

2 SITE DESCRIPTION

2.1 PROJECT SITE LOCATION

The project site is located in the District of Port-Louis at Chaussée Tromelin, Fort George, Port Louis. The site is found within the boundary limits of the Port Area and is situated within the premises of the Mauritius Chemical & Fertilizer Ltd. The site is easily accessible by a two-way tarred road. The project location plan is herein attached as ANNEX II and depicts the facilities surrounding the proposed site. The land survey plan is enclosed in ANNEX IV.

2.2 LEGAL, REGULATORY AND ADMINISTRATIVE FRAMEWORK

2.2.1 LAND OWNERSHIP

The site earmarked for the proposed undertaking covers an area of 20,000 m² which forms part of Portion 1 and Portion 2 of MCFI site having a total extent of 50,478 m². It is classified as state land that falls under the present jurisdiction of the Mauritius Port Authority (MPA). The lease agreement between the MPA and the MCFI is enclosed in ANNEX V. It is to be noted that the lease which was renewed in the year 2000 already included MCFI having an operational tank farm facility on its site.

As far as the routing of the new connecting pipes is concerned, an application for way-leave agreement will be made by the proponent, separate from the lease agreement, upon finalisation of the design, if required.

2.2.2 LEGAL REQUIREMENTS, PLANNING & POLICIES

The policies aimed at managing development in Mauritius have been structured in two mainstreams, the macro level and the micro level. The macro level gives the orientation for development and overall intent for land use at National level while at the micro level the land use is focused towards specific purposes. The instruments presently available are the National Development Strategy and the Outline Schemes. In addition to that the District and Municipal Councils have prepared guidelines that would regulate in a rational manner all developments within their areas of jurisdictions.

The prevailing policies are well supported by pieces' legislations and for which compliance is mandatory for any development to occur. These pieces of legislations are correlated intrinsically. The permit system is a legal requirement that sets out the rules for development to occur and takes on board the whole spectrum from design to implementation. With respect to some specific development the permit system may require other licences that need to be obtained prior to design and implementation such as EIA licence, Government Fire Services Clearance, Building and Land use permit, Port Licence and the like. Compliance with their requirements is essential and mandatory.

2.2.2.1 NATIONAL DEVELOPMENT STRATEGY

The present undertaking falls within the overall policy of the National Strategy. The study and recommendations made in the National Development Plan enhances the expansion of future demands.

“Policy I10-Storage of Hazardous Substances

To provide for environmentally sound management, including the safe storage of dangerous substances in appropriate locations away from residential or other sensitive land uses. Consideration should be given to the establishment of buffer zones around storage areas in conformity with Policy ST3.”

“Policy ST3”

In considering the location of new bad neighbour developments, including sewage treatment works, landfill sites and civic amenity sites and scrap yards, buffer zones up to 1km from sensitive land uses should be identified in conjunction with the Ministry of Environment and shown in revised Local Plans. Acceptable uses within identified buffer zones can include agriculture, forestry, animal-rearing, grazing and pastures.

The MPA has identified the selected site and immediate surroundings for development of bulk storage facilities for petroleum products.

An extract from the Planning Policy Guidance for industrial development regarding the proposed project is reproduced below:

Indicative Buffer Distance between bad neighbour industry and sensitive land uses		
Use	Acceptable Distance of Sensitive Land Use from Boundary of Bad Neighbour Industry	Other considerations
Hazardous Installation including Power Station, Tank Farm	Determined on case by case basis	Hazards include fire explosion, toxic release etc.

The proposed project for the construction of ten storage tanks and associated pipelines falls within the intent of the National Development Strategy and the overall planning of the Port Area.

2.2.2.2 ENVIRONMENT PROTECTION ACT 2002

It is an act to provide for the protection and management of the environmental assets of Mauritius so that; their capacity to sustain the society and its development remains unimpaired. Also, to foster harmony between quality of life, environmental protection and sustainable development for the present and future generations, more specifically, to provide for the legal framework and the mechanism to protect the natural environment, to plan for environmental management and to coordinate the inter-relations of environmental issues. It is also crucial to ensure the proper implementation of governmental policies and enforcement provisions necessary for the protection of human health and the environment of Mauritius.

2.2.2.3 NATIONAL AND PORT LOUIS HARBOUR OIL SPILL CONTINGENCY PLAN

The National Oil Spill Contingency Plan has the main objective of ensuring the constant readiness of Mauritius to respond to oil spill incidents. The National Oil Spill Contingency Plan is a live document, which the ministry of Environment keeps updated on a regular basis, adapting it to the realities of the administrative organization of Mauritius and the development of maritime traffic among others

It is the policy of the promoter to operate their activities within the Port Area in such a way to:

- ☐ Protect and conserve the marine, terrestrial and air environment by establishing procedures and promoting good housekeeping practices.

- ☐ Contributes to the national storage capacity of fuel.
- ☐ Put in place all necessary measures to preserve health & safety of all employees.
- ☐ Comply with requirements of the relevant legislation.
- ☐ Develop, update and rehearse on-site and off-site contingency arrangements.

With the objective of implementing and operating a tank farm at Mer Rouge, the project promoter has caused the preparation of a “Safety and Operations” manual to provide the necessary procedures and guidelines for the safe operations of the tank farm. The key element has been reproduced in this report.

2.2.2.4 PORTS ACT 1998

The Ports Act 1998 provides for the establishment and management of the Port Area by the Mauritius Ports Authority (MPA). Section 4 of this act describes the functions and duties of Authority:

1. Subject to this Act, it shall be the function and duty of the Port Authority as a landlord to:
 - a. Provide and improve port infrastructure, superstructure, heavy equipment and related facilities;
 - b. Provide marine services and navigating aids, and assist in sea rescue;
 - c. Regulate and control:
 - i. Shipping, navigation, dredging and other related matters in ports;
 - ii. The entry of vessels in ports, their stay, movements or operations in, and departure from ports, the loading, unloading and storage of cargo and containers and the landing and embarkation of passengers; and
 - iii. Pollution and protection of the environment within ports, and the enhancement of safety and security;
 - d. Provide for the welfare of employees, and of persons working or living on a vessel in a port;
 - e. Enter into concession contracts for the provision of port and cargo handling services by qualified and licenced operators under such general terms and conditions as the Authority may determine;
 - f. Promote the use, improvement and development of ports;

- g. Exercise licensing, regulating and controlling functions in respect of port and marine services not provided by the Authority;
 - h. Implement Government port policies and keep them under review, and advise the Government on all matters concerning the port sector, its facilities, services and related issues;
 - i. Regulate and control the development within ports in accordance with approved port master plans; and to be the responsible authority for land use control in the port area with the power to lease land under such terms and conditions as the Authority may determine.
2. Nothing in subsection (1) shall be construed as limiting the power of the Authority to do anything reasonably necessary for or incidental to the discharge of its functions of effective and economical management, planning, and control of the ports of Mauritius.
3. The Authority may, as it thinks fit, engage in operations for the salvage of ships and cargo whether inside or outside ports.

2.2.2.5 INTERNATIONAL CONVENTIONS

Mauritius is signatory of a number of international treaties and agreements on environmental protection, namely the MARPOL convention, designed to minimize pollution of seas so as to preserve the marine environment.

The promoter is well aware of the provisions of the International Conventions governing bulk storage and handling of petroleum products. The proponent is committed to implement measures to achieve compliance with goals as laid out by the following conventions during construction and operational phases:

☐ MARPOL

The International Convention for the Prevention of Pollution from Ships (MARPOL) is the main international convention covering prevention of pollution of the marine environment by ships from operational or accidental causes. The Convention includes regulations aimed at preventing and minimizing pollution from ships-both accidental pollution and that from routine operations-and currently includes six technical Annexes. Special Areas with strict controls on operational discharges are included in most Annexes.

☐ UNCLOS

United Nations Convention on the Law of the Sea, which promotes peaceful, equitable and efficient usage of resources of the seas and recognizes the need for conservation and protection of the marine environment.

☐ OPRC

Parties to the International Convention on Oil Pollution Preparedness, Response and co-operation (OPRC) are required to establish measures for dealing with pollution incidents, either nationally or in-cooperation with other countries.

- I. Oil pollution emergency plans or similar arrangements must be coordinated with national systems for responding promptly and effectively to oil pollution incidents.
- II. Reporting of incidents of pollution to coastal authorities (the convention details the actions that are then to be taken).
- III. Establishment of stockpiles of oil spill combating equipment, the holding of oil spill combating exercises and the development of detailed plans for dealing with pollution.

☐ CLC

The 1969 “International Convention on Civil Liability for Oil Pollution Damage” entered into force in 1975 and lays down the principle of strict liability for tanker owners and creates a system of compulsory liability insurance. Claims for compensation for oil pollution damage including clean-up costs may be brought against the owner of the tanker which caused the damage or directly against the owner’s insurer.

☐ FUND

Under the International Convention on the Establishment of an International fund for Compensation for Oil Pollution Damage (FUND), victims of oil pollution damage may be compensated beyond the level of the ship owner’s liability.

2.2.3 ZONING

The site is found within the delimitations of the Port Area; a zone compatible for its implementation. It can be accessed from a tarred access road leading to Lafarge-Holcim.

The project site is adjoined by Fort George on the North West, the Fort George Power Station on the north, a tarred access road on its east, shed no.1 & SAIL on the south; and bounded by the sea on the west.

The context plan is enclosed in ANNEX VI.

2.3 SITE CHARACTERISTICS

2.3.1 GEOLOGICAL AND TOPOGRAPHICAL CHARACTERISTICS

The geology of Mauritius is dominated by deposits of volcanic origin composed essentially of basaltic lavas. According to the FAO/ MSIRI Land Resources and Agricultural Suitability Map of Mauritius, the site falls in an area, which is in a land complex that forms part of the sand beaches and dunes.

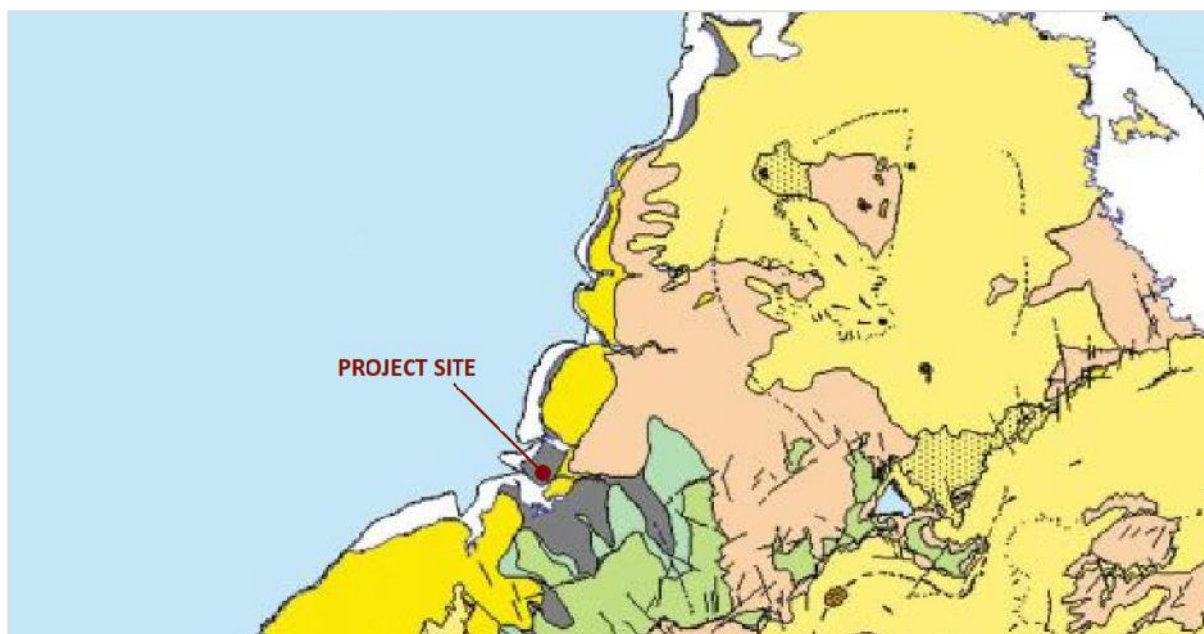


Figure a: Geological map of Mauritius



The project site is part of the reclaimed land that was carried out initially in the early seventies and subsequently in the nineties. The main geological profile would mainly comprise colluvial formation. The geology of the area would be composed of organic silt and clay with variable amount of coral fragment and sand matrix. Extracts of geotechnical investigations carried out on the site for past projects are enclosed in ANNEX VIII.

From visual observation, the project area is relatively flat. The topographical plan for the project site is enclosed in ANNEX IX.

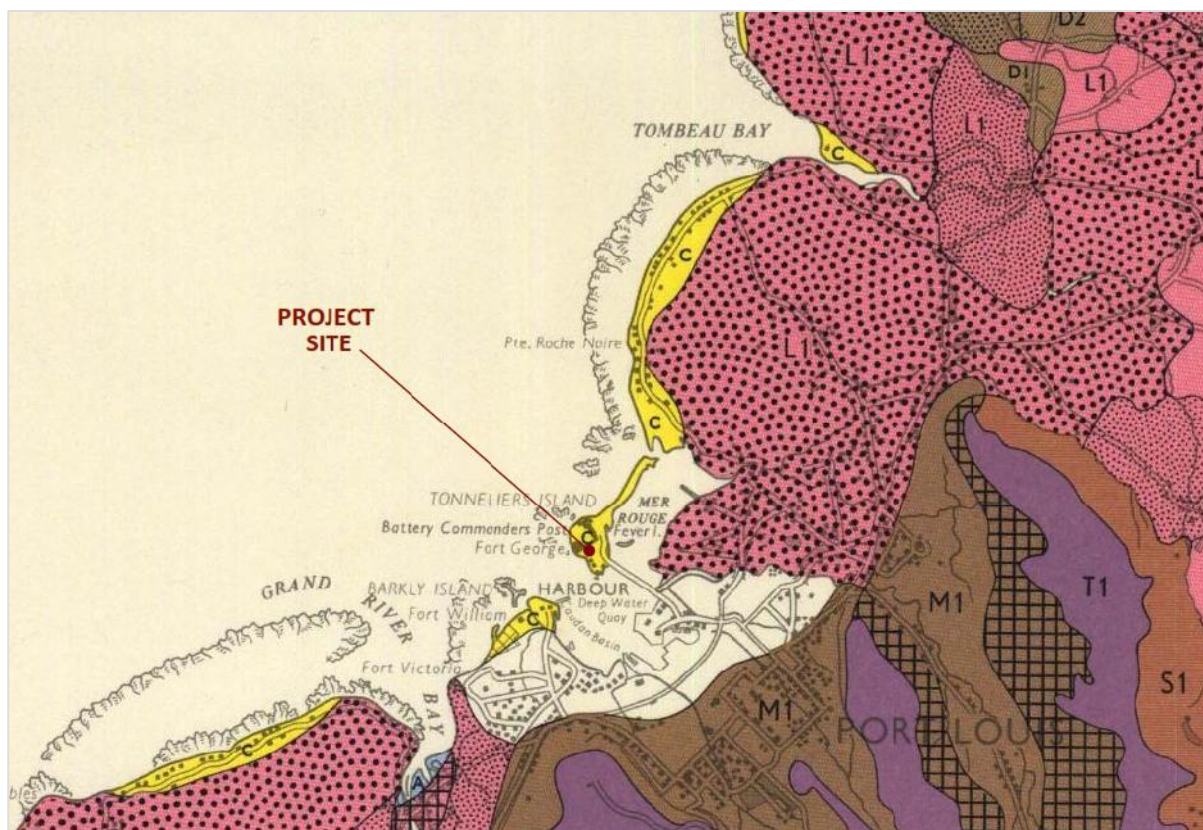


Figure b: Soil map of Mauritius

Soil Groups	Families	Phases (see below for symbols)
 Low Humic Latosols	L1 Richelieu L2 Réduit L3 Ebène L4 Bonne Mère	Normal; Stony; Very Stony; Eroded. Normal; Stony; Very Stony; Eroded. Stony. Normal; Stony; Very Stony; Eroded.
 Humic Latosols	H1 Rosalie H2 Riche Bois	Normal; Stony; Very Stony; Eroded. Normal; Stony; Eroded.
 Humic Ferruginous Latosols	F1 Belle Rive F2 Sans Souci F3 Midlands F4 Chamarel	Normal; Stony; Eroded; Very Eroded. Normal; Eroded. Normal; Eroded. Undifferentiated.
 Latosolic Red Prairie Soils	P1 Médine P2 Labourdonnais P3 Mont Choisy	Shallow; Rocky; Very Rocky. Shallow; Rocky; Very Rocky. Shallow; Rocky; Very Rocky.
 Latosolic Brown Forest Soils	B1 Rose Belle B2 Bois Chéri	Shallow; Rocky; Very Rocky. Shallow; Rocky; Very Rocky.
 Dark Magnesium Clay	M1 Lauzun M2 Magenta	Normal; Eroded. Normal; Stony; Eroded.
 Ground Water Laterite	W Undifferentiated	
 Grey Hydromorphic Soils	D1 Balacava D2 St. André	Normal; Stony; Very Stony. Normal.
 Low Humic Gleys	G1 Petrin G2 Valetta	
 Regosols	C Coral Sand	
 Lithosols	T1 Rough broken land (Mountains) T2 Rough broken land (Gorges) T3 Rock land (Skeletal soil on hummocky bedrock) T4 Rock land (Thin cover of high organic matter soil on smooth bedrock)	
 Mountain Slope Complexes	S1 Nicollière, undifferentiated S2 Ferney, undifferentiated	
 Alluvial Soils	A Undifferentiated	

2.3.1.1 SITE HYDROLOGY AND HYDROGEOLOGY

As per the Hydrology Data Book (2000 – 2005), the site earmarked for the proposed undertaking lies within the catchment “XY” for the region of Port Louis. This catchment covers an extent of 51 km².

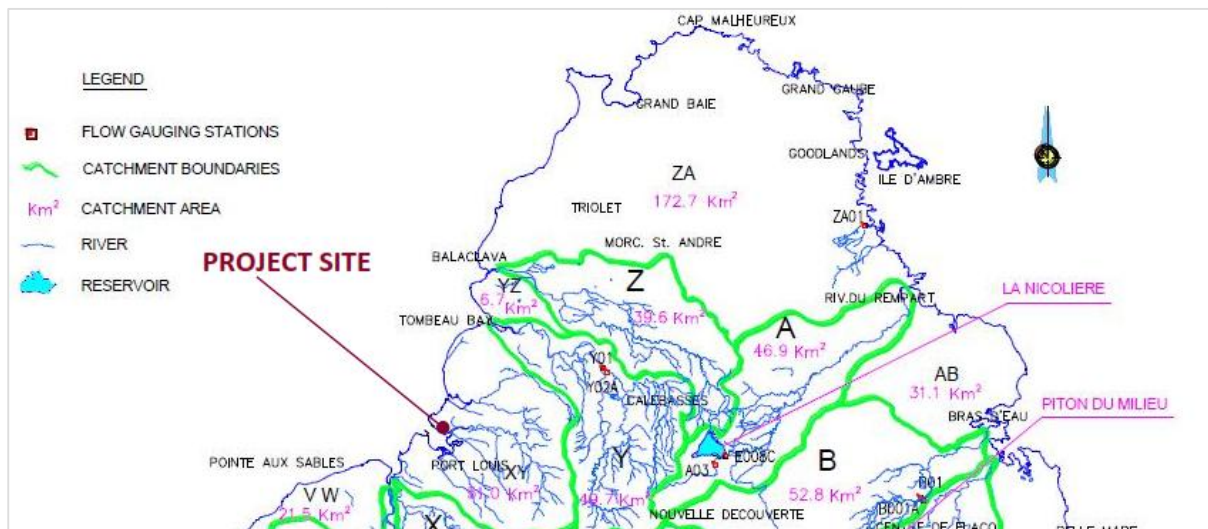


Figure c: Hydrology map for the Port Louis region (Courtesy of Hydrology Data Book 2000-2005)

The project site lies within the coastal area of sea water intrusion outside the main aquifers.

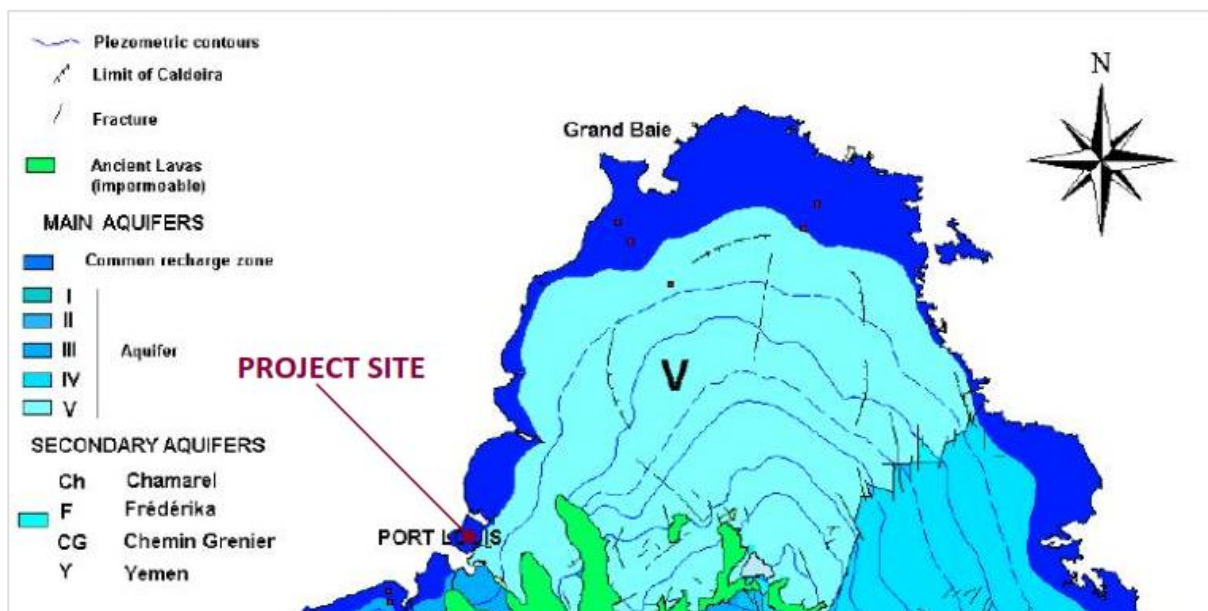


Figure d: Hydrogeology map for the Port Louis region (Courtesy of Hydrology Data Book 2000-2005)

2.3.2 CLIMATE

Mauritius enjoys a mild tropical maritime climate throughout the year, characterised by a warm humid summer extending between November and April; and a relatively cool dry winter between June and September. October and May are transition months.

Mean mid-day temperature ranges from 26°C to around 30°C in summer; and from 22°C to 27°C in winter when moving from the Central Plateau to the Coastal areas.

On account of its relief, the island is also characterised by a number of distinct microclimates with varying levels of rainfall, temperature or humidity.

2.3.2.1 SUNSHINE REGIME

Mauritius receives 6.5 to 8 hours of bright sunshine daily. During summer, the average time for sunrise is 05:00 and for sunset is 19:00. In the summer months, the region receives around 7.5 to over 8.0 hours of bright sunshine. During the winter season, sunrise is usually around 06:30 whilst sunset is normally around 17:55. The region is exposed to around 7.5 hours of bright sunshine in winter.

2.3.2.2 SITE TEMPERATURE REGIME

The temperature on site is similar to the western coast with a summer temperature averaging 35°C during daytime, falling to 25°C at night. In winter, the temperatures vary between 18°C to 25°C.

Temperature (°C)			
	Maximum	Minimum	Mean
January	30.9	23.8	27.3
February	31.3	24.1	27.7
March	30.9	23.8	27.3
April	30.0	23.0	26.5
May	28.4	21.0	24.7
June	26.7	19.5	23.1
July	25.7	19.1	22.4
August	25.5	18.7	22.1

September	26.9	19.2	23.1
October	28.1	20.1	24.1
November	29.7	21.4	25.5
December	30.5	23.0	26.7

Table iii: Monthly temperature recorded in Fort William¹

2.3.2.3 SITE RAINFALL REGIME

The rainfall in Mauritius vary from region to region with highest precipitation on the Central Plateau and lowest on the Western and North Western belt. The site lies on the North West coast and as per the meteorological statistics the mean annual is about 600 mm.

2.3.2.4 SITE WIND REGIME

The wind regime of the island is mainly governed by the easterlies. The wind speed averages 20km/h. The South East Trade Winds blow over Mauritius for the major part of the year at a speed reaching 50 km/h sometimes. However, the island being tropical is also subject to cyclonic conditions. The highest wind gusts are received during cyclonic conditions. The peak cyclonic winds recorded as far is about 250 km/h for a gust speed. The local authorities require that superstructures be designed to withstand gusts of 280 km/h. The criterion of 280 km/h will be adopted for any subsequent detailed design.

2.3.3 COASTAL CHARACTERISTICS

The region within the Port Area includes highly man-modified coastal facilities. Since the early seventies there has been a series of land reclamation activities by dredging the sea bed. According to the Environmental Sensitivity Map 18 of the Coastal Sensitivity Atlas of Mauritius for Oil Spill response, the project site borders a shoreline classified as *Sheltered rocky shore*. This Coastal Sensitivity Atlas of Mauritius for Oil Spill Response was prepared in 1987 by the Ministry of Housing Lands and the Environment. Since then, the Port Area has witnessed a significant transformation with implementation of state-of-the-art and modern infrastructures.

¹ Source: Mauritius Meteorological Services, 2005.

2.3.4 MARINE CHARACTERISTICS

The project site is located within the Port Area and could be thus classified as a port development. The region of the Port-Louis Harbour has a basin type configuration that is unprotected from the fringing reef. The main water body is the sea that has been dredged on several occasions in order to maintain the draft required for ships in the navigation channel.

2.3.4.1 BIOTIC FEATURES

The region is generally poor in habitat due to episodic dredging operation, poor water quality from point source and non-point source pollutant entering the Latanier River. Thus, fauna and flora would not thrive at appreciable level in such waters.

2.3.4.2 TIDES AND CURRENTS

Tides in Mauritius are semi-diurnal and micro tidal, with mean spring range being 0.6 m. The maximum spring tides are about 0.8 m. Moreover, the mean neap tidal range is 0.24 m, whereas the minimum neap tidal range is 0.15 m.

Mauritius is affected by the south equatorial current flowing in a westerly direction, although they are generally variable in the quadrants immediately around the island. Currents within the coral reef lagoon are mainly wind-driven.

Tidal induced currents inside the harbour are weak. During the rainy season in summer, Latanier River and Ruisseau Le Pouce flow into the harbour and cause induced currents in the direction of outer sea. The water current in the Port Area is low under quiescent conditions. However, the effects of change in tides give rise to induced currents both towards the harbour and away from it.

Waves are also produced from ships' movement inside the harbour. The height of the waves is in direct proportion with the size of the ships and speed of travel. From observation, such waves do not exceed 1.0m in pitch.

2.3.4.3 SEAWATER QUALITY

Physic-chemical test results for seawater at Port-Louis Harbour show that baseline conditions for parameters such as pH, Dissolved Oxygen (DO), Chemical Oxygen Demand (COD), Nitrate and

Phosphate are within limits in accordance to the Coastal Water Quality Guidelines for the Industrial Category.

Harbour stations	Temperature (°C)	Salinity (ppm)	pH	DO (mg/L)	COD (mg/L)	NO ₃ ⁻ N (mg/L)	PO ₄ ³⁻
Trou Fanfaron	21.0-29.0	32.9-35.0	8.0-8.4	5.7-6.2	0.2-2.2	<0.1-0.2	0.05-0.09
Caudan	21.0-29.0	34.6-36.0	8.1-8.5	5.8-7.0	0.3-1.6	<0.1	0.01-0.10
Bulk Sugar Terminal	21.0-29.0	34.9-36.0	8.1-8.5	6.4-7.2	0.7-1.9	<0.1	0.06-0.09
Navigating light	21.0-29.0	34.6-36.0	8.1-8.5	6.2-7.6	0.2-1.3	<0.1	0.03-0.09
Open sea	21.0-29.0	33.7-36.0	8.2-8.5	6.9-7.5	0.1-1.0	<0.1-0.2	0.01-0.10
Coastal water quality guidelines for the industrial category	Ambient	-	7.0-9.0	>2	5.0	1.0	0.10

Table iv: Summary of seawater quality for March 2011- September 2012²

Baseline conditions with regard of the coastal water at the New Oil Jetty, representative of the seawater quality of the harbour, are also given in table below.

Sea water parameters	Sea water quality at the New Oil Jetty					Coastal Water Quality Requirements Guidelines Category D
	Site ID					
	1	2	3	4	5	
pH	8.15	8.15	8.16	8.14	8.16	7.0-9.0
Temperature, °C	25.3	25.4	25.3	25.3	25.3	ambient
DO, mg/L	7.1	7.6	8.2	7.9	7.3	>2
Salinity, %	35	36	36	35	35	-
Nitrate, mg/L	1	1.1	1.4	0.9	0.6	1
Phosphate, mg/L	0.1	0.2	0.2	0.1	0	0.1
TSS, mg/L	7	21	20	10	11	15

Table v: Results of seawater quality for the New Oil Jetty³

²Source: Albion Fisheries Research Centre

³ Source: EIA report for the Proposed Oil Farm of 25,000 mt capacity at Mer Rouge by Mer Rouge Oil Storage Terminal

The results of the water quality analysis were generally within the “Guidelines for Coastal Water Quality Requirements” for parameters with established norms except for nitrate & phosphate and TSS, which were higher in site 2 and 3. Parameters, which comply with the published guidelines, were pH, temperature and dissolved oxygen. With the current conditions at the oil jetty, the seawater quality can be considered as acceptable in terms of its physico-chemical properties.

2.3.5 ECOLOGICAL SENSITIVITY

2.3.5.1 FAUNA AND FLORA

The site is not home to flora and fauna that are on the verge of extinction or which need to be preserved. Extremely low diversity of flora is encountered on site, which is mainly invasive vegetation such as grass.

2.3.5.2 WATERBODIES AND WATERCOURSES

There are no canals, rivers, watercourses, open reservoirs or lakes nor wetland on the site or within a radius of influence of 1 km from the project site. The sea is within close proximity of the site. The rivers flowing in the region of Port-Louis harbour are:

- ☐ Latanier river located some 1.2 km South-East of the site in question.
- ☐ Rivulet Terre Rouge sited some 1.7 km North-East to the project site.

A layout depicting the waterbodies and watercourses is enclosed in

2.3.5.3 CLASSIFIED ENVIRONMENTALLY SENSITIVE AREAS (ESAS)

The Rivulet Terre Rouge Estuary Bird Sanctuary, also identified as Wetland No.178 on the ESA site map for the region of Central North West in the ESA Classification Report by the Ministry of Environment and Sustainable Development, lies some 1.4 km away from the project site. A major section of this interface between fresh and seawater (about 26 ha) is also known as the Rivulet Terre Rouge Estuary Bird Sanctuary, which is a classified RAMSAR site (Category 1) since 2001.

This wetland is characterized as follows:

- ☐ Intertidal mud/sand flats.

- ☐ Permanent shallow marine waters (less than 6m deep at low tide).
- ☐ Permanent estuarine waters.

It is an important wintering ground and refuge for migratory birds from the Northern hemisphere seeking to escape winter conditions. The site is visited by about 1200 birds of 19 species yearly. Birds usually arrive during the period of September/October and leave by late February/March. The 19 bird species are covered by the RAMSAR agreement.

Other species found in the estuary are molluscs, crabs, worms and bivalves upon which the migratory birds feed.

The site also harbours floral species, several of which are endemic/ indigenous to Mauritius and some alien species.

2.3.6 EXISTING LAND USE

To the North:

- *Mauritius container terminal and Fort George CEB Power Plant.*

To the South:

- *Lafarge Holcim.*

To the East:

- *MPA Office.*

To the West:

- *Fort George and storage yard for vehicles.*

Salient infrastructures and land uses in the vicinity of the project site include the following (approximate distance from project site boundary and direction are also indicated):

- ☐ Oil Jetty (1.32 km North North-West)
- ☐ Indian Oil Mauritius Ltd (855m North North-West)
- ☐ Fort George (Adjoining West)

- ☐ Mauritius Container Terminal (370m North)
- ☐ Mauritius Cane Industry Authority quay (680m South South-West)
- ☐ National Coast Guard Headquarters (1.3 km South-West)
- ☐ Vivo Energy Mauritius Ltd (1.1km East South-East)
- ☐ Total Mauritius Ltd (1.2km East South-East)
- ☐ Engen Petroleum (Mauritius) Ltd (1.5km East South-East)
- ☐ Rivulet Terre Rouge Estuary Bird Sanctuary (1.7km North-East)
- ☐ Riche Bois Fish Landing Station (1.4km North North-East)

A comprehensive land use map showing the location of salient features in the surrounding environment is enclosed in ANNEX VI. The residential zones are depicted by ANNEX VII.