

CONTRACT NO. SFF/2024/123
CONSTRUCTION & COMMISSIONING OF BERTH 104 & LPG PIPELINE FROM THE JETTY IN THE PORT OF SALDANHA TO THE AVEDIA TERMINAL

PART C4: SITE INFORMATION

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C4.1 CLIMATIC DATA

The project is located in a moderate climatic region having a Weinert N-value of between 2 and 5.

C4.1.1 Temperature

The average monthly temperatures of Saldanha are listed below:

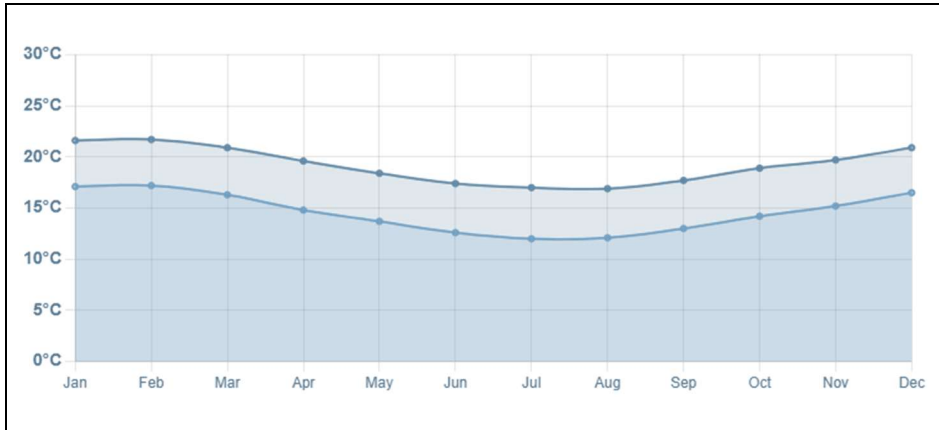


Figure 4.1: Average monthly temperatures

C4.1.2 Rainfall

The following rainfall data was provided by the South African Weather Service (SAWS) and is based on a data collected over a period from 2014 – 2023. The data has been collected from weather station Saldanha Kuspatrollie ARS.

Table 4-1: Monthly average rainfall statistics (Port of Saldanha)

Month	Average Rainfall (mm)	Standard Deviation	Average Number of Rain Days	Average Number of Rain Days					Maximum 24-hour Rainfall (mm)	Date of Maximum 24-hour Rainfall
				1 - 5 mm	5.1 - 10mm	10.1 - 20mm	20.1 - 50mm	50.1 - 100 mm		
JAN	10.0	8.2	4.2	1.9	0.3	0.2	0.0	0.0	13.2	28/01/2023
FEB	4.5	8.2	2.2	0.8	0.0	0.0	0.1	0.0	23.8	20/02/2023
MAR	20.5	17.2	7.4	2.9	0.4	0.3	0.3	0.0	24.2	09/03/2021
APR	17.0	15.7	5.5	1.8	0.6	0.4	0.1	0.0	21.2	21/04/2016
MAY	26.7	21.5	9.0	2.9	1.0	0.4	0.3	0.0	26.6	25/05/2023
JUN	78.6	39.9	11.3	3.1	2.1	1.7	0.4	0.3	74.0	07/06/2017
JUL	48.1	13.5	11.5	4.2	1.8	1.0	0.3	0.0	39.8	09/07/2020
AUG	38.2	19.5	11.5	4.7	1.2	1.3	0.0	0.0	37.4	26/08/2021
SEP	34.7	21.8	9.5	3.8	1.3	0.3	0.1	0.1	63.6	04/09/2022
OCT	10.6	13.0	5.1	1.9	0.2	0.1	0.1	0.0	36.8	22/10/2021
NOV	16.3	11.0	4.9	2.2	0.3	0.3	0.2	0.0	22.0	23/11/2022
DEC	18.4	26.6	5.5	1.9	0.5	0.2	0.2	0.0	39.6	16/12/2022
YEAR (Total)	323.6		87.6	32.1	9.7	6.2	2.1	0.4		

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C4.1.3 Wind

The following wind speed data was provided by the South African Weather Service (SAWS) and is based on a data collected over a period from 2014 – 2023. The data has been collected from weather station Langebaanweg AWS which is approximately 20km from the Port of Saldanha. The analysis is based on the hourly wind speeds.

Table 4-2: Average monthly frequency (%) and speed (m/s) of wind directions

MONTH		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
Calm	F	2%	3%	4%	9%	14%	14%	16%	12%	9%	5%	4%	2%	8%
	m/s													
N	F	5%	3%	7%	6%	10%	14%	11%	10%	8%	6%	7%	5%	8%
	m/s	5	5	5	5	5	6	6	5	5	5	5	4	5
NNE	F	6%	6%	6%	6%	10%	12%	9%	9%	7%	5%	5%	5%	7%
	m/s	4	5	4	4	4	4	4	4	4	5	4	5	4
NE	F	2%	1%	2%	2%	5%	6%	5%	5%	3%	2%	2%	1%	3%
	m/s	3	3	2	2	2	2	2	2	2	2	3	2	2
ENE	F	0%	0%	1%	1%	2%	3%	3%	2%	2%	1%	1%	1%	2%
	m/s	2	2	2	2	2	2	2	2	2	2	2	2	2
E	F	0%	0%	0%	1%	1%	2%	1%	1%	1%	1%	1%	0%	1%
	m/s	2	2	3	2	2	2	2	2	2	3	2	2	2
ESE	F	0%	0%	0%	1%	1%	1%	1%	1%	1%	1%	1%	0%	1%
	m/s	3	3	3	3	3	2	2	3	3	3	3	4	3
SE	F	1%	1%	1%	3%	2%	2%	2%	2%	2%	3%	1%	1%	2%
	m/s	4	3	3	4	3	3	3	3	3	4	3	4	3
SSE	F	2%	2%	1%	5%	3%	3%	4%	3%	3%	4%	2%	1%	3%
	m/s	4	4	3	4	3	3	3	3	3	4	4	4	3
S	F	4%	4%	4%	7%	5%	6%	7%	6%	7%	7%	6%	5%	6%
	m/s	5	4	4	4	3	3	3	3	3	4	4	5	4
SSW	F	28%	30%	24%	23%	16%	12%	14%	16%	23%	25%	30%	28%	22%
	m/s	7	6	6	4	3	3	3	3	4	5	6	6	5
SW	F	33%	34%	28%	23%	19%	9%	12%	15%	17%	25%	24%	32%	22%
	m/s	5	5	4	4	3	3	3	3	4	5	5	5	4
WSW	F	10%	11%	11%	7%	6%	3%	4%	6%	6%	8%	8%	11%	7%
	m/s	4	4	3	3	3	3	3	3	4	4	4	4	3
W	F	3%	2%	2%	1%	1%	2%	2%	2%	2%	2%	2%	2%	2%
	m/s	3	3	3	2	2	3	3	3	3	3	3	3	3
WNW	F	1%	1%	1%	1%	1%	2%	2%	2%	2%	1%	2%	1%	2%
	m/s	3	3	3	2	2	3	3	3	3	3	3	3	3
NW	F	2%	1%	2%	1%	2%	3%	3%	3%	3%	2%	2%	2%	2%
	m/s	3	3	3	3	3	4	3	3	4	3	4	4	3
NNW	F	1%	2%	3%	2%	3%	5%	4%	4%	4%	2%	3%	2%	3%
	m/s	3	3	4	3	4	5	4	4	4	3	4	4	4

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Table 4-3: Legend for wind direction

Direction	Range (in degrees)		
N	>=348.75	or	<11.25
NNE	11.25	to	33.74
NE	33.75	to	56.24
ENE	56.25	to	78.74
E	78.75	to	101.24
ESE	101.25	to	123.74
SE	123.75	to	146.24
SSE	146.25	to	168.74

Direction	Range (in degrees)		
S	168.75	to	191.24
SSW	191.25	to	213.74
SW	213.75	to	236.24
WSW	236.25	to	258.74
W	258.75	to	281.24
WNW	281.25	to	303.74
NW	303.75	to	326.24
NNW	326.25	to	348.74

Table 4-4: Average number of days per month for a range of wind speeds

MONTH	Average Number of Days Per Month					
	0.5-2.5 m/s	2.5-3.5 m/s	3.5-5.6 m/s	5.6-8.7 m/s	8.7-10.7 m/s	>10.7 m/s
JAN	5.38	5.16	9.34	7.43	2.78	0.90
FEB	4.77	5.07	8.72	6.78	2.14	0.53
MAR	7.91	5.84	9.58	5.97	1.45	0.25
APR	9.97	6.15	8.28	4.91	0.59	0.10
MAY	13.39	6.59	7.26	3.32	0.41	0.04
JUN	13.63	4.95	6.26	3.99	0.93	0.23
JUL	14.68	5.97	6.42	3.08	0.60	0.25
AUG	12.87	6.50	7.21	3.87	0.46	0.09
SEP	10.19	5.71	8.27	5.18	0.51	0.14
OCT	7.80	5.90	9.29	6.54	1.28	0.20
NOV	6.30	5.05	8.99	7.21	1.90	0.55
DEC	5.25	5.20	10.01	7.60	2.20	0.74

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C4.2 GEOTECHNICAL INFORMATION

A Geotechnical Desktop Study was performed in July 2024 and is included in this tender pack for the Contractor's information. It must be noted that the geotechnical information provided is not necessarily representative of the actual conditions that may be encountered along various sections of the pipeline route. Any variations between the subsurface conditions described in the attached geotechnical desktop study and actual conditions encountered on site will be for the Contractor's account.

Herewith a summary of the general geology and observed subsurface conditions:

- a) The site is known to be underlain predominantly by coarse porphyritic granite of the Cape Granite Suite. Overlaying the granite are Quaternary age sediments of the Witsand, Langebaan and Velddrift Formations. The Quaternary age formations range from unconsolidated sand with comminuted (crushed) shells and pebbles to cemented limestone and calcrete.
- b) The portion of pipeline running along the quay, the Southern iron ore stock yard, and the Oyster Dam (the causeway) will likely be constructed in fill material. The extent of the fill was confirmed by previous investigations with fill intersected to 10.0m depth at the breakwater edge to the South of the dockyard decreasing to 1.2m depth at boreholes located further North (landward).
- c) North (beyond the Oyster Dam), the pipeline is likely to be constructed in naturally transported soils. The naturally transported soils along this portion of the pipe route would be both alluvial and aeolian origin and predominantly comprise sandy soils.
- d) Capping the transported soils is strongly cemented pedogenic calcrete varying in thickness from 0.70m to 3.00m. The strongly cemented calcretes have previously been tested to have Unconfined Compressive Strength (UCS) values ranging from 12 to 126 MPa.
- e) A thin veneer of silty grained sands overlay the calcretes locally.
- f) Groundwater levels were previously recorded and found to occur at depths ranging from 1.72 to 3.40m below existing ground level.

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C4.3 METEOCEAN INFORMATION

A metocean report has been prepared for Contractor review and is included in the tender pack.

The following summarises the key findings of the report:

- a) The mean water level at Saldanha Bay is +1.11 m CD.
- b) The 90th percentile high tide was calculated to be +1.90 m CD.
- c) Results from the spectral wave modelling and Boussinesq wave modelling used in Dynamic Mooring Analysis:
 - The maximum modelled Significant Wave Height (H_{m0}) over a 15-year period is 1.55m.
 - The Peak Wave Period (T_p) ranges from 3.94 seconds to 20.34 seconds, but is on average 11.37 seconds.

Table 4-5: Summary of the maximum wave crest level exceedance for 2025 and 2055

Return Period (y)	Max Wave Crest Level (m CD)	
	2025	2055
10	4.41	4.68
20	4.61	4.89
50	4.94	5.22
100	5.21	5.48
200	5.49	5.77
500	5.89	6.17