

3.0 Site Description

3.1 Location

The site for the proposed construction and operation of the wind farm is at Plaine Sophie, in the South West of Mauritius, in the district of Plaines Wilhems. Annex 2 shows the official site plan issued by the Ministry of Agro-Industry and Food Security.

3.2 Accessibility to Site

Plot A is easily accessible through “Les Mares Road” which links La Marie to Petrin (B102). However, additional roads will be created when developing the wind farm site for easy access to the two plots of land earmarked for the proposed project as per Annex 3. An 8 km road will be constructed within the site for transportation of WTGs and cranes which will be used for the erection of the said WTGs.

3.3 Ownership and Acreage

The site is State Land which will be leased to Consortium Suzlon-Padgreen Co Ltd (See Annex 2). The proposed site consists of two plots of land mainly Plot A (293,325 m²) and Plot B (139,675 m²). Table 3.1 shows the number of turbines that will be installed in each plot of land as per the siting plan in Annex 3.

Table 3.1: Number of Turbines Onsite

Plot	Number of turbines	Turbines
Plot A	9	T1, T2, T3, T4, T5, T11, T12, T13 and T14
Plot B	5	T6, T7, T8, T9 and T10

3.4 Zoning

Figure 3.1 shows plot A of the site which is State land including part of State land Perrier, State land Good End and State land Marcel. The portion of land is surrounded by surplus of State land Perrier, surplus of State land Good end, surplus of State land Marcel and Les Mares Road which connects La Marie to Petrin. The CWA Canal passes through the site.

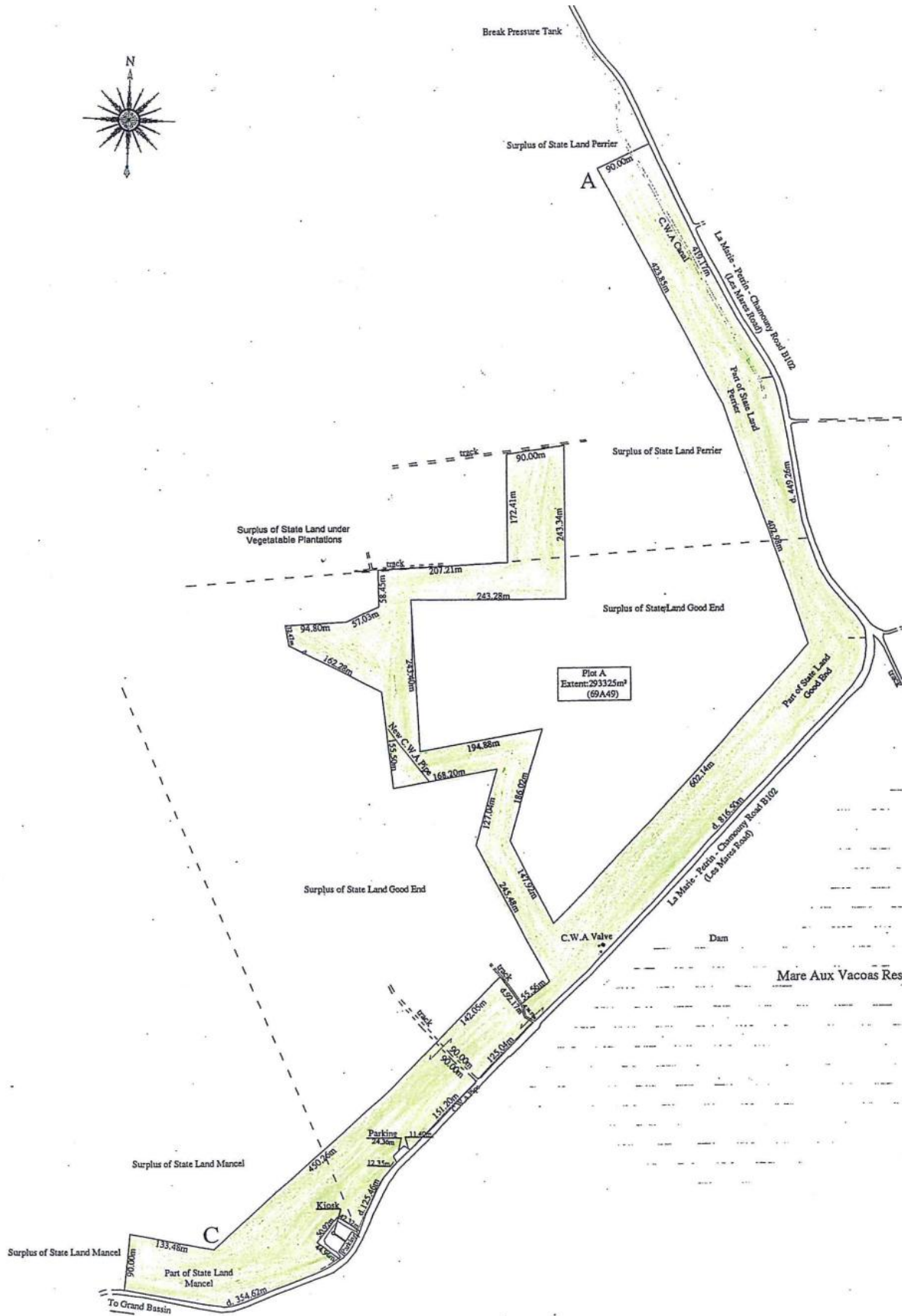


Figure 3.1: Plot A of the Site

Figure 3.2 shows plot B of the site which is State Land (State Land Goode End) surrounded by a private property and surplus of State Land Good End. The project site has a total land extent of 433,000 m².

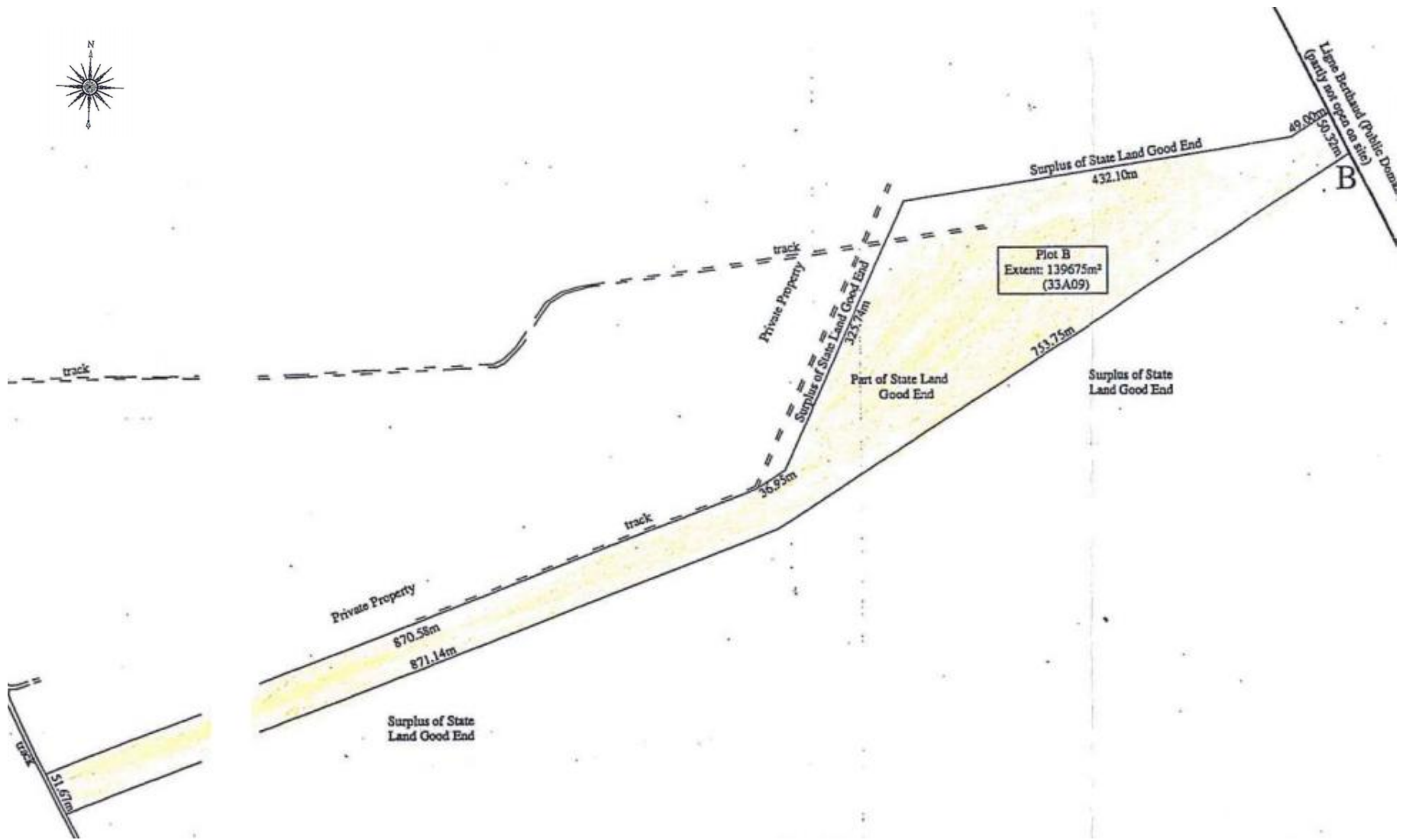


Figure 3.2: Plot B of the Site

3.5 Site Characteristics

3.5.1 Former and Actual Land Usage

The land presently consists of marsh scrub and forest plantation. An area of 8,750 m² will be cleared for construction of the wind farm. Each turbine will require an area of approximately 10 m x 10 m as per Annex 4. The total area therefore required by the 14 turbines will be around 1400 m² and the remaining land will be re-afforested. The site characteristics (geomorphology, agricultural suitability, pedology, hydrogeology, prevailing wind measurement and characteristics of surrounding area) are fully addressed in the sections that follow.

3.5.2 Geomorphology of the Site

According to the “Land Resource and Agricultural Suitability map, FAO/MSIRI, May 1973” (see Figure 3.3), the Plaine Sophie site, situated in the Central uplands consists of late lava and intermediate lava.

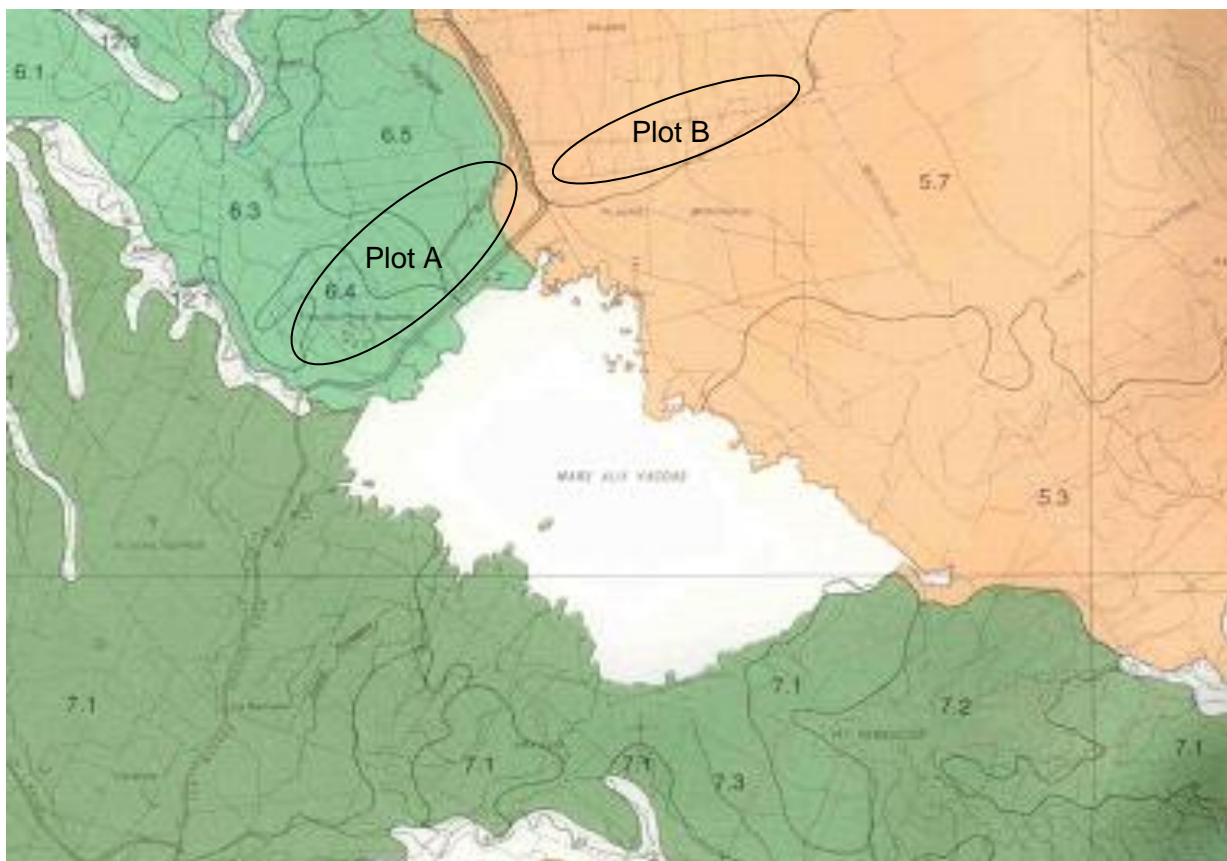


Figure 3.3: Land Resources and Agricultural Suitability Map of the Plaine Sophie Area

Plot A is mainly Latosolic Brown Forest (LBF)/ Lithosol which varies from deep, dark brown silty clay loam to skeletal lithosols on bedrock exposures. It comprises:

- Rocky to rocky Brown Forest Soils with rough hummocky terrain with slopes mostly less than 13% and altitude around 105 to 610 m.
- Land unit 6.4 is rolling to sloping, moderately steep in parts with slopes ranging from 8 to 30%. It has an altitude varying from 180 to 600 m.
- Land unit 6.5 is flat to almost flat with slopes mostly less than 2%. The altitude is in the range of 180 to 600 m.

Plot B is situated on the central late lava plateau with a sloping and undulating landform. It has frequent hummocks and extensive areas of very rough terrain. Land unit 5.7 consists of hummocks with relief up to 3m. Wide variation in soil from deep silty clay loams in depressions to Lithosols on bedrock exposures. It is sloping undulating, hummocky and very rough with slopes less than 13%. The land altitude varies from 195 to 619 m.

A Geotechnical Investigation was carried out at the Plaine Sophie site as per Annex 5. The main findings obtained from the study are as follow:

- From desktop study of the regional geology; it was found that it consists of Latosolic Brown Forest Soil and Humic Latsols.
- The site investigation program comprised a geotechnical investigation whereby four exploratory core hole drilling and in-situ tests were undertaken. BH-A, BH-B, BH-C and BH-D are the locations where the rotary core hole drilling was done up to a depth of 6 m as shown in Figure 3.4.



Figure 3.4: Location of Rotary Corehole Drilling at Project Site

- Table 3.2 shows the results obtained from in-situ tests where Standard Penetration Test (SPT) blow count N is the number of blows required to drive a split spoon by 300 mm and RF representing Refusal where full penetration of 450 mm could not be achieved after 51 blows.

Table 3.2: Details of Field Investigation Performed

Location of Borehole	Depth of Drilling (m)	Casing Depth (m)	In-situ Test (SPT)	
			Depth (m)	N
BH-A	6	4.5	1.0 - 1.5 2.5 - 3.0 4.5	12 3 RF
BH-B	6	2.6	0.6 2.6 - 3.1	RF 18
BH-C	6	4.1	1.1 - 1.6 2.6 - 3.1 4.1 - 4.6	4 11 15
BH-D	6	1.0	1.0	RF

- The results obtained for groundwater conditions (Table 3.3) may differ from actual groundwater levels as it varies depending on factors like precipitation, water line

break, surface drainage and hydrogeology of the area. Therefore, it is advised to include a contingency amount in the construction budget to allow for the possibility of variations in groundwater conditions.

Table 3.3: Groundwater Condition below Existing Ground Surfaces (m)

Test Holes	Core Hole Depth (m)	Approximate Water Level (m) observed below Existing Ground Level after end of drilling work
BH-A	6.00	0.93
BH-B	6.00	1.02
BH-C	6.00	Dry
BH-D	6.00	0.66

- Subsurface characteristics of strata were determined by the ground profile and engineering properties of the chosen four drilling locations. The results are summarized in Table 3.4. The Rock Quality Designation (RQD) is an indirect measure of the number of fractures and the amount of jointing in the rock mass.

Table 3.4: Ground Profile and Engineering Properties of the Drilled Boreholes

Location of Borehole	Subsoil Ground Profile
BH-A	0.0 - 0.40 m: Top soil 0.40 - 4.50 m: Soft to firm Silty Gravel/Gravelly Silt (Residual soil) plus Completely weathered very weak rock mixture, SPT (N-Value) varies from 3-Refusal 4.50 - 6.00 m: Moderately strong to strong with occasional thin weak layers Basalt, moderately weathered with occasional highly weathered, RQD varies from 0 - 60 %, estimated confined compressive strength of 10 - 30 MPa
BH-B	0.0 - 3.10 m: Stiff to firm Silty Gravel Silt (Residual soil) with slight weathered basalt rock (Boulder) in matrix of Silty Gravel/Gravelly Silt, SPT (N-Value) varies from 18-Refusal 3.10 - 6.00 m: Strong with occasional thin weak layers Basalt, moderately weathered with occasional high weathered, RQD varies from 50 - 60%, estimated unconfined compressive strength of 10 - 50 MPa
BH-C	0.0 - 0.30 m: Top soil 0.30 - 6.00 m: Soft to stiff Silty Gravel/Gravelly Silt (Residual soil) plus Completely weathered very weak rock mixture, SPT (N-Value) varies from 4 - 15
BH-D	0.0 - 0.40 m: Top soil 0.40 - 1.80 m: Medium dense to dense Soft to firm Silty Gravel/Gravelly Silt (Residual soil) plus moderately weathered moderately basalt rock mixture (Boulder), SPT (N-Value) Refusal 1.80 - 6.00 m: Strong to moderately strong with occasional thin weak layers Basalt plus Agglomerate Mixture Rock, slightly to moderately weathered with occasional highly weathered, RQD varies from 30 - 90%, estimated unconfined compressive strength of 10 - 50 MPa

On basis of findings, conventional shallow (Mat)/Deep foundation system foundation can be adopted for proposed wind turbine structure.

- It is recommended that during foundation construction works, it is important that all bearing surfaces must be inspected and approved by the geotechnical engineer prior to confirm subsoil conditions/origin of soil/strength of rock and bearing pressures as anticipated in design.

3.5.3 Land Resources and Agricultural Suitability of the Site

The “Land Resources and Agricultural Suitability map, FAO/MSIRI, May 1973” was consulted in order to assess the agricultural suitability and resourcefulness of the proposed site of the wind farm. According to the map, the land is unsuitable for sugarcane plantation as, it has limitations which are so severe that it prevents any possibility of successful sustained use of the land. Plot A has high to moderate agricultural suitability for forestry/fodder and tea. Plot B has a highly agricultural suitability for forestry, livestock fodder/grazing; a moderate agricultural suitability of limited mixed

cropping and a marginally agricultural suitability for tea. To improve the land for better agricultural suitability, derocking will be required.

3.5.4 Pedology of the Site

Plot A of the site (see Figure 3.5) has a geological landscape of plateau and glaze-cones developed on intermediate lavas. The portion of land has a more or less poor external drainage. The soil is red-brown with moderately structured basaltic debris.

Plot B (see Figure 3.5) consists of a plain smooth landscape with cones formed by “late lavas”. The stones present are large enough to dominate the soil type since the land consists mainly of stony soil (stoniness rate >60%) of 50 cm on average with deep stones and blocks. The portion of land is also rich in primary minerals.

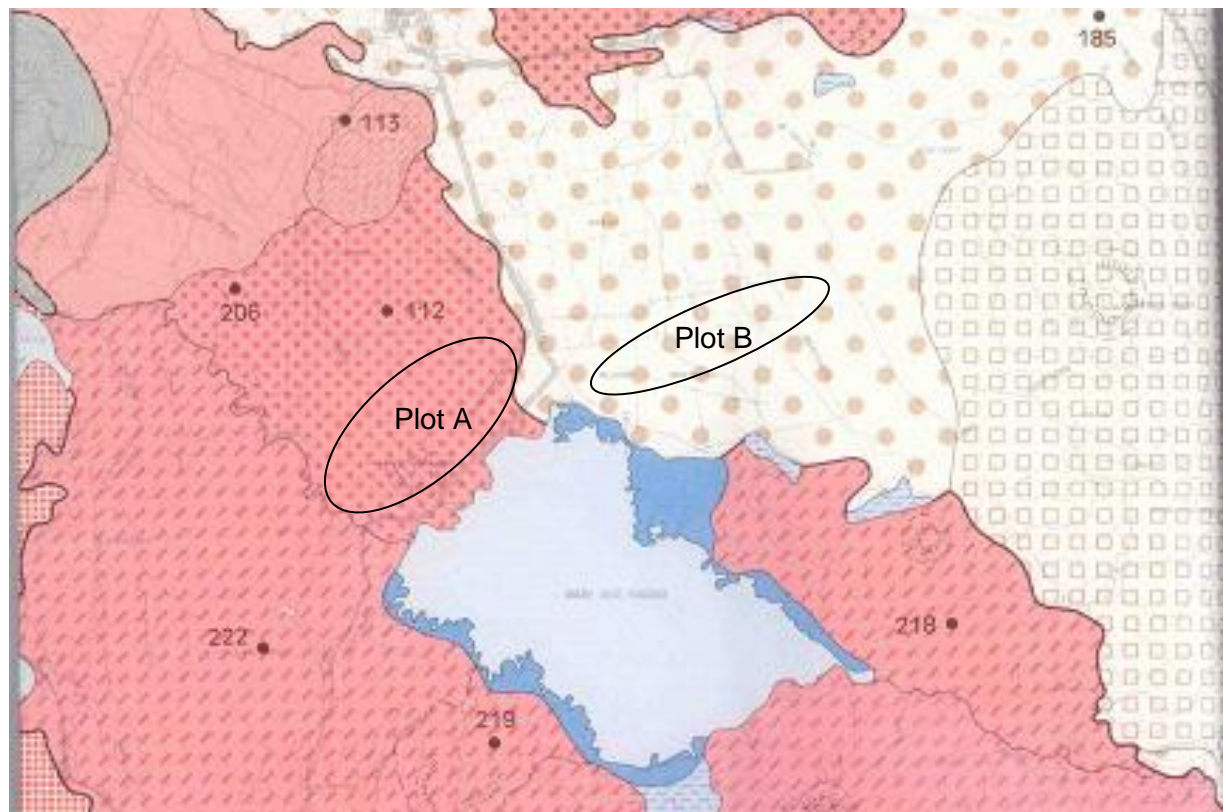


Figure 3.5: Pedology Map of the Plaine Sophie Region

3.5.5 Hydrogeology of the Site

Groundwater is compartmentalized in aquifers by structures of ancient volcanic formations. The two plots of land are found in a common recharge area (see Figure 3.6) which between two principle aquifers mainly Curepipe aquifer (I) and the aquifer of Nouvelle France-Belle Rose-Plaisance (III). The recharge area consists of calderas which are structures that enclose water formed during precipitation. River Congliano passes through plot A.

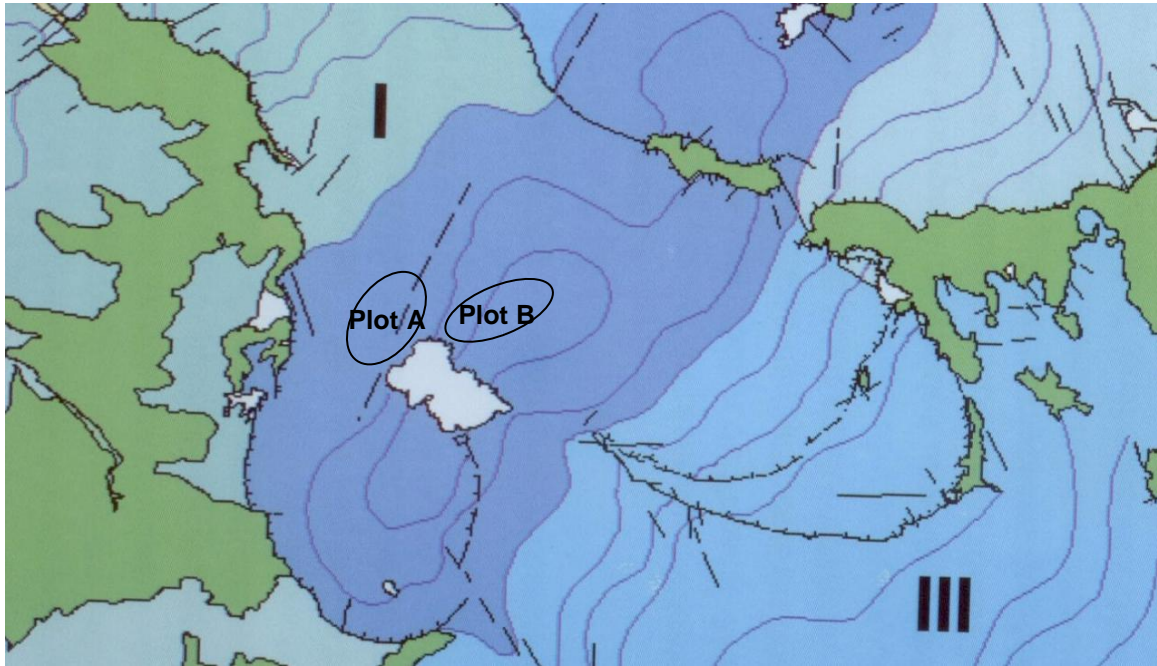


Figure 3.6: Aquifers of Mauritius

The site has a super humid mesothermal climate with a mean annual precipitation between 2400 to 5000 mm and a mean annual evapotranspiration between 1400 to 1600 mm. The distribution of rain is not homogeneous in the region and the water is concentrated mainly in the vicinity of recent basalts, which is, at plot A (see Figure 3.6). The reservoir of Mare aux Vacoas is close to the southern part of the site.

3.5.6 Wind Regime

Mauritius is situated in the equator-ward belt of the southern sub tropical anticyclone system. Atmospheric pressures at the surface increase southward in this belt, creating a gradient which maintains a general easterly wind flow. The prevailing wind pattern in Mauritius is the South East Trade Winds, except for short periods in the summer months when tropical storms approach the island. The trade winds are stronger and more persistent in winter when strong anticyclones pass to the South and close to the island. Transaction advisors of 'Credit Rating Information Services of India Ltd (CRISIL)' installed a met mast at Curepipe Point (previously proposed site for the project). The raw wind data (see Annex 6) was recorded from April 2010 for a period of 12 months as shown in Table 3.5.

Table 3.5: Raw Wind Data from April 2010 to March 2011

Months	Average Wind Speed (m/s)	Months	Average Wind Speed (m/s)
April 2010	6.6	October 2010	6.0
May 2010	6.6	November 2010	6.2
June 2010	7.5	December 2010	5.2
July 2010	7.5	January 2011	6.2
August 2010	7.9	February 2011	5.6
September 2010	5.9	March 2011	5.8

The annual average wind speed (at a height of 60 m above ground level) measured was in the range of 6.40 m/s as at March 2011. The wind data revealed an “International Electro technical Commission” (IEC) Class 3 wind regime with low wind at an average annual wind speed of less than 7.5 m/s. Since the new proposed site of Plaine Sophie falls within 5 km distance from the mast location (Curepipe Point), the wind data obtained at Curepipe Point has been adopted for the Plaine Sophie wind farm.

3.6 Characteristics of Surrounding Area

The Plaine Sophie site is close to the largest freshwater lake, that is, the Mare aux Vacoas Reservoir, which is around 150 m away from the nearest wind turbine generator, T3. The surrounding area is dotted with casuarinas and coniferous trees (see Annex 7). Nature Reserve Perrier is found at 350 m away from the site boundary and the nearest residential building from wind turbine T14 is found at a distance of 890 m.