4. DESCRIPTION OF THE EXISTING ENVIRONMENT

4.1. PHYSICAL ENVIRONMENT

Geology and soils

The Project area is entirely underlain by basaltic flows from the Late (recent) Volcanic Series, which flowed in a SE direction from a crater in the center of the island at Curepipe Point. The superficial 'late lavas' which were deposited less than 1 million years ago overlie those of the Older Volcanic Series.

The absence of a hydrographic network over the region extending from *Plaine Magnien* to the east and down to the sea reflects the permeability and transmissivity of the geological formations within this region. Figure 4-1 illustrates the superficial geology of the project area.

Figure 4-2: Soil types along proposed road alignment (Legend: next page)Figure 4-2 gives the soil types along the proposed road alignment. Soils along the road alignment are of the Latosol Red Prairie Soil Group, of the Labourdonnais Family, rather shallow, rocky to very rocky.

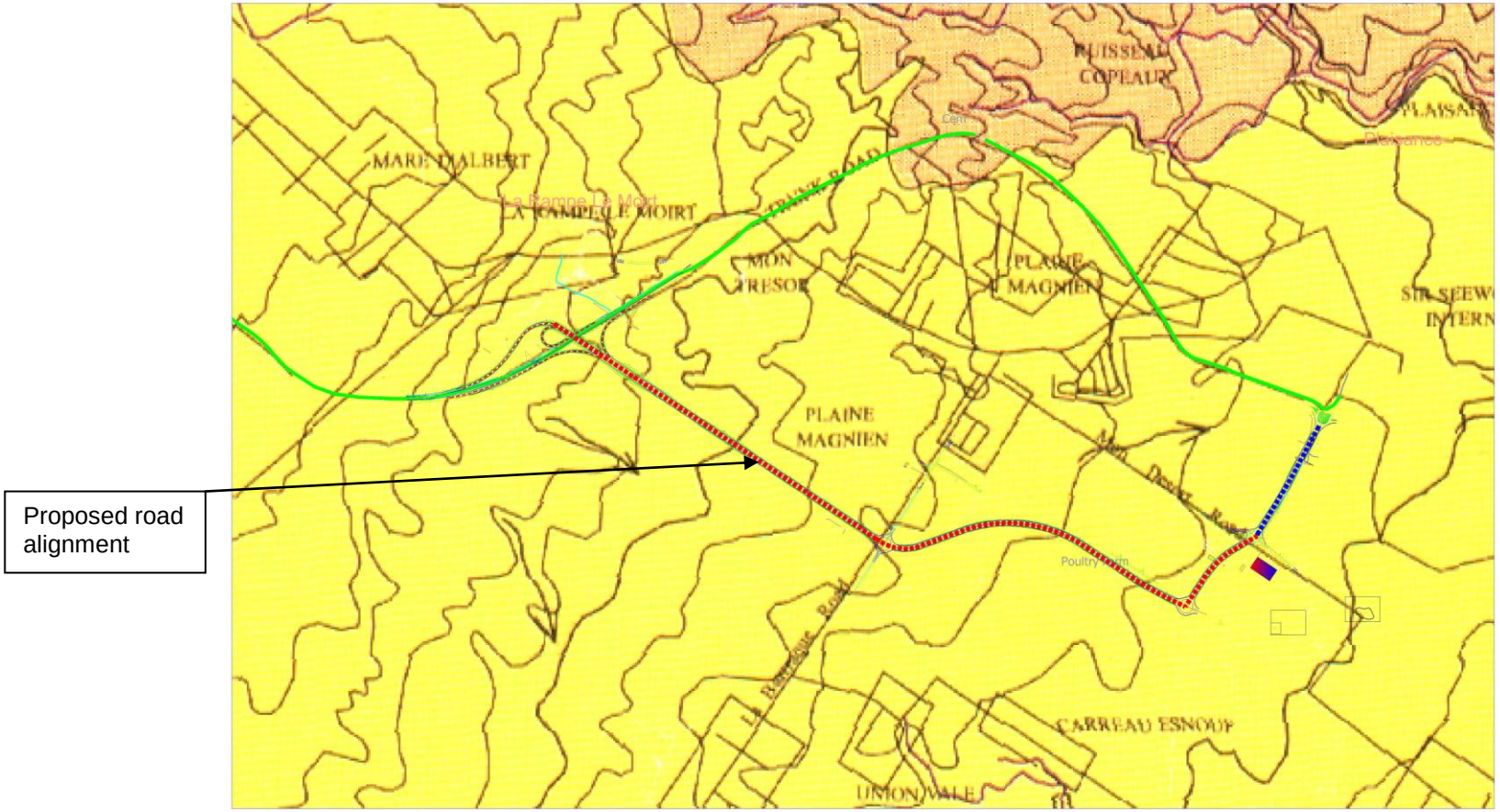
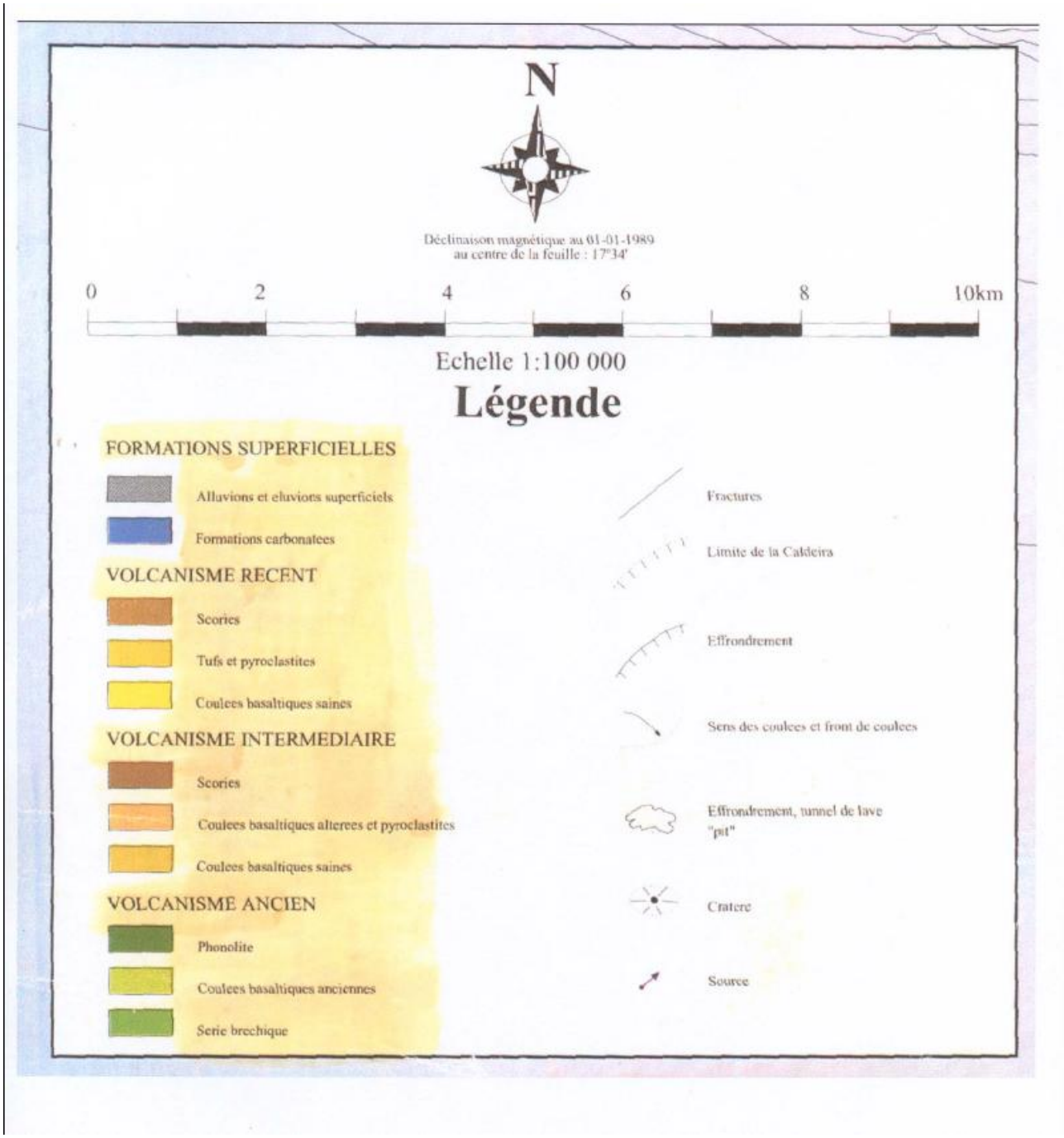
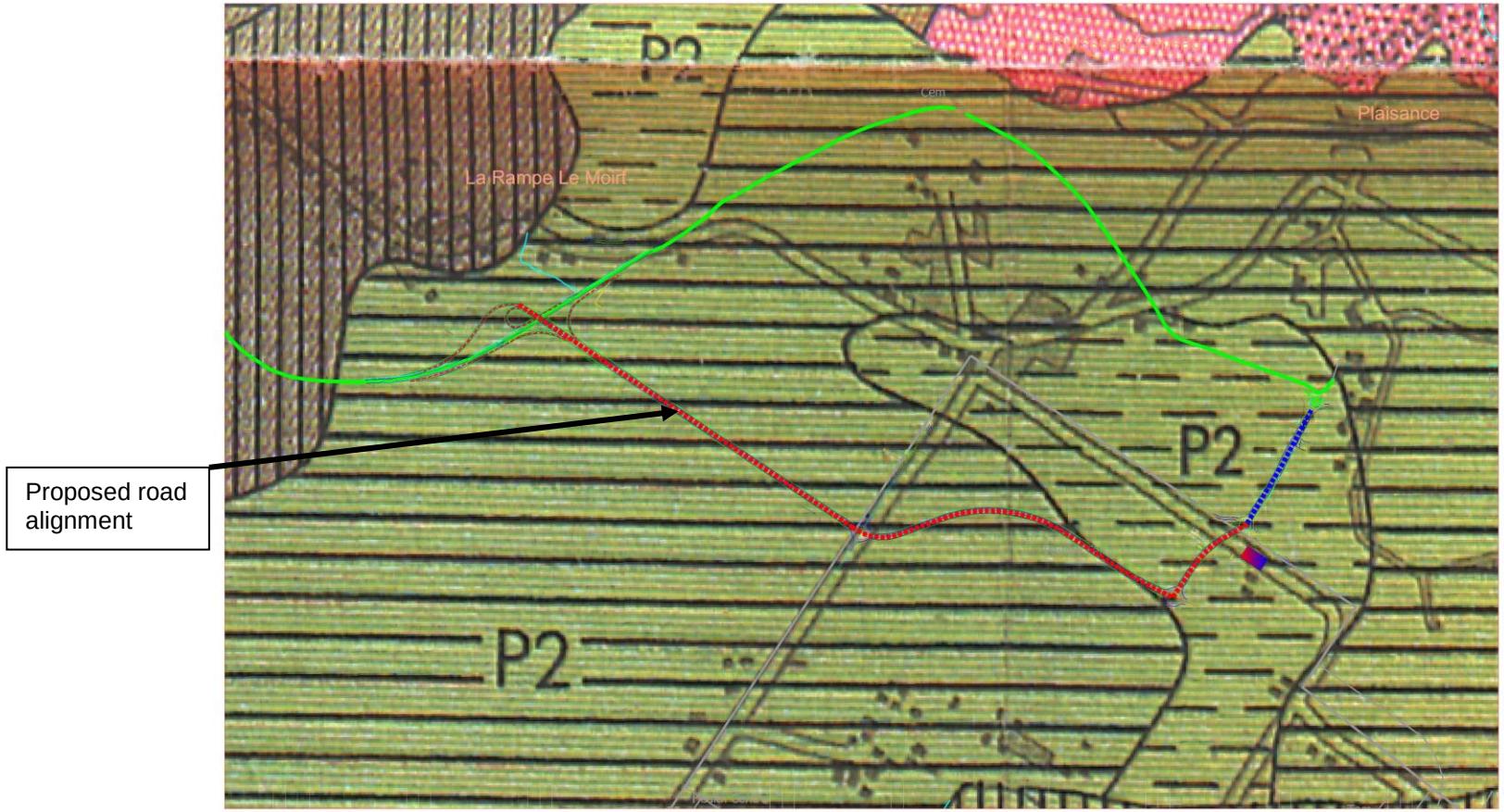


Figure 4-1: Superficial Geology along proposed road alignment
(*Source: Geological Map of Mauritius, L.Girogi et al..)*



Legend : Geological Map



Soil types along proposed road alignment

Figure 4-2: Soil types along proposed road alignment (Legend: next page)

(Source: Soil Map of Mauritius, MSIRI,)


19 58 00-07 S
LEGEND
Soil Groups
Families
Phases (see below for symbols)
Low Humic Latosols
L1 Richelieu — Normal; Stony; Very Stony; Eroded.
L2 Réduit — Normal; Stony; Very Stony; Eroded.
L3 Ebène — Stony.
L4 Bonne Mère — Normal; Stony; Very Stony; Eroded.
Humic Latosols
H1 Rosalie — Normal; Stony; Very Stony; Eroded.
H2 Riche Bois — Normal; Stony; Eroded.
Humic Ferruginous Latosols
F1 Belle Rive — Normal; Stony; Eroded; Very Eroded.
F2 Sans Souci — Normal; Eroded.
F3 Midlands — Normal; Eroded.
F4 Chamarel — Undifferentiated.
Latosolic Red Prairie Soils
P1 Médine — Shallow; Rocky; Very Rocky.
P2 Labourdonnais — Shallow; Rocky; Very Rocky.
P3 Mont Choisy — Shallow; Rocky; Very Rocky.
Latosolic Brown Forest Soils
B1 Rose Belle — Shallow; Rocky; Very Rocky.
B2 Bois Chéri — Shallow; Rocky; Very Rocky.
Dark Magnesium Clay
M1 Lauzun — Normal; Eroded.
M2 Magenta — Normal; Stony; Eroded.
Ground Water Laterite
W Undifferentiated
Grey Hydromorphic Soils
D1 Balaclava — Normal; Stony; Very Stony.
D2 St. André — 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 Nicolière, undifferentiated
S2 Ferney, undifferentiated
Alluvial Soils
A Undifferentiated
Special Phases
Shallow and Gravelly
Rocky
Very Rocky
Stony
Very Stony
Eroded
Very Eroded

Climate

Due to its situation at latitude 20°S Mauritius and its limited dimensions, Mauritius features a tropical maritime climate with two distinct seasons:

- A hot and rainy season November to April (southern hemisphere summer); and
- A milder and dryer season (southern hemisphere winter) from May to October.

This general climatic regime is heavily influenced by orographic conditions of the island and the wind regime which together result in two clearly differentiated climatic zones in Mauritius:

- the windward zone (south and southeast) which is clearly exposed to trade winds; and
- the relatively well-sheltered leeward zone (west).

Seasonal variation in temperature is generally small with a mean summer temperature of 24.7°C and the mean winter temperature of 20.4°C. Maximum temperatures are usually recorded in January and February, with average maximum day temperatures reaching 29.2°C. The coolest months are July and August. During this period night minimum temperature drops to 16.4°C. The months of October and May are commonly addressed as transitional months. Intermittent tropical cyclones may typically occur during summer.

Annual rainfall of Mauritius varies greatly depending on the elevation, ranging from about 4 000 mm on the high grounds to about 800 mm on the west coast. The wettest months are February and March and the driest month is October. A major part of this rain, about 70%, falls between December and March, during the summer season.

In the airport region, meteorological data are being recorded at *Plaisance Station* operated by the Mauritius Meteorological Services (MMS). Records of *wind directions* indicate that during winter (April to October) southeastern wind directions clearly prevail. In summer (November to March) wind directions are more variable with mainly northeastern, eastern and southeastern directions. Mean monthly maximum and minimum *temperatures* as recorded at Plaisance station in the period 2000 – 2009 were 31.4 and 17.9°C respectively[11]. The long term mean of *monthly rainfall* are illustrated in Figure 4-3 below.

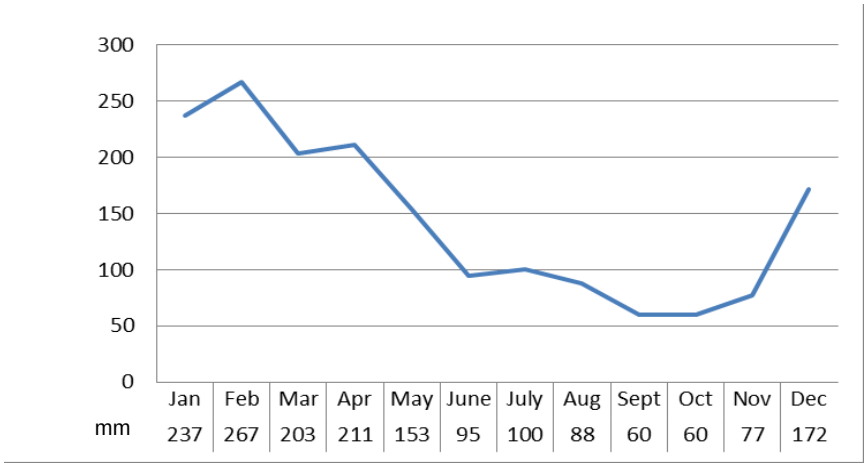


Figure 4-3: Long term mean monthly rainfall at Plaisance Station (1978 – 2009)
(*Source: EIA – Airport Hotel Ltd – Development of Holiday Inn Airport Hotel at Plaine Magnien*)

[11] Source: MMS

The following Table 4-1 indicates the Intensity – Duration – Frequency values for rainfall over the Island (in mm) used in the design of the drainage structures for the Project.

Table 4-1: Rainfall Intensity - Duration - Frequency

Return Period	Duration in Minutes						
	1	***5***	***10***	***15***	***30***	***60***	***120***
2 Year	2.08	1.72	1.42	1.56	0.94	0.64	0.37
5 Year	2.92	2.26	1.84	1.45	1.23	0.94	0.61
10 Year	3.47	2.62	2.12	1.65	1.42	1.12	0.77
25 Year	4.17	3.08	2.48	1.90	1.67	1.36	0.98
50 Year	4.68	3.42	2.75	2.08	1.85	1.53	1.13
100 Year	5.19	3.76	3.01	2.26	2.03	1.70	1.28

Source: Mauritius Meteorological Services

Hydrology / Hydrogeology

As mentioned earlier, the geology within the Project area is such that no significant hydrographic network, drainage paths or wet areas exist. Actually the stretch characterized by the absence of any perennial surface stream or drainage paths extends over the entire area from River Tabac (~ 9km due southwest) to Mahébourg. The proposed road alignment does not cross any watercourse.

As regards ground water the area is underlain by the Aquifer of Nouvelle France – Rose Belle – Plaisance (Aquifer III), one of the five main aquifers of the island. More details are given in the 'Carte Géologique et Schéma Hydrogeologique' an extract of which is provided in Figure 4-4

The brackish quality of the sea water in the Bras de Mer du Chaland indicates substantial groundwater flow to the sea in that region, confirming that the aquifer is quite transmissive in that particular direction. Further the brackish nature of groundwater up to one kilometre or so inland indicates saline water intrusion within the coastal zone of the aquifer. This fact excludes the possibility (present & future) of exploiting groundwater in the region extending from the airport premises to the coast in the direction of the Bras de Mer du Chaland.

For the purpose of the Project no specific groundwater studies were undertaken, but the geotechnical survey undertaken for the nearby Holiday Inn Hotel project, however, confirmed ground water levels in the area to be at more than 7 m below ground level, given that no groundwater was encountered in trial pits dug to 7m.[12].

The CWA operates a groundwater pumping station in the neighbourhood of the Holiday Inn Hotel. This station will be close to the proposed road, at some 5m from the shoulder of the 3rd lane.

[12] EIA Airport Hotel Ltd., Development of Holiday Inn Airport Hotel Ltd. at Plaine Magnien.

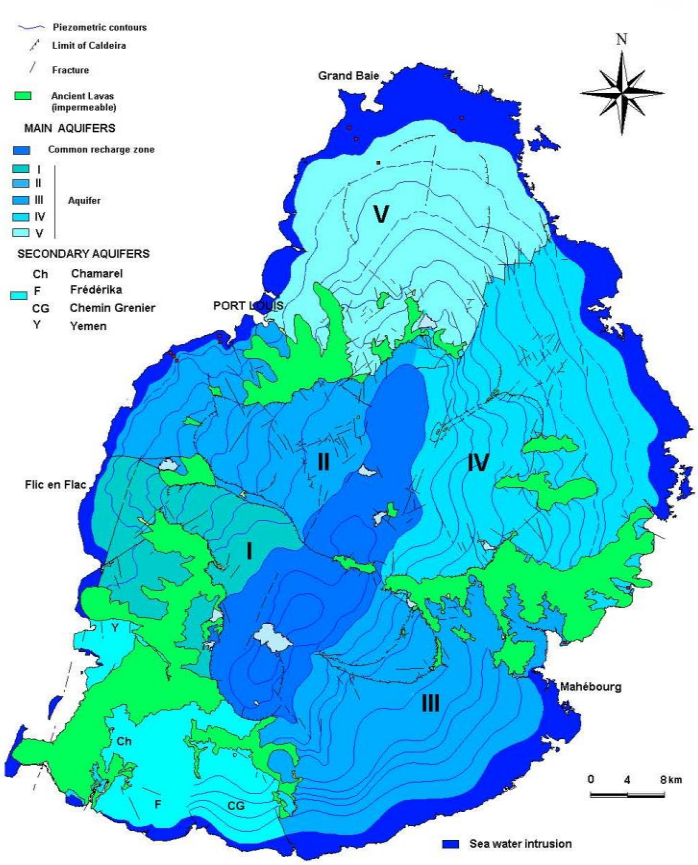


Figure 4-4 : Aquifers of Mauritius

Topography and land Use

The landscape of the airport region is relatively flat, sloping towards the ocean to the east. Gently undulating terrain is restricted to the area beyond the proposed crossing of La Barraque Road. The Project route is located at elevations ranging from 56m amsl at the start and about 112 m amsl towards the end of the Project near M1.

The wider zone is bordered by the foot-hills of the Bambous Mountains in the north, tree lined valleys eroded by rivers and streams in the south, and a beach zone along the coast-line in the east. Land use in the Project area is dominated by sugarcane cultivation, a small portion of which (east of la Barraque Road) is under pivot irrigation.

Pivot irrigation, ~ km 1+900

Proposed road corridor, view from ~km 3+950 to the SE

Vegetables are grown on a small plot immediately to the N of the proposed 3rd roundabout next to *La Barraque Road. A* small orchard with lychees was noted at ~CH 2+600.

Ambient Noise Levels

Official information of existing ***ambient noise levels*** in the Project area do not exist and separate noise measurements have not been undertaken under this study. As part of the EIA for the nearby Holiday Inn Hotel, however, a baseline noise survey was undertaken at 4 monitoring stations in the immediate vicinity of the proposed hotel site in June 2012. Monitoring was carried out continuously over a 24 h period to determine the existing noise levels prior to project implementation and to compare these to the prescribed environmental noise exposure limits as defined in GN17/1997.

The results of the Holiday Inn noise survey showed that the noise levels prevailing during both day and night were within the prescribed noise exposure limits even though the noise from aircraft movements – especially at night – was audible but lasted for few minutes only.[13] The results of the mentioned noise measurements from all 4 stations are provided in Annex 1 of this report.

Since the mentioned survey of 2012 was conducted no significant changes occurred in the area, e.g. e.g. in terms of topography, wind, air traffic or land use. Ambient noise levels in the area are thus assumed to still be in the order of those that were measured in 2012. A further assumption is that ambient noise levels as recorded at the Holiday Inn site would be in the same order of those prevailing in the area of the present Project and hence be within the relevant exposure limits as laid down in the applicable regulations (see section 6.2).

[13] Environmental noise assessment at the future location of the Holiday Inn Airport Hotel. C Wong So Associates Ltd. in association with Enviro Consult Ltd. June 2012 for Hotel Airport Ltd.

4.2. BIOLOGICAL ENVIRONMENT

The biological environment of the wider study area is negatively influenced by its vicinity to the international airport and the motorway M1 and particularly by the dominance of extensive sugarcane plantations in the area. Sugarcane habitats represent highly disturbed ecosystems which typically feature invasive and exotic species only. Therefore no separate field surveys on flora or fauna were undertaken for the present study.

In the few patches of fallow land herbe fataque (*Panicum maximum*) is a common and locally dominant species. In Mauritius fataque is a typical weed in sugar-cane fields, due to its ability to grow under poor conditions. It commonly occurs along field edges, farm roads and banks of irrigation ditches, from where it keeps infesting the cane crop mainly transported with irrigation water.

The ***fauna*** within the project area is essentially made up of a few birds and a mammal species. The site visit undertaken in February 2014 confirmed a number of bird species that were already listed in the aforementioned Airport Master Plan of 2004. All are exotic introduced species and common to Mauritius such as the omnipresent doves *Streptopelia picturata* and *Str. chinensis*, common Mynah (*Acridotheres tristis*), Condé (*Pycnonotus jocosus*), house sparrow (*Passer domesticus*), Malgasy foudy (*Foudia madagascariensis*) and Grey partridge (*Francolinus pondicerianus)*. Of the four species of mammals mentioned in the Masterplan exotic rat (*Rattus rattus*) and mongoose (*Herpestes auropunctatus*) are likely to occur in the Project area.

Grey partridge

Malgasy foudy

Common Mynah

4.3. ENVIRONMENTALLY SENSITIVE AREAS

Environmentally and culturally sensitive areas, sites or features located in the study area are described below. Their respective location is shown in Figure 4-5. As can be seen from this figure some are located beyond the actual study corridor and thus relatively far off the potential area of influence of the Project.

Blue Bay marine park

The Blue Bay Marine Park is a designated protected area under the national legislation and under the Ramsar Convention of Wetlands of International Importance. Covering a total of 353 ha the site includes the lagoon and extends about 1 kilometre seawards beyond the reef crest. Blue Bay Marine Park harbours mangroves, corals, sea grasses, fish and other marine organisms, including vulnerable species, threatened ecological communities and high biodiversity of fish and corals.

Blue Bay Marine Park lies at about 2,400 m to the east of the proposed route (Figure 4-5). Given the distance of the site and considering the topographical and geological conditions and type and scale of the proposed interventions, it is assumed that this sensitive area lies beyond the potential area of influence of this Project. The legal protection framework is provided in the Fisheries and Marine resources Act of 1998.

Heritage sites

Towards the end of the Project route a total of 6 ***pyramidal structures*** are noted inside the sugarcane fields (see Figure 4-6). They are built from volcanic rocks with other stones built into them. The size of these 'monuments' is in the order of 25x25m, which makes them prominent landmarks of the *Plaine Magnien* landscape. The closest of these structures is at only about 80 m from the edge of the proposed route (~ CH 3+900 lhs) while the others are between 100 and 150m off to the north of the proposed alignment (~ CH 3+100 – CH 3+400).

The origin of these structures has been subject to many speculations and discussions and a generally accepted explanation is not available to date[14]. In some articles (e.g. see footnote) the size and design of the Plaine Magnien pyramids are said to be similar to pyramids found in Tenerife, Canary islands. The structures still have, or had, panels indicating that they are listed as national heritage under the National Monuments Act of 1985, amended by the National Heritage Fund Act 2003 and protected as such.

[14] See article by Antoine Gigal at: www.piramidasunca.ba/eng/latest-news/item/3301-megalithic-walls-and-hydraulic-systems-linked-with-mauritius-pyramids.html

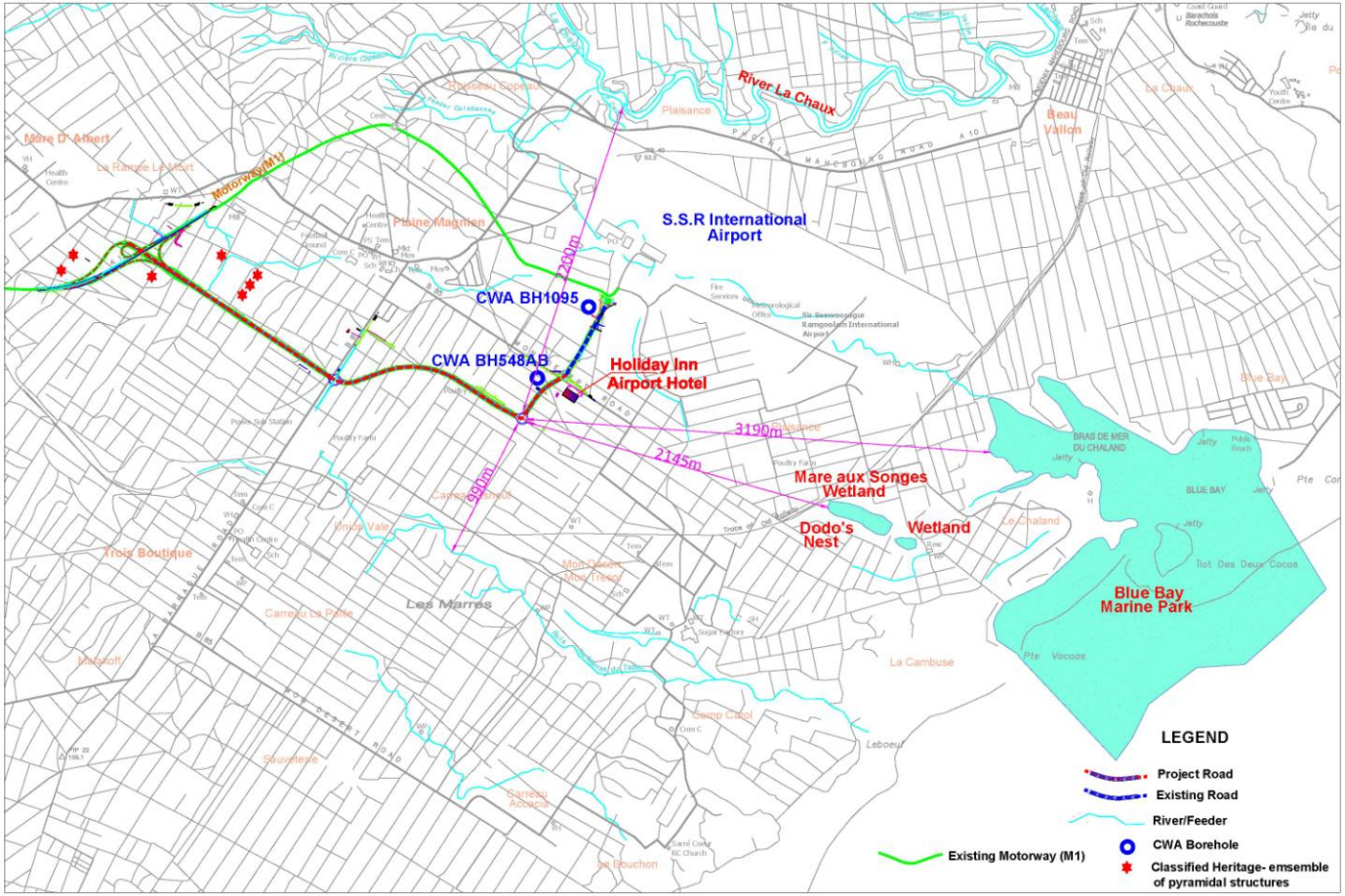


Figure 4-5: Environmentally sensitive areas and features and their distance to the Project

Figure 4-6: Protected pyramidal structures in the vicinity of the Project road at Plaine Magnien

Another heritage site in the wider area is the ***Mare Aux Songes Archaeological Site***, where remnants of the Mauritian icon bird Dodo and other animals dating more than 4000 years were recently found for the first time. As can be seen from Figure 4-5, however, this site is located at such distance from the Project that it is not likely to be affected.

Other Existing Features

As mentioned previously, the CWA operates a groundwater pumping station (BH 548) – Figure 4-7 – that will be immediately next to the Project road. Figure 4.8 indicates the location of the said pumping station.


Figure 4-7: CWA Groundwater Pumping Station BH 548

A poultry farm is located at Ch 2+600km, on the LHS of the proposed road (Holiday Inn – M1 direction), Figure 4-8


Figure 4-8: Poultry farm at ~ CH 2+600 lhs

Figure 4.9 illustrates the location of the CWA pumping station and of the poultry farm.

The distance of the CWA pumping station premises from the proposed road boundary is given in Figure 4-10.

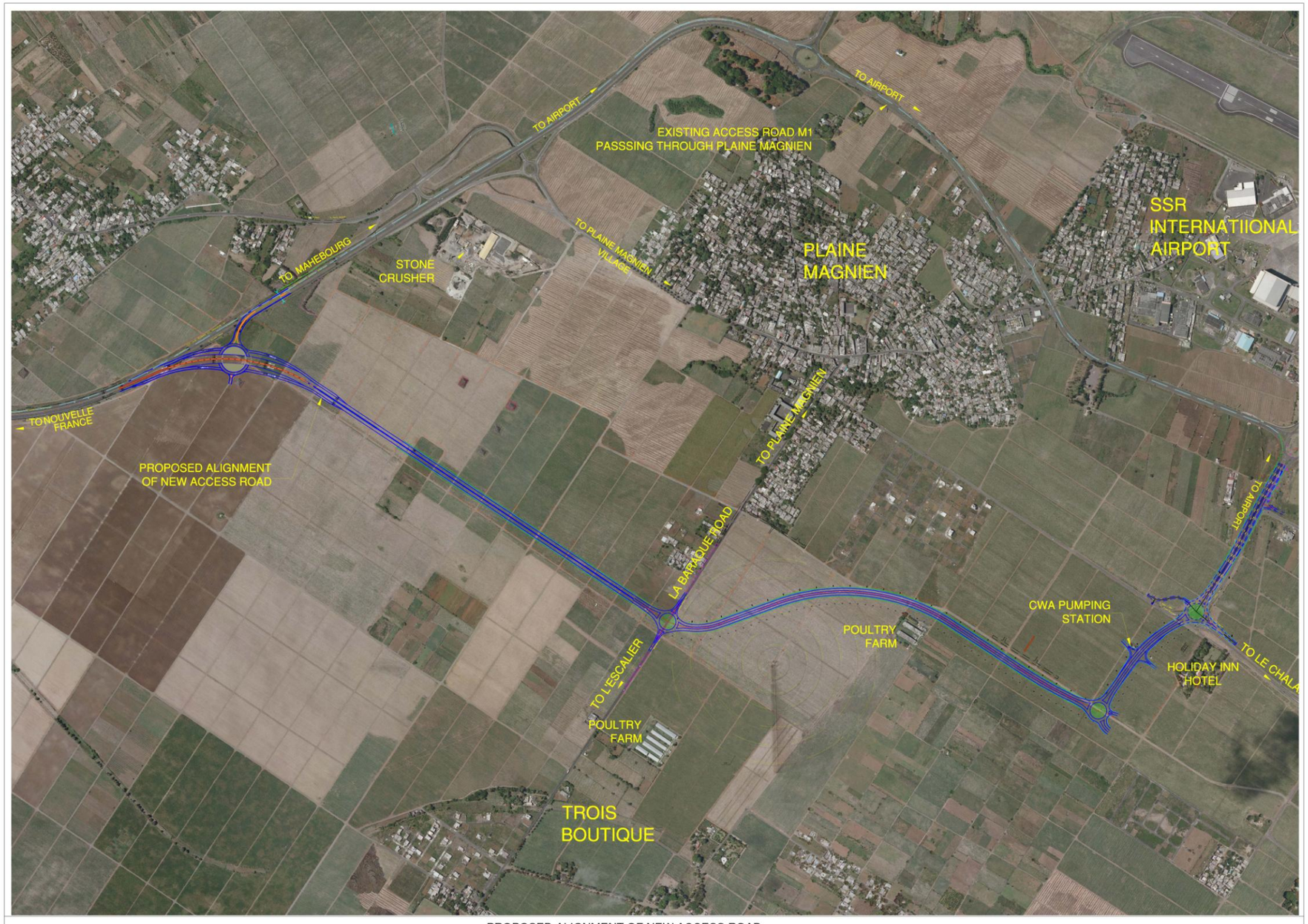


Figure 4-9: Location of CWA pumping station and of the Poultry Farm(s)

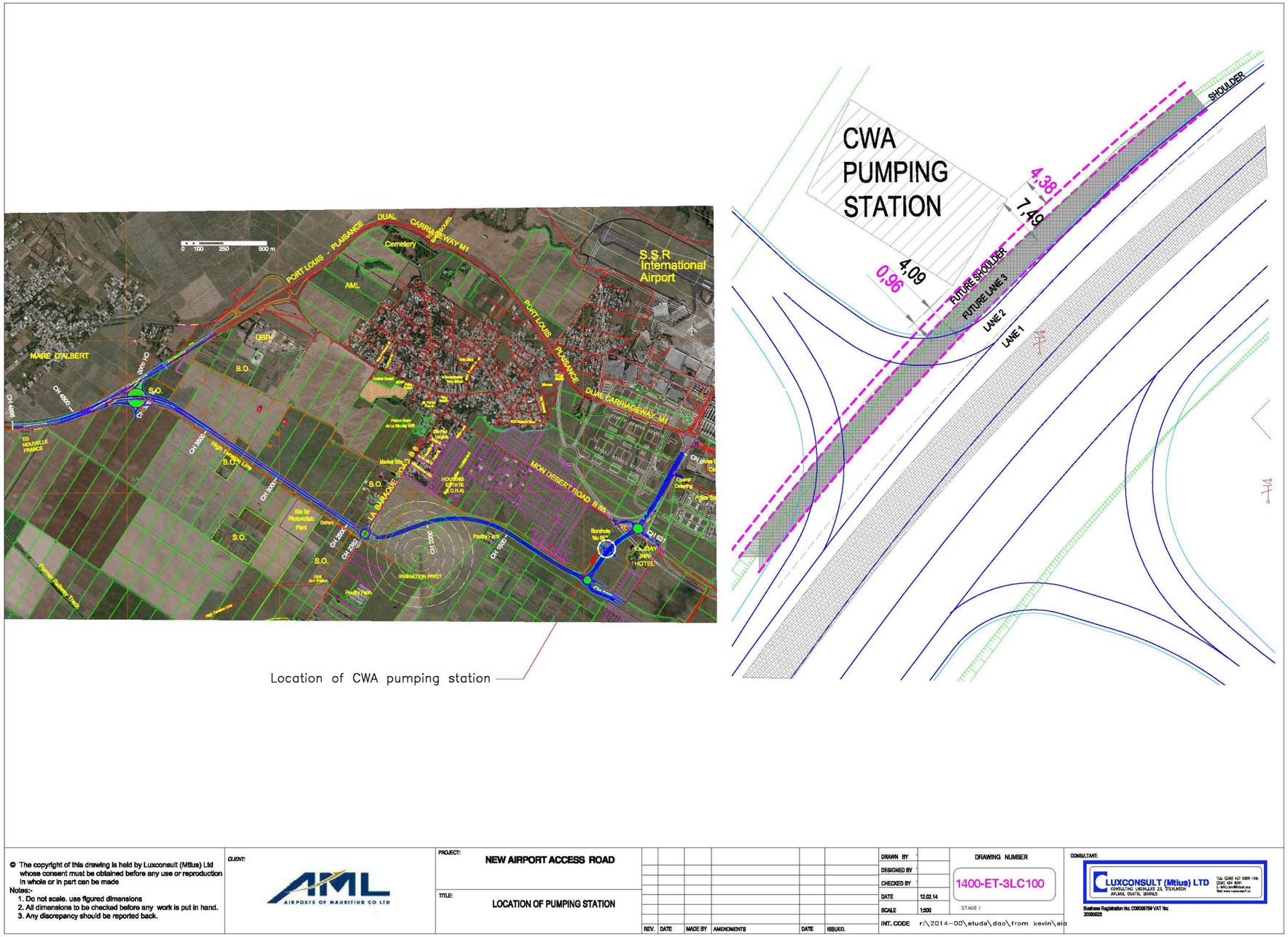


Figure 4-10: Location of CWA pumping station premises relative to proposed road boundary

4.4. HUMAN ENVIRONMENT

In terms of human environment, existing – and planned - ***residential areas*** are considered to be the potentially most sensitive receptors of direct or indirect Project impacts, specifically in terms of noise generated by the road during both construction and operation. The nearest such areas / sites are:

- The Holiday Inn Hotel (about 150m to the SE of the proposed 1st roundabout, ~ CH 0+600 of the Project route; distance ~ 120m),Figure 4-11
- A CHA housing estate located between the Mon Désert Road (B85) and the Project Road (~ CH 1+550 – 1+900, partly developed);
- *Plaine Magnien* (agglomeration on La Barraque Road located at some 150m distance from the Project route near CH 2+380);
- A single residential house, Figure 4-12, under construction at the southern edge of an agglomeration (part of *Plaine Magnien*) located N of / immediately next to the proposed roundabout at *La Barraque Road. (* Figure 4-13Illustrates the location of this building from the boundary of the proposed road) ; and
- An agglomeration belonging to *Mare d'Albert'*, located at the end of the Project about 200m to the north of the proposed new interchange with the M1.

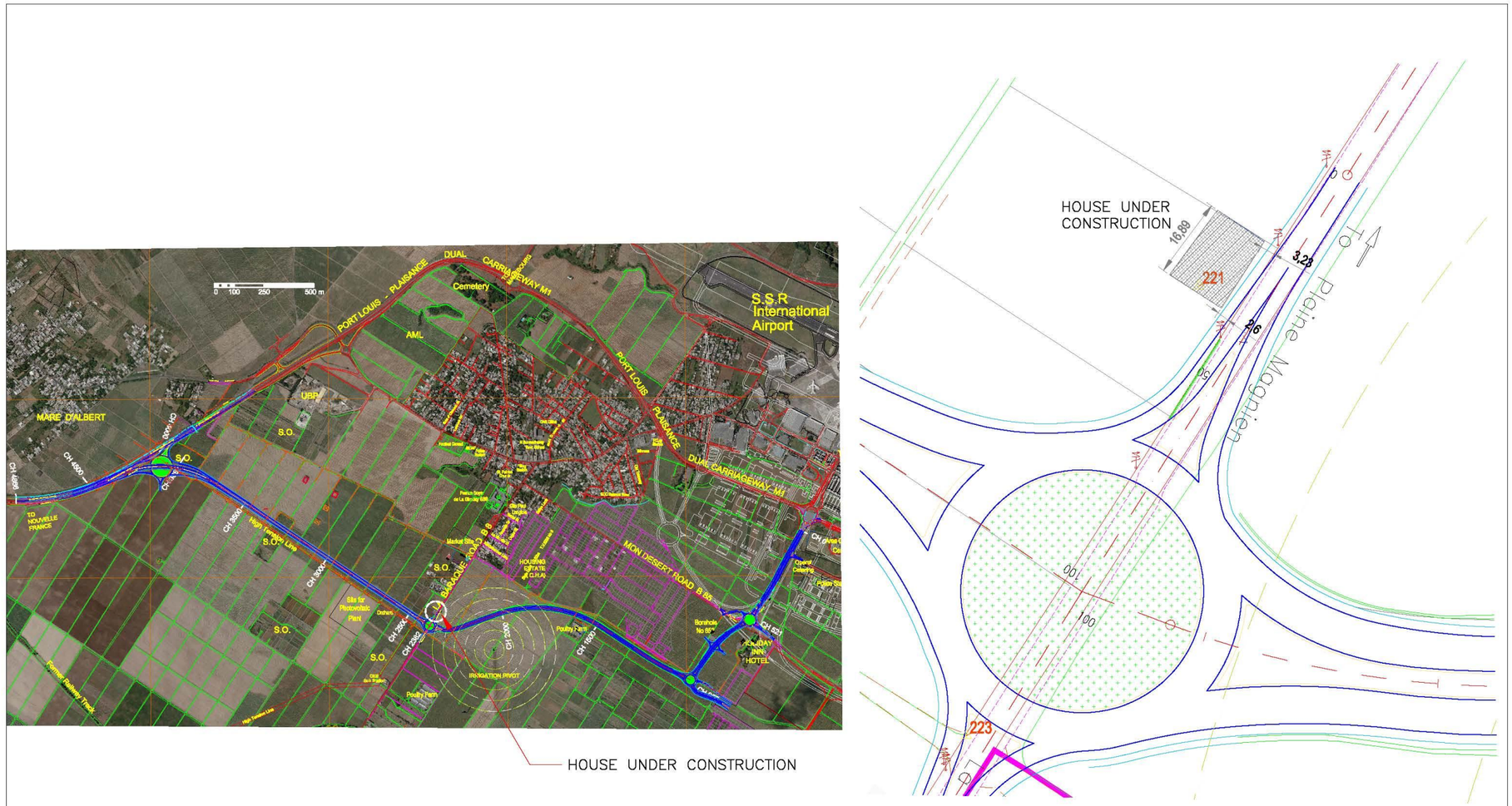
Further man-made structures / services noted in the environs of the Project route include:

- A poultry farm operated by Omnicane Ltd. (~ CH 2+600).
- A high tension line along a cane track parallel to the Project route (~ CH 2+400 – end of Project, distance to the road edge will be about ~ 30 to 50m.)

A UBP stone crushing plant is located east of the M1, directly next to the point where the current access road to the airport branches off the motorway.

Figure 4-11: Holiday Inn Hotel with previous construction site in the foreground

Figure 4-12: Detached house under construction immediately next to the proposed roundabout on La Barraque Road (part of agglomeration belonging to Plaine Magnien)



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Notes:-
1. Do not scale. use figured dimensions
2. All dimensions to be checked before any work is put in hand.
3. Any discrepancy should be reported back.

CLIENT: AML AIRPORTS OF MAURITIUS CO LTD

PROJECT: NEW AIRPORT ACCESS ROAD

TITLE: .

REV.	DATE	MADE BY	AMENDMENTS	DATE	ISSUED.

DRAWN BY	
DESIGNED BY	
CHECKED BY	
DATE	12.02.14
SCALE	1:500
INT. CODE	r:\2014-00\etude\dao\from kevin\ela

DRAWING NUMBER: 1400-ET-3LC100

STAGE /

CONSULTANT: LUXCONSULT (Mtius) LTD
CONSULTING ENGINEERS 23, SILVERSON AVENUE, QUATRE BORNES
Tel: (230) 427 4299 / 46
(230) 454 8291
E-MAIL:lux@intnet.mu
Web:www.luxconsult.mu

Business Registration No: C08008799 VAT No: 20086525

Figure 4-13: Location of building relative to road boundary

Figure 4-14below is a panoramic view from the ‘pyramid’ (~ CH 3+900 lhs) in an eastern direction. The proposed road will be running beyond of and in parallel to the high voltage line.

Figure 4-14: Panoramic view from the ‘pyramid’ (~ CH 3+900 lhs) in an eastern direction

Figure 4-15 illustrates the various settlements and residential developments along the project route.

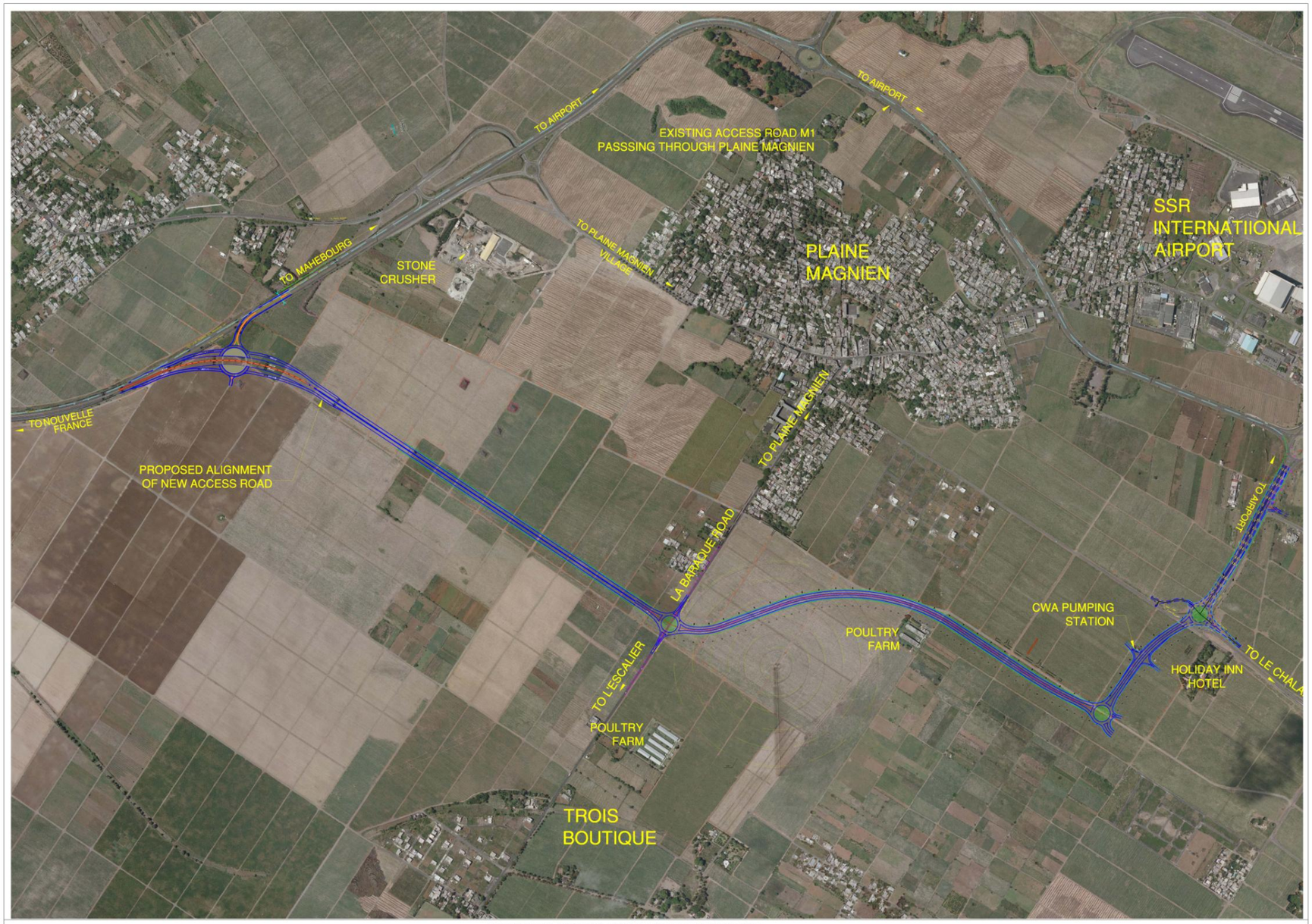

Figure 4-15: Human environment: settlements and residential developments along the Project road

4.5. OTHER PLANNED AND ONGOING DEVELOPMENTS

A large-scale project was recently initiated by Omnicane Ltd. who are in the process of developing a 400 ha property ('*Mon Trésor*') to the south of the SSR International Airport, bordering at the sea and at the Blue Bay Marine Park. The Masterplan covering the Stage 1 of this Project until 2025 was completed in September 2013. The initial stage of that project extends over 160ha, comprising of business development, residential development and services, green areas and roads as shown in Figure 4-16 below.

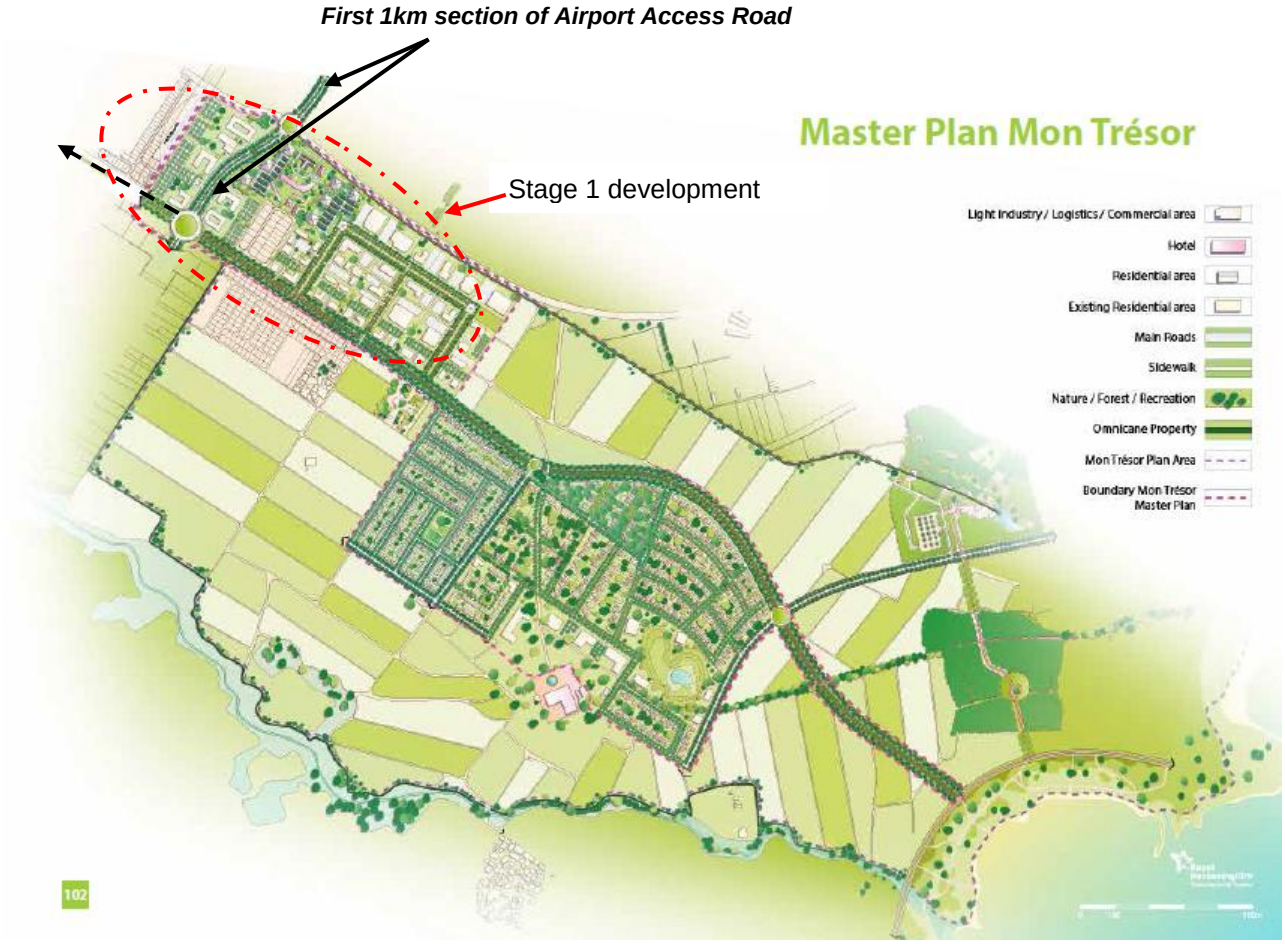

Figure 4-16: Omnicane Masterplan Mon Tresor, Stage 1
Source: Omnicane Urban Development Masterplan Mon Trésor Site (October 2013)

Omnicane's long term regional development vision (2045) for the Mon Trésor site is shown in Figure 4-17 hereunder. That scenario illustrates the growing importance that the Project road will have in the region in the long term. For this reason a traffic study that was undertaken as part of the present Project fully considered the double function of the road and included both, airport-generated traffic and traffic that will be generated by the Mon Trésor Project over time (see section 6.2 of this report).

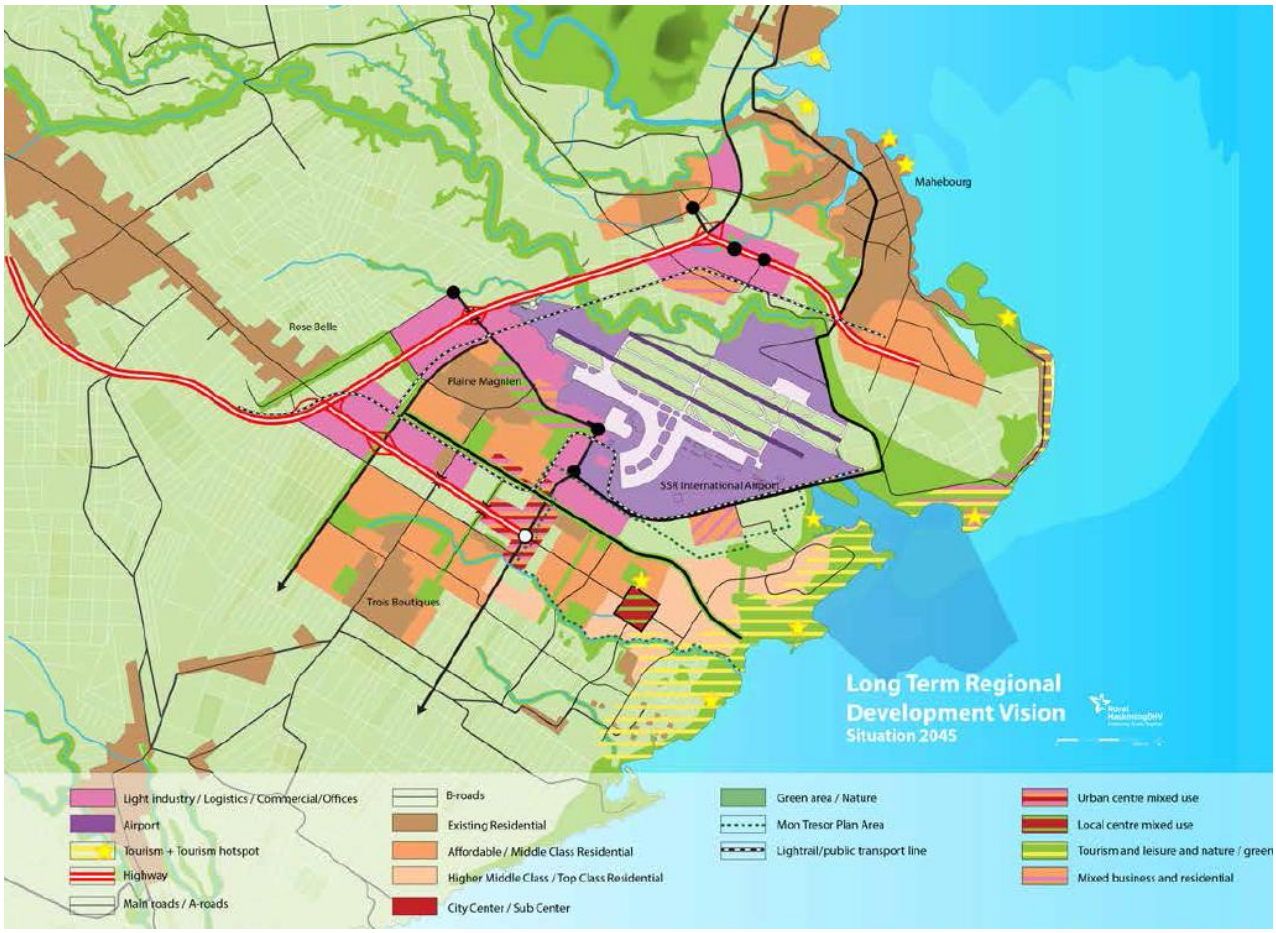

Figure 4-17: Omnicane Masterplan Mon Tresor, long term regional development vision (2045)
Source: Omnicane Urban Development Masterplan Mon Trésor Site (October 2013)

Further planned or already ongoing developments in the Project area and the wider zone include:

- The development of a market (north of 2nd roundabout in the south of Plane Magnien on La Barraque Road);
- The continued development of a housing estate (CH 1+500 – 1+900 to the right of the route) and
- The construction of a photovoltaic plant (CH 2+750 left);
- Morcellement

4.6. TRAFFIC STATUS

In the context of the proposed project, traffic counts were carried out at 2 locations as illustrated in Figure 4-18 hereunder.

Legend: 6361/6894 – No.of vehicles / PCUs

Figure 4-18: Location of Traffic count stations and Present Traffic