

Chapter 2: The Project site & its Environment

This section of the report provides a brief of the description of the project and its characteristics. The chapter also provides information on the climatic conditions prevailing in Mauritius while emphasising on the climatology in the vicinity of the proposed development. Issues relating to the geotechnical characteristics likely to be encountered on the proposed site are also mentioned.

2.1 Project Description

The proposed development involves parcelling an area of 5ha6950m² into 41 residential plots, and 3 green spaces. Medium to large plot sizes will be preferred for this development to encourage an open environment with well spaced dwellings. The proposed site is more fully illustrated at Annex A. The site is readily accessible from the 'Port Louis - Plaisance Dual Carriageway' (M2) through the Labourdonnais roundabout via an existing 6.00 wide tarred access road. Two industries of particular environmental interest found in the periphery of the proposed site are the Terra sugar factory (Terragri) and Terragen Ltd (ex-Centrale Thermique de Belle Vue) which generates electricity. The adjoining industries are on the other side of the hill and the proposed residential development is windward, hence nullifying any risks of pollution to the proposed undertaking. Adequate setbacks have been maintained and the presence of existing built up area, namely Hillside morcellement confirms the suitability of the site for residential purposes.

2.2 Site Topography

A topographic plan has been produced to include contours at an interval of 2.0m. The individual plot slopes have been computed from the topographic plan and the average slope has been found to be suitable for the construction of residential buildings. The topographical plan has been prepared by Mr. Krishna Dwarka, registered land Surveyor.

2.3 Island Climatology

The island of Mauritius is located in the south west of the Indian Ocean between longitudes 57°17' and 57°48' East and latitudes 19°50' and 20°32' South. Being a tropical island, Mauritius may be regarded as experiencing only two seasons:

- Summer – From November to April
- Winter – From May to October

2.3.1 Rainfall regime

The island of Mauritius may be regarded as having a moderately tropical climate with the summer season lasting from November to April while the winter season starts in May and ends in October. Unexpected weather conditions are usually experienced during tropical cyclones which occur during the summer period. A micro-climate prevails on the island, characterised by varying rainfall, temperature and humidity from one region to another. The proposed development is located in the northern part of the island which has a mean annual rainfall of approximately 1200 mm. An isohyet map is shown at Figure 2.3.1.1. The rainfall regime is of particular interest in the design of the storm water drainage network of the proposed residential development. In order to select particular rainfall intensity for the design of drains using the rational method, engineers have been known to use values quoted below:

Recording Period	Rainfall (mm)
5 min	15
15 min	30
35 min	61
60 min	82
120 min	115
180 min	150
240 min	180

720 min	250
1440 min	490

Table 2.1: Extreme rainfall intensities recorded over a period of 85 years (Padya 1984)

2.3.2 Sea breeze

A sea breeze is generated as a result of a convection current causing warm air to rise. The proposed site may be influenced by sea breezes. The magnitude of any residual sea breeze reaching the proposed site is only likely to have a gentle cooling effect.

2.3.3 Cyclonic winds

Extreme wind velocities can only be expected during cyclones which occur during the summer period. The percentage of monthly occurrences of observed cyclones is listed in *Table 2.2* along with hourly winds and peak gusts for specified return periods.

MONTH	DEC	JAN	FEB	MAR	APR	MAY	TOTAL
%	18.1	20.8	30.6	18.1	9.7	2.8	100

Return period (years)	100	50	15	5
Hourly winds (km/h)	125	112	90	72
Peak gusts (km/h)	230	200	160	130

Table 2.2: Percentage of cyclonic occurrences during the summer period and peak gusts recorded for associated return periods (Padya 1984)

Gusts are likely to be experienced during cyclones in the summer season. These gusts may cause a wind load which will be taken into consideration during the design stage of the dwellings. The path of major cyclones which affected Mauritius is found at Figure 2.3.3.1.

2.3.4 Temperature

Data gathered from the Meteorological services has shown that the average yearly temperature in the vicinity of the proposed development is approximately 26⁰C with maximum temperatures reaching between 24⁰C and 34⁰C in the summer while minimum

temperatures are between 21 °C and 25 °C in the winter period. It should also be noted that expressed as a percentage, the mean annual hours of bright sunshine can be quantitatively evaluated to be approximately 8 hours per day.

2.4 Local Air Quality

The presence of several residential areas in the close vicinity of the proposed development suggests that the local air quality is of satisfactory standards. Although no *in situ* data regarding air quality has been collected, background concentrations can be estimated as listed in *Table 2.3*:

Sulphur dioxide (SO_2)	10 $\mu g/m^3$
Total suspended particulate (TSP)	30 $\mu g/m^3$
Particulate (PM_{10})	15 $\mu g/m^3$
NO _x (Nitrogen oxides)	10 $\mu g/m^3$

Table 2.3

Mauritian standards concerning air quality have been published together with those of the World Bank with regards to the proposed emission and effluent standards for Mauritius hence providing an indication of an adequate air quality.

2.5 Noise Pollution

Noise level is generally measured in decibels (dBA). According to current legislation in Mauritius, the noise levels should not exceed the following values for the specified intervals:

- 07 00 to 18 00: 60dBA
- 18 00 to 21 00 55dBA
- 21 00 to 07 00: 50dBA

Recorded data in specific locations (*Figure 2.5.1*) on the 02nd of September 2016 on the proposed site using a portable sound metering equipment has shown that the noise level is within the permitted tolerances (*Tables 2.5.1 to 2.5.3*). It should be noted that the noise survey

was performed during the daytime and at night on the 02nd of September 2016. Quick variations in digital readings meant averages were calculated. The calculated mean indicate that the noise levels at the proposed site do not exceed the above mentioned thresholds.

Table 2.4 provides an indication of the approximate values for common noise levels. It is thus observed that the noise level in a quiet bedroom is 37dBA.

Source	Noise level / dBA
Threshold of hearing	0
A quiet bedroom	37
Communication becomes difficult	56
Busy office	60
Pneumatic drill at a distance of 7m	95
Jet aircraft 250m overhead	102
Threshold of pain	120

Table 2.4: Common noise level experienced in everyday life

It should be observed that any experienced noise level will depend upon physical variations in the surroundings of the proposed developed. Wind direction, reflection and refraction of sound waves and absorption due to mounds, fences, walls and landscaped areas are all factors which will generally attenuate the noise levels. Hence it has been observed on site that a sudden wind blowing results in fluctuations of the readings obtained.

The results of the noise surveys performed demonstrate that the noise levels were below the threshold required for residential morcellements. Since variations in wind caused the instrument reading to change, averages have been computed. It should also be realised that the calculated values are outside in the open air. Clearly the noise level inside dwellings, once built would be far below. Based on the above, the proposed location appears to be suitable for the setting up of a residential morcellement.

Location	1	2	3	4	5	6
dBA	59.2	59.6	57.4	57.5	58.2	59.4

Table 2.5.1: Results of noise survey performed at 11.00am.

Location	1	2	3	4	5	6
dBA	53.1	54.2	52.7	53.5	54.1	53.8

Table 2.5.2: Results of noise survey performed at 07.00pm.

Location	1	2	3	4	5	6
dBA	48.9	49.5	48.6	48.7	48.7	49.6

Table 2.5.3: Results of noise survey performed at midnight.

The results of the noise surveys performed demonstrate that the noise levels were generally below the threshold required for residential morcellements. Thirteen readings were taken at each location following the law of diminishing returns. Gorham (2001) showed taking more than 13 readings would not significantly improve the quality of results obtained. Since variations in wind caused the instrument reading to change, averages have been computed for each location.

2.6 Soil Description and Geomorphology

The geology of Mauritius is mainly composed of basaltic lavas which originate from volcanic origin. The Food and Agriculture Organisation (FAO) and Mauritius Sugar Industry Research Institute (MSIRI) Land Resources and Agricultural Suitability Map of Mauritius identifies the site for proposed development as forming part of the northern intermediate lava plains and slopes. Butte aux Papayes (146m) for instance is considered as forming part of the remnant cones of the Intermediate Lavas. The FAO/MSIRI map classifies the different regions into land units. Soils of land complex 2 cover some 19 500 hectares in Mauritius and usually found within the triangle Port – Louis, Triolet – Pamplemousses and are the outliers of the older latosol surface (not covered by Late lavas) in the central and eastern Northern plain. This complex can be regarded as the “red lands” from the Richelieu family of Low Humic Latosols which are predominant. The Intermediate lavas being relatively much older than the Late Lavas are more deeply weathered and the soils developed on them are generally “free” soils, being non – stony or containing few boulders on the surface. The proposed site consists of two land units namely 2.1 and 2.3 as shown in *Figure 2.6.1*:

Soil mapped as 2.1 is generally considered as land consisting of gently undulating or undulating seawards. Land unit 2.1 is characterised by moderately deep to deep dark reddish brown to brown silty clay with few large boulders or stones. Land unit 2.3 bears similar characteristics to land unit 2.1 and is characterised by moderately deep to deep, dark reddish brown to brown silty clay with eroded phase on steeper slopes. The proposed site mapped as Land Unit 2.1 and 2.3 is demonstrated in *Figure 2.6.1*. The Land Unit 2.3 is characterised by a soil moisture deficit region (4 to 9 months) where irrigation is mostly recommended for crop cultivation and where the slopes are relatively steep varying between 8% to 20%. The land unit 2.3 covers some 1000 hectares in Mauritius which represents approximately 0.5% of the total island. Moreover, the description provided by the FAO/MSIRI map suggests that the soil is generally stiff such that no foundation problems are expected during the construction stages. The soil stratigraphy revealed by trial pits dug for the purpose of Engineering report of Hillside Morcellement (Phase I) shows that weathering has penetrated to more than 2.50 metres and the absence of caves is confirmed. The allowable bearing capacity of the soil can thus safely be assumed to be approximately 200 KN/m².

2.7 Topography and Physical features

The topography of the project site is gently undulating and is adequate for residential development. An adequate storm water drainage network will be designed to ensure no water stagnation occurs.

The topography plan for the proposed development, duly signed by Sworn Land Surveyor, Mr Krishna Dwarka is at Annex A. The contour lines are indicated at 2.0m interval. The proposed site does not contain any physical features of particular interest.

2.8 Hydrology and Hydrogeology

The rainfall pattern of Mauritius is strongly influenced by the island topography. While the mean annual rainfall for the Central Plateau is approximately 5000mm, the average annual rainfall for the region of Mapou is approximately 1200 mm. In a study conducted by the Water Resource Unit (WRU) in 1997, it was shown that the whole island receives an annual rainfall of 2100mm which constitutes approximately 3900Mm³ of rain water annually. It was found that 30% of the water is lost due to evapo-transpiration, 60% is converted to surface run off and the net groundwater recharge is equal to 10%.

Rainfall contributes to surface and groundwater resources which are closely interrelated since groundwater is the main contributor to sustaining the natural flows in rivers. Mauritius may be regarded as consisting of five main aquifers:

- Aquifer of Curepipe – Vacoas – Flic en Flac
- Aquifer of Phoenix – Moka – Beau Bassin – Coromandel
- Aquifer of Nouvelle France – Rose Belle
- Aquifer of Nouvelle Decouverte – Plaines des Roches – Trou d'Eau Douce
- Aquifer of Northern Plains

These aquifers contribute to most of the groundwater resources of Mauritius. The implementation of the proposed development is likely to increase the surface run off of the site so that a storm water drainage network will be required to account for this change in absorption capacity of the site.

In order to evacuate storm water, an adequate storm water drainage network will be designed in accordance with the regulations currently in force. A plan showing the main aquifers of Mauritius is found at Figure 2.8.1.