

DISCLAIMER STATEMENT

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This Disclaimer Statement is being issued by KWSC in relation to the Project. Further to the request of various Interested Parties during the Pre-Bid Meeting dated September 4, 2024, KWSC has elected to provide the following technical studies (collectively, the **Technical Studies**) conducted by the technical advisors for the Project on behalf of KWSC:

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

Ibrahim Hyderi Desalination Plant

Climatic Data acquisition and assessment

Climatic Data

Karachi Airport Station of Pakistan Meteorological department (PMD) has been opted for climatic and hydrological studies of the project area of Ibrahim hyderi desalination plant. This station has been opted due to its relevance to the project site and local data availability.

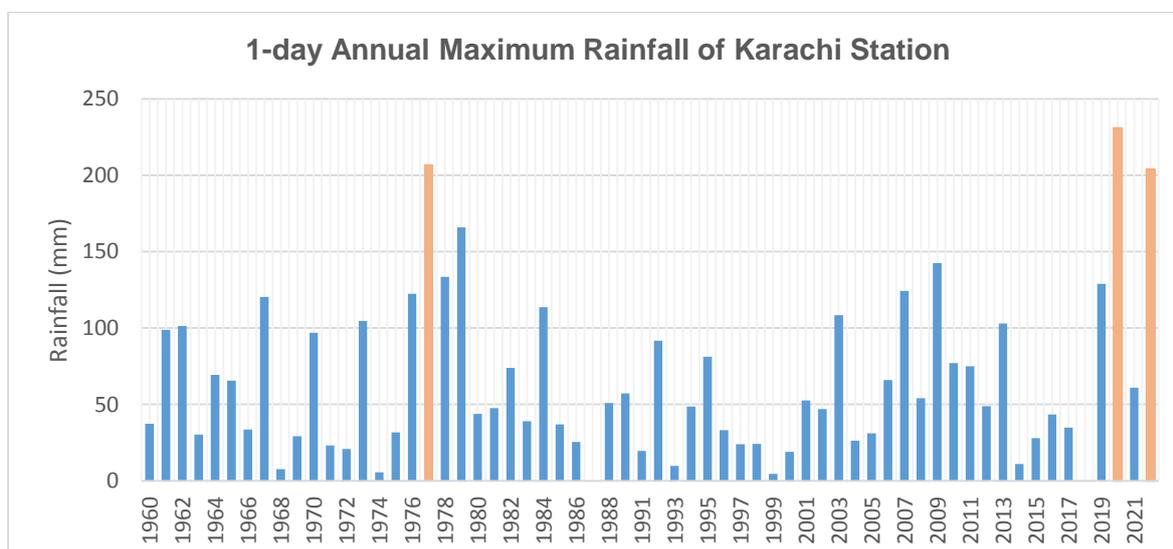
Climatic Parameters such as Temperature, wind speed, humidity and solar radiation data for past 20 years from 2001 till 2020 have been acquired from PMD for the required station of Karachi.

Climatic data has been acquired for the following durations;

Climatic parameter	Data Type	Year	Available data range
Rainfall	1-day Maximum	62	1960-2021
Temperature	Mean monthly	20	2001-2020
Relative Humidity at 0000 UTC	Mean Monthly	20	2001-2020
Relative Humidity at 1200 UTC	Mean Monthly	20	2001-2020
Wind speed at 0000 UTC (Knots)	Mean Monthly	20	2001-2020
Wind speed at 1200 UTC (Knots)	Mean Monthly	20	2001-2020

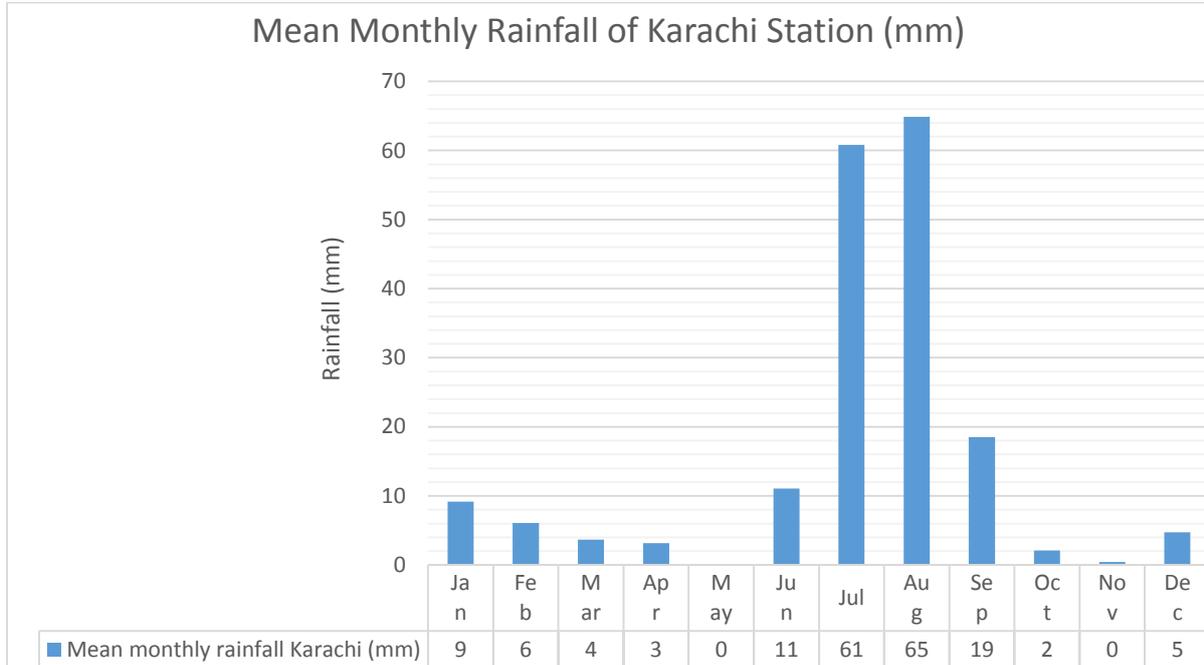
Rainfall Analysis

1-day Annual Maximum rainfall of past 62 years have been analyzed. The analysis incorporated historic rainfall records of 2020 and 2022 of Masroor base station, as it observed as highest of both the station for maximum 1-day rainfall record. It is observed that the city has observed historic rainfall records in the year 1977, 2020 and 2022 of 207mm, 234mm and 204 mm respectively.



Mean Monthly Rainfall

The city of Karachi receives most of its rainfall in the monsoonal season with annual average rainfall of about 175 mm. Mean monthly rainfall in the monsoon ranges from 19 mm to 65 mm. The months of July and August are observed to be wet months with mean monthly rainfall of 61 and 65 mm respectively.



Temperature

Mean monthly temperature of Karachi of past 20 years Annual average temperature experience in Karachi is 27°C ranging between mean maximum and minimum of 28 °C and 26.8 °C respectively.

Temperature	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Annual (°C)
Average	19	22	26	30	32	32	31	30	30	30	25	21	27
Max	21.3	24.7	27.7	30.8	33.2	33.8	33	31.4	31.5	36	26.7	23.3	27.9
Min	17.2	19	25.1	29	30.6	31.3	29.5	28.3	28	27.7	23.7	19.6	26.8

Wind Speed

Annual average wind speed around midnight is about 4 Knots ranging between 6 and 3 knots approximately. Whereas, the wind speed is higher around evening that is about 8 Knots varying between 6.7 to 10 Knots.

At 0000 UTC (knots)

Wind Speed (Knots)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Annual Knots
Average	2	3	3	4	6	7	8	7	6	2	2	2	4
Max	4.7	5.1	5.5	6.9	8.4	10	10.8	9.5	9.7	3.5	2.7	3.6	5.8
Min	0.8	1.3	0.3	2.3	3.4	3.9	3.5	4.5	3.4	0.8	0.4	0.8	2.5

At 1200 UTC (knots)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Annual Knots
Average	6	8	8	10	12	11	11	10	9	7	5	5	8
Max	9	10.3	10.8	12.1	13.3	13.4	14.1	12.4	12.2	9.2	6.9	7.4	10
Min	4.1	5.7	4.8	1.1	9.8	7.6	7.9	7.2	1.5	5.7	3.8	3.3	6.7

Relative Humidity (%)

Relative humidity of the Karachi Station implies annual average humidity around evening about 48% average ranging between 51% and 45%, this humidity level increases mostly by the midnight, the statistics suggest that relative humidity is about 73% with highest being 77% and the lowest around this time being 70%. As per EPA guidelines, the relative humidity should be below 60% ideally between 30% and 50%.

At 1200 UTC (%)													
Relative Humidity (%)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Annual (%)
Average (%)	33	33	37	45	57	61	67	68	61	44	34	32	48
Max	46	44	46	49	66	65	71	76	69	57	45	47	51.1
Min	25	24	26	35	46	56	63	61	56	34	28	20	45
At 0000 UTC (%)													
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Annual (%)
Average (%)	33	33	37	45	57	61	67	68	61	44	34	32	73.3
Max	46	44	46	49	66	65	71	76	69	57	45	47	76.8
Min	25	24	26	35	46	56	63	61	56	34	28	20	69.8

24 hour annual maximum rainfall data of Karachi Station from 1960-2022

1-Day Annual Maximum Rainfall of Karachi Airport Station From 1960-2022

Year	Maximum Rainfall (mm)
1960	37.3
1961	98.8
1962	101.3
1963	30.2
1964	69.3
1965	65.5
1966	33.5
1967	120.4
1968	7.6
1969	29.2
1970	97.0
1971	23.1
1972	20.8
1973	104.6
1974	5.6
1975	31.6
1976	122.4
1977	207.0
1978	133.6
1979	166.0
1980	43.8
1981	47.6
1982	74
1983	38.9
1984	113.7
1985	37
1986	25.4
1987	0
1988	51
1990	57.2
1991	19.5
1992	91.7
1993	9.8
1994	48.7
1995	81.3
1996	33.2
1997	24
1998	24.1
1999	4.5
2000	19

1-Day Annual Maximum Rainfall of Karachi Airport Station From 1960-2022

Year	Maximum Rainfall (mm)
2001	52.5
2002	47
2003	108.4
2004	26.3
2005	31
2006	65.9
2007	124.2
2008	54
2009	142.5
2010	77.1
2011	74.93
2012	48.768
2013	103
2014	11
2015	28
2016	43.4
2017	34.8
2018	0.01
2019	129
2020	231*
2021	61
2022	204*
Mean	61.3
St. Dev	49
Count	62

*24 Hr. maximum rainfall observed at Karachi Masroor. For specific year annual maximum of Masroor base is opted which broke the records of 100 year rainfall return.

Mean Temperature Karachi °C

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL ©
2001	19.4	22.3	26.4	29.2	31.6	32.3	29.6	29.4	29.5	36	26	23.1	27.9
2002	19.9	21	26.4	29.6	31.3	31.6	29.5	28.3	28	29.4	25.1	21.4	26.8
2003	20.1	22.7	26.1	30.3	30.6	31.4	30.9	29.7	28.9	28.9	23.7	20.1	26.9
2004	19.7	22.2	27.7	30.2	32	32.1	30.6	29.5	29	28.1	24.3	22.4	27.3
2005	18.6	20.8	25.9	29.1	30.9	32.3	30.3	29.4	30.4	29	26	20.7	27
2006	18.9	24.7	25.7	29.4	31	32	31.1	28.7	30.5	30.4	26.4	20.1	27.4
2007	19.9	23.4	25.5	30.3	31.8	32.5	31.3	30.1	30.6	28.6	26.2	20	27.5
2008	17.2	19	27	29.2	30.6	32.1	30.7	29.4	30.7	29.6	25	21	26.8
2009	20.5	23.1	26.9	29.9	32.2	32.2	31.3	30.3	29.6	29.3	25	21.3	27.6
2010	19.9	22	27.7	30.5	32.3	31.5	31.5	30.2	30.2	29.9	25.1	19.6	27.5
2011	18.9	21.5	26.5	29	31.2	32	31.1	30	29.6	27.7	26.7	20.8	27.1
2012	18.5	19.4	25.4	29.8	31.3	31.3	30.6	29.8	29.8	28.8	25.6	21.2	26.8
2013	19.1	21.5	26	29.1	31.1	32.9	30.9	29.4	29.2	30.6	25.2	20.6	27.1
2014	17.3	20.5	25.3	29.7	31.5	32.8	31.1	30.3	30.3	29.8	26.2	20.9	27.1
2015	19.5	22.7	25.3	30.8	31.9	33.8	31.2	29.6	30.5	30.3	25.8	20.6	27.7
2016	21.3	22.6	27.5	29.6	31.5	32	30.8	30.1	29.6	29	25.2	23.3	27.7
2017	18.9	22.7	26.5	29.9	32	32.7	30.4	30.4	29.8	30.1	24.6	20.6	27.4
2018	20.7	23.1	27.7	30.8	33.2	32.1	31.1	29.1	29.1	29.9	26.6	20.7	27.8
2019	19.8	21.1	25.1	29.7	31.3	33.1	31.5	29.6	31.5	30	25.4	20.4	27.4
2020	17.6	22.7	25.2	30.5	32.2	33.5	33	31.4	31.2	29.5	23.7	20.3	27.6
Average	19	22	26	30	32	32	31	30	30	30	25	21	27
Max	21.3	24.7	27.7	30.8	33.2	33.8	33	31.4	31.5	36	26.7	23.3	27.9
Min	17.2	19	25.1	29	30.6	31.3	29.5	28.3	28	27.7	23.7	19.6	26.8

Wind Speed at 0000 UTC in Knots for Karachi Airport station

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual (Knots)
2001	4.5	5.7	7.9	9.5	12.2	12.3	8.5	9.8	8.2	5.7	4.2	4.3	7.7
2002	6	7	8.6	10.9	12.6	9.1	14.1	9.7	11	5.8	5.8	5.2	8.8
2003	7.1	8.3	9.2	10.1	11.2	10.5	7.9	9.6	7.3	6.2	4.7	4.1	8
2004	6.3	7.2	7.2	10.1	11.9	12.2	12.5	11.9	9.4	6.7	3.8	4.9	8.7
2005	4.5	6.9	7.8	9.5	10.1	9.9	11.2	10.7	8.1	5.9	4.4	4.5	7.8
2006	4.7	6	7.8	8.9	10.5	10.8	11.2	8.9	6.5	7.9	4	4.8	7.7
2007	4.1	7.5	6.8	7.8	10.2	10.5	8.6	9.4	8	5.8	6.2	3.3	7.4
2008	4.3	7.6	8.2	10.5	12.6	7.6	11	9.3	8.7	6.6	5.1	3.9	7.9
2009	7	7.2	7.9	9.3	9.8	9.7	9.5	9.3	9.1	6.1	5	3.9	7.8
2010	5	6.8	7.7	8.2	9.8	9.3	8.8	7.2	1.5	6.2	4.9	5	6.7
2011	5	6.6	6.5	8	11.7	11.7	10.8	8.5	7.1	6.3	5.4	4.4	7.7
2012	5.8	6.6	9.3	9.8	12.3	12.8	13.1	11.2	8.4	7.1	5.7	5.8	9
2013	5.2	6.9	9	10.3	11.5	10.8	12	11.2	10.3	7.7	5.1	4.5	8.7
2014	5.9	8.9	8.6	11.5	12.4	13.4	12.8	11.6	11.7	8.3	6	4.5	9.6
2015	6.9	10.3	10.1	11.5	12.8	12.3	13.7	12.3	10.5	8.7	5.6	5.8	10
2016	7.5	8.7	4.8	1.1	13	11.7	11.8	10.5	12.1	9.2	5.5	5.2	8.4
2017	7	8	10.8	12.1	12.8	11.5	12.1	10.3	8.7	8.5	5.4	7.4	9.6
2018	6.3	7	9.5	10.2	10.8	11.1	12.3	12.4	12.2	8.7	6.1	6.8	9.4
2019	6.7	8.9	10.2	11.7	12.1	11.7	13.7	9.1	8.5	8	6.9	7.4	9.6
2020	9	9.4	9	10.5	13.3	10.9	10.1	8.9	9.4	7.3	6.2	5.5	9.1
Average	6	8	8	10	12	11	11	10	9	7	5	5	8
Max	9	10.3	10.8	12.1	13.3	13.4	14.1	12.4	12.2	9.2	6.9	7.4	10
Min	4.1	5.7	4.8	1.1	9.8	7.6	7.9	7.2	1.5	5.7	3.8	3.3	6.7

Wind speed at 0000UTC (Knots)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
2001	1.7	2.2	2.6	4.3	6.5	7.9	6.2	7.5	4.9	2	1.6	1	4
2002	2.5	1.6	2.7	5.3	8	8	10.4	6	6.5	1.1	1.3	1.6	4.6
2003	1.8	3.1	3.2	4.8	6	7.7	4.8	6.6	4.9	0.8	1.7	2.1	4
2004	2.1	2.1	2.1	3.9	6	8	8.6	9.5	5.5	2.3	0.4	2.4	4.4
2005	2.1	4	3.7	3.1	4.3	5.5	8.6	7.1	5.1	1.7	0.7	0.8	3.9
2006	1.5	1.6	1.6	4.3	7.2	6.7	8.6	5.9	4	3	0.9	1.6	3.9
2007	0.8	1.4	2.3	2.3	3.9	3.9	3.5	4.5	4.1	1.1	0.6	1.7	2.5
2008	1.5	2.3	2.3	3.4	7.7	4.9	6.6	6.3	5.2	2.2	1.3	2.1	3.8
2009	3.4	1.3	2.5	2.6	3.4	5	6.4	6.5	5.5	1.3	2.5	2.7	3.6
2010	1.9	2.7	2.6	4.1	6.3	7.3	5.8	6	4.6	1.7	2	2.3	3.9
2011	2.1	2.1	2.8	3.1	7.1	8.2	7.5	5.6	4.3	2.3	0.9	1.3	3.9
2012	2.4	2.8	4.8	4.4	7	8.7	9.4	7.7	3.4	1.2	0.9	3	4.6
2013	2.6	2.9	2.7	3.5	7.5	6.5	8.3	7.5	6	3.3	2.2	1.5	4.5
2014	1	1.8	3.5	4.1	6.4	8.5	9.5	8.3	7.4	3.4	1.7	1	4.7
2015	2.3	5.1	3.2	5.4	7.3	7.5	10	9.4	4.7	2.8	2.5	3.1	5.3
2016	1.9	3.2	5.5	6.9	8.2	10	9.7	7.5	9.7	3.5	1.6	2.4	5.8
2017	4.7	4.2	4.8	5.9	8.4	8.5	10.8	9	6	2.4	1.8	3.6	5.8
2018	1.6	2.4	0.3	5.9	5.4	8	8.6	9.2	8.2	1.9	1.3	2.6	4.6
2019	2.1	3.7	3.5	4.3	4.8	5.8	10.5	6.6	4.9	1.7	2.6	2.8	4.4
2020	3.9	3.6	3.7	4.1	7.9	6.9	6.8	7.2	5.3	2.2	2.7	2.9	4.8
Average	2	3	3	4	6	7	8	7	6	2	2	2	4
Max	4.7	5.1	5.5	6.9	8.4	10	10.8	9.5	9.7	3.5	2.7	3.6	5.8
Min	0.8	1.3	0.3	2.3	3.4	3.9	3.5	4.5	3.4	0.8	0.4	0.8	2.5

Mean Monthly Humidity at 1200 UTC (5 pm) (%)

KARACHI AIRPORT

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual (%)
2001	26	32	35	47	59	63	71	65	59	47	30	39	47.8
2002	27	27	33	43	57	62	66	65	63	39	34	33	45.8
2003	31	35	37	35	53	63	71	67	57	34	31	34	45.7
2004	34	33	26	47	55	62	64	66	59	43	32	25	45.5
2005	29	41	45	37	55	59	65	65	60	37	36	30	46.6
2006	31	37	38	49	62	59	68	76	61	54	38	40	51.1
2007	31	44	43	47	57	64	66	72	59	35	41	31	49.2
2008	28	30	36	48	66	62	63	68	58	48	31	47	48.8
2009	37	40	46	35	55	63	69	71	67	46	31	32	49.3
2010	35	32	42	49	59	64	67	70	59	47	33	28	48.8
2011	35	38	37	41	60	63	63	67	69	46	45	33	49.8
2012	31	24	37	47	59	64	66	65	64	47	40	32	48
2013	33	35	34	49	54	57	66	67	59	50	34	33	47.6
2014	25	27	35	47	57	61	64	61	60	36	36	31	45
2015	38	41	37	45	60	56	69	67	56	47	28	31	47.9
2016	46	25	41	47	60	60	68	70	63	57	34	38	50.8
2017	38	25	36	44	59	62	70	67	63	44	29	20	46.4
2018	36	37	33	45	46	65	65	68	63	40	32	30	46.7
2019	40	34	37	48	56	59	65	73	68	41	35	30	48.6
2020	30	28	34	44	57	57	65	75	62	38	33	29	46.1
Average (%)	33	33	37	45	57	61	67	68	61	44	34	32	48
Max	46	44	46	49	66	65	71	76	69	57	45	47	51.1
Min	25	24	26	35	46	56	63	61	56	34	28	20	45

Mean Monthly Humidity of Karachi Station in %

MEAN MONTHLY RELATIVE HUMIDITY of KARACHI AIRPORT STATION AT 0000 UTC (12 am) (%)

KARACHI AIRPORT

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual (%)
2001	57	68	68	78	79	77	82	80	82	83	65	67	73.8
2002	56	59	72	71	79	81	80	81	81	80	72	66	73.2
2003	67	67	68	63	75	81	83	81	78	73	67	67	72.5
2004	67	72	69	74	79	79	81	83	81	74	68	56	73.6
2005	59	66	75	67	77	79	79	80	79	72	69	60	71.8
2006	61	73	70	78	79	79	81	88	83	78	78	73	76.8
2007	59	80	77	80	82	81	80	84	80	74	80	64	76.8
2008	57	64	72	77	82	79	78	82	75	77	62	71	73
2009	65	74	76	67	78	81	83	83	83	81	62	59	74.3
2010	71	68	79	76	81	82	82	84	80	78	61	61	75.3
2011	65	71	71	75	81	79	80	82	82	78	74	60	74.8
2012	60	52	67	78	79	81	79	80	83	76	74	60	72.4
2013	62	63	71	78	78	77	81	82	80	76	65	64	73.1
2014	56	60	64	77	79	76	82	79	77	69	63	55	69.8
2015	67	70	65	71	81	73	81	82	78	74	52	56	70.8
2016	75	55	72	78	81	81	81	82	81	82	69	72	75.8
2017	67	51	72	72	78	80	83	82	83	78	65	51	71.8
2018	67	74	73	75	70	79	78	81	81	76	62	62	73.2
2019	65	63	66	76	81	79	79	86	83	73	62	55	72
2020	59	58	64	77	80	78	79	86	82	69	64	59	71
Average (%)	63.1	65.4	70.6	74.4	79.0	79.1	80.6	82.4	80.6	76.0	66.7	61.9	73.3
Max	75	80	79	80	82	82	83	88	83	83	80	73	76.8
Min	56	51	64	63	70	73	78	79	75	68.9	52	51	69.8