bed
	Nala / Water
	Chamber

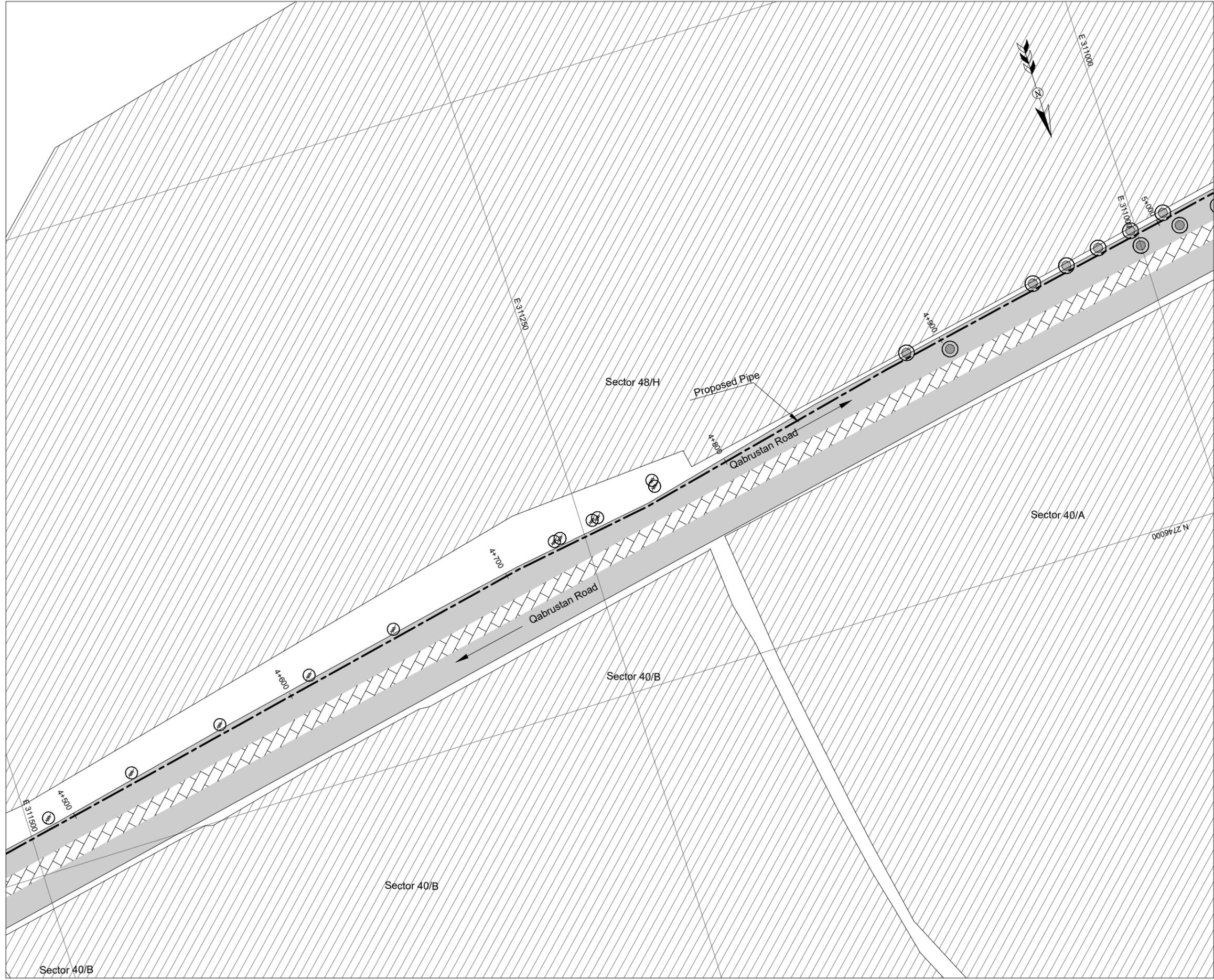
Project : **5 MGD DESALINATION PLANT**

Contract : ----

Consultants : **Techno-Consult International Pvt. Ltd.**

Drawing Title : **TOPOGRAPHIC MAP OF 5MGD DESIGN 5+000 TO 5+480**

Designed By :	Date : August 2022
Drawn By :	Sheet : 11 / 11
Checked By :	Drg No :
Approved By :	



LEGEND:-

	Manhole
	Telephone Pole
	Electric Pole
	Light Pole
	Proposed Pipe
	Property
	Roads
	Salt Bed
	Nala / Water
	Chamber

Project :
5 MGD DESALINATION PLANT

Contract :

Consultants :
 Techno-Consult International Pvt. Ltd.

Drawing Title :
**TOPOGRAPHIC MAP OF 5MGD DESIGN
4+500 TO 5+000**

Designed By : _____ Date : August 2022

Drawn By : _____ Sheet : 10 / 11

Checked By : _____ Drg No : _____

Approved By : _____