

## 4 Natural Environment of the Project

### 4.1 Overview

This Chapter reviews the natural environment of the Project site but is not limited to its immediate vicinity. In order to obtain base-line information on the natural environment of the Project, the following tasks have been carried out, namely:

- a terrestrial floral survey, executed by DIOSPYROS LTD. No endemic rare or endangered floral species were found.
- a monitoring of the quality of waters on Site at four points within the project development site.
- an assessment of Site Hydrology, particularly under exceptional climatic events.

### 4.2 Climatic Environment

Mauritius, at latitude 20°S and its modest dimensions (60km NS x 45km EW), is subjected to a tropical ocean climate characterised by two alternating main seasons:

- a hot and rainy season from November to May (southern hemisphere summer)
- a relatively mild, dry season from June to October (southern hemisphere winter)

This climatic regime is heavily biased by the wind regimes and orography, which clearly set out two sharply differentiated zones:

- the windward zone to the South and South East, well exposed to trade winds
- the leeward zone to the West, relatively well sheltered from the trade winds

Of particular interest to the Project, data pertaining to climatic conditions prevailing on the site will include:

- daily rainfall
- wind velocity and direction
- daily temperature

#### 4.2.1 Rainfall

Probable maximum precipitation is of basic importance for predicting storm runoff and designing its safe evacuation. Data from the Mon Choisy Station (Stn No. 012333, 9m AMSL) are tabulated hereunder.

**Table 4.2.1.1 – Average Monthly and Annual (mm) gauged at Mon Choisy – 2003-2012**

|            |          | Precipitation (mm) per month and year |     |     |    |    |    |    |    |    |    |    |    |      |
|------------|----------|---------------------------------------|-----|-----|----|----|----|----|----|----|----|----|----|------|
| Location   | Altitude | J                                     | F   | M   | A  | M  | J  | J  | A  | S  | O  | N  | D  | YR   |
| Mon Choisy | 9m AMSL  | 136                                   | 165 | 227 | 98 | 64 | 59 | 44 | 42 | 53 | 26 | 43 | 43 | 1000 |

The above monthly and annual rainfall data must be completed by cyclonic rainfall data, which allow an assessment of maximum rainfall intensities expectable on the Island. Under cyclone conditions, the rainfall can be assumed to be quasi-uniform over the Island and data from the continuous rain recorders operated at the Meteorological Stations may be assumed to hold for the Site.

**Table 4.2.1.2: Extreme rainfall intensities<sup>6</sup>**

| <b>Period of Recording</b> | <b>Precipitation Height (mm)</b> |
|----------------------------|----------------------------------|
| 5 min                      | 15                               |
| 15 min                     | 30                               |
| 35 min                     | 61                               |
| 1 hr                       | 82                               |
| 2 hrs                      | 115                              |
| 3 hrs                      | 150                              |
| 4 hrs                      | 180                              |
| 12 hrs                     | 250                              |
| 24 hrs                     | 490                              |

## 4.2.2 Temperature

No systematic air temperature measurements exist for the Site and it may therefore be appropriate to use data recorded by the Meteorological Services at near-by Pamplémousses similarly exposed to trade winds<sup>7</sup>.

**Table 4.2.2.1 – Temperature recorded at Pamplémousses Station (1971-2010)**

| <b>Month</b>                | <b>JAN</b> | <b>FEB</b> | <b>MAR</b> | <b>APR</b> | <b>MAY</b> | <b>JUN</b> | <b>JUL</b> | <b>AUG</b> | <b>SEP</b> | <b>OCT</b> | <b>NOV</b> | <b>DEC</b> |
|-----------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| <b>Mean Max</b>             | 31.1       | 30.8       | 30.6       | 29.8       | 28.1       | 26.5       | 25.7       | 25.9       | 27.0       | 28.4       | 30.0       | 30.7       |
| <b>Highest Max Recorded</b> | 35.2       | 35.5       | 34.0       | 33.6       | 32.0       | 30.0       | 29.0       | 29.9       | 30.5       | 32.5       | 35.0       | 35.4       |
| <b>Mean Min</b>             | 22.1       | 22.2       | 21.7       | 20.8       | 18.6       | 16.7       | 16.1       | 16.2       | 16.6       | 17.7       | 19.1       | 20.9       |
| <b>Lowest Min Recorded</b>  | 16.1       | 16.3       | 14.5       | 13.1       | 11.0       | 9.2        | 9.0        | 10.0       | 10.7       | 12.0       | 12.9       | 15.0       |

Source: Mauritius Meteorological Station

<sup>6</sup> PADYA, B.M (1984): The Climate of Mauritius

<sup>7</sup> PADYA, B.M (1984): The Climate of Mauritius.

### 4.2.3 Free Surface Evaporation

No free surface evaporation data exists for the Site and it may therefore be appropriate to use data recorded at Pamplémousses and for which data closest to the Site exists.

**Table 4.2.3.1: Mean USWB Class A-Pan Evaporation (E0 mm) at Pamplémousses<sup>8</sup>  
(1960-1990)**

| MONTH          | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | ANNUAL |
|----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--------|
| <b>E0 (mm)</b> | 196 | 169 | 170 | 150 | 139 | 120 | 134 | 147 | 164 | 187 | 186 | 192 | 1 960  |

### 4.2.4 General Wind Regimes

#### (i). Trade Winds

This climatic regime is heavily biased by the wind regimes and orography, which clearly sets out two sharply-differentiated zones:

- the windward zone, to the South and South East, well exposed to Trade Winds
- the leeward zone to the West, relatively well sheltered from the Trade Winds

The Site is not directly exposed to the South and South East Trade winds, being on the Northern Plains of the Island.

#### (ii). Sea Breezes

Sea breezes are generated by convection effects, which are induced by intense solar heating of the island. On the West Coast, sea breezes from the West can completely mask the Trade Winds, especially during the summer.

#### (iii). Cyclonic Winds

Extremely high wind velocities are associated with cyclones, which occur during the summer.

#### 4.2.4.1 Trade Winds

The trade winds range typically between 4 to 16 knots, with occasional peaks at 21 knots reached at 12h00, particularly during the winter season. The wind speeds fall considerably between 18h00 and 22h00 and remain low during the night, to reinforce again at about 8h00.

#### 4.2.4.2 Average Wind Climate

No wind measurements have been carried out on or in the immediate neighbourhood of Site. The nearest Meteorological Station is at Pamplémousses and the wind roses are given in Appendix K.

<sup>8</sup> **SIGMA (1992):** Western Coastal Irrigation Project

Referring to Appendix K, two series of frequency analysis have been studied:

- the winter series (May to October)
- the summer series (November to April)

#### 4.2.4.3 Cyclonic Winds

The south-western Indian Ocean is one of the regions of the Globe, which is hit by tropical cyclones. Extremely high wind velocities are associated with these cyclones.

Tropical cyclones usually occur during the summer and percentage occurrences of observed cyclones are given hereunder:

**Table 4.2.5.3.1: Monthly Percentage Occurrences of observed Cyclones (1960-1983)**

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

Average values may reach 140 km/h (75 knots). The Return Period for Hourly Winds and Peak Gusts has also been calculated from the cyclone data available from the National Meteorological Services:

**Table 4.2.5.3.2: Statistical Distribution of Cyclone Wind Velocities for the Pamplemousses Meteo Services (1960-1983)**

| Return Period (yrs) | 100 | 50  | 15  | 5   |
|---------------------|-----|-----|-----|-----|
| Hourly Wind (km/h)  | 125 | 112 | 90  | 72  |
| Peak Gusts (km/h)   | 275 | 240 | 160 | 130 |

The actual direction of the cyclonic winds will of course depend upon the paths of the cyclone but is most likely between East and North West direction.

#### 4.2.4.4 Site Exposure to Winds

The relevance of the wind data detailed above is obvious from the point of view of buildings, equipment anchoring and wind-induced fugitive dust emissions.

The Site may be under the full influence of trade winds. Furthermore, cyclonic conditions may induce very strong E winds reaching the Site from the ocean.

## 4.3 Terrestrial Environment

### 4.3.1 Vegetal Cover

A comprehensive floral survey over the entire site has been carried out by DIOSPYROS Ltd. The report is attached in Appendix H. The presence of invasive plants were recorded and all the plants recorded on western part of the site were classified as Alien,

i.e., as plants that occur naturally in other parts of the world but have been introduced in the area by man, whether accidentally or voluntarily. The remaining site is under sugar cane cultivation that will be removed after the crop season.

With reference to the ecology survey of DIOSPYROS Ltd, no fauna was seen during the site visit and particularly no native geckos.

### 4.3.2 Site Geology

The Project Site has been superposed to the geological map of the region as shown in Figure 4.3.2.1. The Site is located in an area issued from the Late Lavas flows of the Younger Series. The Late lavas of the Younger Series followed the short erosion of the mildly vesiculated olivine basalt of the Early Lavas without a preceding phase of pyroclastic activities. Flow after flow of lavas poured out from a series of shield volcanoes flooding almost the whole Island, and building up to a height of 2200ft near Curepipe.

### 4.3.3 Site Pedology

The general pedology of the region has been mapped according to both the "Hawaiian" classification<sup>9</sup> and to the ORSTOM classification<sup>10</sup>; the Project Site has been overlaid to both pedological maps of the region as shown in Figure 4.3.3.1.

The Parc de Mont Choisy IRS development lies on the Latosolic Red Prairie Soil in the shallow and gravelly phase of the Mont Choisy families. These Red Prairie Latosolic soils are intra zonal soils developing on the Late Lavas, and onto the dryer areas compared to the Latosolic Brown Forest soils of the wetter areas. Soils belonging to the Mont Choisy Family are very shallow soils on slightly weathered Later Lavas devoid of surface drainage. They occur in the drier areas of the North, East and South East of the Island with a mean annual rainfall of 1000mm to 2500mm. The soils are slightly acid to neutral and range from pH 6.0 to 6.9. Organic matter averages 7.7%. Nitrogen is high varying from 0.34 to 0.5% and Carbon to Nitrogen ratios vary from 9.2 to 12.0. The field texture of the soils is that of a silty clay to silty clay loam.

### 4.3.4 Site Hydrology

The Site is underlain by the Aquifer V: aquifer of Northern Plains as shown in Figure 4.3.4.1.

No drainage paths or wet areas exist on Site as is confirmed from existing cadastral maps and observations made on Site during the Topographical Survey. This is to be expected, considering the highly permeable nature of the formations.

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<sup>9</sup> PARRISH & FEILLAFFÉ: Soil Map of Mauritius. M.S.I.R.I. 1962.

<sup>10</sup> P. WILLAIME: Carte Pédologique de l'île Maurice. ORSTOM & M.S.I.R.I. 1984.





### Soil Group

### Special Phases

### HAWAIIAN CLASSIFICATION



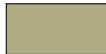
Latosolic Red Prairie Soils



Shallow and Gravelly



### ORSTOM CLASSIFICATION



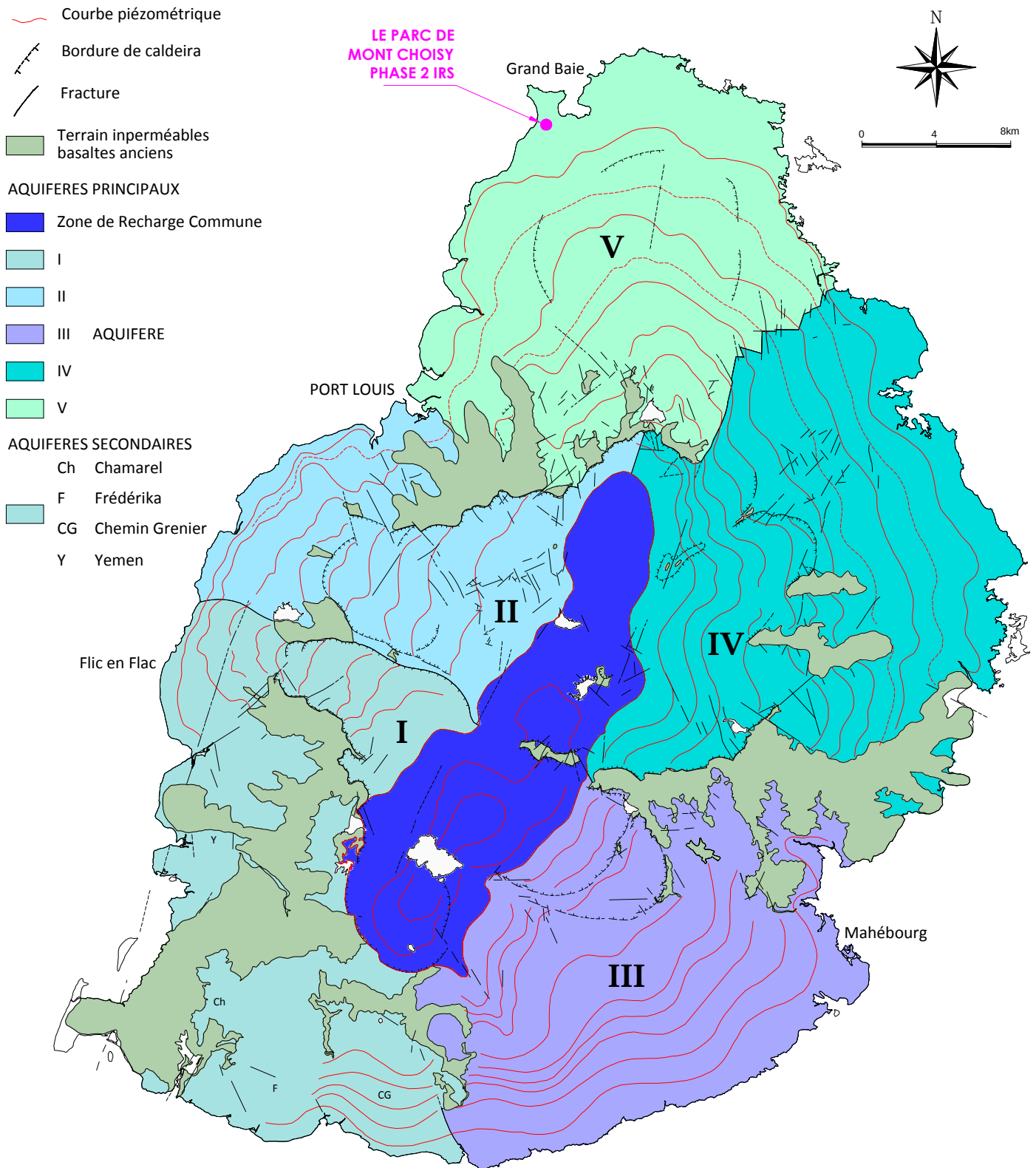
Sols gravelo-cailloteux sur 80cm en moyenne  
(h: Drainage externe localement déficient)

### MONT CHOISY PROPERTY DEVELOPMENT LTD

### **Le Parc de Mont Choisy Phase 2 Integrated Resort Scheme at Mon Choisy**

Figure 4.3.3.1 - Pedological Maps

# LES AQUIFERES DE L'ILE MAURICE



- I AQUIFERE DE CUREPIPE - VACOAS - FLIC EN FLAC
- II AQUIFERE DE PHOENIX - BEAU BASSIN - ALBION - MOKA - COROMANDEL
- III AQUIFERE DE NOUVELLE FRANCE - ROSE BELLE - PLAISANCE
- IV AQUIFERE DE NOUVELLES DECOUVERTES - PLAINES DES ROCHES/MIDLANDS - TROU D'EAU DOUCE
- V AQUIFERE DES PLAINES DU NORD

**MONT CHOISY PROPERTY  
DEVELOPMENT LTD**

**Le Parc de Mont Choisy Phase 2  
Integrated Resort Scheme  
at Mon Choisy**

Figure 4.3.4.1 - Aquifers of Mauritius

## 4.3.5 Site Hydrogeology

### 4.3.5.1 Percolation Rates and Holding Capacity

The knowledge of the infiltration rates characteristics of the type of soil encountered is necessary, as they have to be taken into consideration when designing the infrastructure and structural works.

As part of the Soil Investigation Study, three (3) trial pits and three (3) percolation tests were carried out on the Mont Choisy site. The site works and percolation tests were carried out in accordance with the “Code of Practice for site investigation – BS 5930:1999”, the “Code of Practice for the design and installation of drainage fields for use in wastewater treatment – BS6297:2007” and the “Soakaway Design BRE Digest 365”.

The Soil Investigation report which covers a comprehensive identification and description of the soil strata and percolation tests results is attached in Appendix I.

Three (3) trial pits were excavated on the site as shown in Figure 4.3.5.1.1. The soil sequence observed at the trial pits were homogeneous and comprised up to 300mm of topsoil (described as Soft slightly orangish brown gravelly low plasticity clay with frequent roots) overlaying

- i) very weak brownish creamish grey highly weathered basalt (encountered on trial pits 1A and 3A),
- ii) weak to moderately weak brownish grey highly to moderately weathered basalt and
- iii) strong grey moderately to slightly weathered basalt reaching to the maximum explored depth.

Groundwater was not encountered up to the maximum explored depth.

The percolation (P) values of the three trial pits are shown in Table 4.3.5.1.1.

**Table 4.3.5.1.1 Percolation Rate at Mont Choisy**

| Test No | Trial Pit No | Depth (m) | Percolation (Vp) values in s/mm |           |           | Average percolation rate (Va) values in (s/mm) |
|---------|--------------|-----------|---------------------------------|-----------|-----------|------------------------------------------------|
|         |              |           | Test No 1                       | Test No 2 | Test No 3 |                                                |
| 1       | TP 1A        | 1.2       | 34.3                            | 61.2      | 88.1      | 61.2                                           |
| 2       | TP 3A        | 1.5       | 22.5                            | 22.3      | 28.7      | 28.7                                           |
| 3       | TP 2         | 0.0-0.65  | 2.4                             | 2.3       | 2.5       | 2.4 (BS 6297)                                  |
|         |              |           | 4.0                             | 4.3       | 5.4       | 4.6 (BRE)                                      |

