REPUBLIC OF SEYCHELLES

MINISTRY OF ENVIRONMENT, ENERGY AND CLIMATE CHANGE

PUBLIC UTILITIES CORPORATION

PROJECT NEPTUNE
Project Management Unit (PMU)

SEYCHELLES WATER AND SANITATION PROJECT

CONSTRUCTION OF LA DIGUE WASTEWATER SYSTEM

Environmental and Social Impact Assessment Report

August 2017

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ABBREVIATIONS

ACP	African, Caribbean and Pacific (ACP) Group of States
AFD	French Development Agency
AWF	African Water Facility
BOD5	Biochemical Oxygen Demand
CBD	Convention on Biological Diversity
dB	Decibels
DI	Ductile Iron
DN	Nominal Diameter
EIA	Environmental Impact Assessment
EO	Environmental Officer
EPA	Environmental Protection Act
ESIA	Environmental and Social Impact Assessment
EDF	European Development Fund
EIB	European Investment Bank
ESMP	Environmental and Social Management Plan
EU	European Union
EUR	Euro
FS	Feasibility Study
GIS	Geographical Information System
GoS	Government of Seychelles
GRM	Grievance Redress Mechanism
HDPE	High Density Poly-Ethylene
ICZM	Integrated Coastal Zone Management
IPPC	International Plant Protection Convention

M	metre
MoEE	Ministry of Environment, Energy and Climate Change
MLUH	Ministry of Land Use and Housing
O&M	Operation and Maintenance
POP	Persistent Organic Pollutants
PE	Person Equivalent
PMU	Project Management Unit
PS	Pumping Station
PUC	Public Utilities Corporation
SWSP	Seychelles Water and Sanitation Project
SIC	Sub-Project Implementation Committee
ToR	Terms of Reference
WHO	World Health Organisation
WWTP	Waste Water Treatment Plant

Executive Summary

As part of the development objective of the "Seychelles Water Development Plan 2008-2030", the Government of Seychelles prepared a 20-year investment plan to meet the water demand in the three main Islands of Mahé, Praslin and La Digue up to the year 2030. This has led to the "Seychelles Water & Sanitation Project (SWSP)", also called "Project Neptune". This ESIA specifically refers to the Construction of the La Digue Wastewater System hereinafter referred to the as the "Project". The Terms of Reference for this ESIA are contained in Annex 1.

This ESIA was carried out under the following legislative and other requirements:

(a) The Seychelles Environment Act 1994;

(b) EIB Environmental and Social Standards

The Seychelles Islands are rich in terms of ecosystems and biodiversity, many species are endemic and many fauna and flora are endangered. The environment of the Seychelles Islands is threatened by:

- Extreme weather events (Natural Disasters), strong winds, landslides, coastal flooding, extended periods of dry weather and tidal surges. These extreme weather conditions are likely to increase in frequency and severity under the influence of climate change, along with pressure for people to move to higher ground to grow food and cash crops;
- Development in catchment areas, leading to habitat destruction and potential for increased soil erosion, landslides and flooding;
- Population growth and good economic growth leading to pressure on the limited land especially on the coastal areas to develop income from tourism, hence further habitat destruction; and
- Interference and degradation at the biodiversity hotspots that are located outside of the protected areas where there is important natural habitat present.

This Project targets specifically the threat posed by the lack of proper sanitation facilities on La Digue Island. The activities under the Project will be relatively small in scale but may lead to disruptions along the main roads and along property boundaries where the sewer lines and pumping/lifting stations and manholes are expected to be built. The other main infrastructure is a sewage treatment plant that will be located near a farming area i.e. L'Union Estate, that will be provided with the treated effluent for irrigation purposes.

The potential impact of any activity will depend on the nature, location and specific mode of construction by the chosen contractor. In most cases, along the sewer line, adverse environmental impacts are expected to be temporary and limited to the immediate vicinity of the excavated areas at the construction sites. They could include temporary disturbance of drains or streams, noise and dust during construction, small-scale vegetation loss, and pollution from inappropriate construction materials waste disposal. The monitoring process of specific activities within the overall Project and the use of standard Environmental Codes of Practice ensures adequate mitigation of those risks. The civil works contract will include standard clauses to ensure the mitigation of any potentially negative impacts.

Community consultation is also an integral part of the monitoring of activities during implementation. PUC and the appointed contractor will participate in public consultation meetings and discussions with district council or administration and representation in the main project committees. Feedback mechanisms and community monitoring of project implementation have also been included under the Project.

No activity within the Project will be permitted that does not flow with this safeguarding process. This includes the social and environmental information, training and monitoring process described in detail in the Environmental and Social Management Plan (ESMP). Facilitators should also be trained on the Project's environmental and social guidelines. Since environmental and social criteria are fully integrated throughout the Project preparation process, stakeholder participation and information disclosure will be assured at every stage of Project implementation.

The ESMP describes in detail and guides the Project implementation which is designed to achieve sound environmental practice and ecologically sustainable outcomes. The ESMP provides the mechanism to allow Project implementation by monitoring specific Project activities that would be unacceptable on the basis of environmental or social criteria. The aim of the ESMP is that all negative impacts will be mitigated. During Project implementation there will be a need to integrate the ESMP to assure its implementation.

Notwithstanding the above, the activities listed below will not be permitted:

- Activities which support the areas named in the exclusion list of the EIB's standards, e.g. political, military/security, religious activities, though the Project will be working closely with church groups; businesses involves addictive materials etc. during normal consultation with the wider public audience.
- Activities within the overall Project that involve the significant conversion or degradation of critical natural habitats and forests;
- Activities that involve the use of toxic chemicals;
- Activities involving Involuntary Resettlement.

All of the above do not exist in the Project.

The ESIA Report contains the following chapters:

- Chapter 1 discusses the context of The Seychelles Water and Sanitation Project and safeguard management requirements of the Seychelles' Islands government and the EIB
- Chapter 2 briefly describe the proposed Project and its components, which has been developed by the Consultants and PUC.
- Chapter 3 discusses the Seychelles' legislations, Institutional Capacity and International Agreements
- Chapter 4 discusses the Seychelles' International Agreements
- Chapter 5 describes the Seychelles' Islands environment conservation initiatives that have been developed over the years, by the Environment Department, NGOs, and other stakeholders
- Chapter 6 describes areas where an environmental inventory has been undertaken and set as baselines for environmental monitoring

- Chapter 7 describes the potential environmental and social impacts of the proposed Project as well as mitigation measures
- Chapter 8 provides the ESMP that will guide the Project implementers on the steps to follow for monitoring activities with potential environmental and social issues, associated mitigation measures, as well as arrangements for implementation.
- Chapter 9 describes activities carried out for stakeholder engagement and public consultation.
- Annexes provide technical tools for Project implementers to use as reference for identifying, safeguard issues of Projects and specific procedures to follow under certain special circumstances.
- The Annexes also contains notes of the public meetings. Concerns raised were addressed in the ESIA report or may be considered at later stages of the Project.

1 Introduction to the Project

1.1 Project Background

In the "Seychelles Water Development Plan 2008-2030", the Government of Seychelles prepared a 20-year investment plan to meet the water demand in the three main Islands of Mahé, Praslin and La Digue up to the year 2030. This has led to the "Seychelles Water & Sanitation Project (SWSP)", also called "Project Neptune". Funding for investments within this project were sourced through a loan with the European Investment Bank (EIB) and the French Development Agency (AFD) as well as grants from the Government of Seychelles (GoS), the European Development Fund (EDF) and the African Water Facility (AWF).

Project Neptune has been divided into several smaller projects, including the project of this ESIA namely "Construction of La Digue Wastewater System" (hereinafter referred to as the "Project". The Public Utilities Corporation of Seychelles (PUC) is the Promoter of the Project and also acts as the Client in relation to consultants, and Employer and Engineer in relation to contractors, through the Project Management Unit (PMU) for the Project. The Terms of Reference (ToR) for this ESIA which have been issued by the Department of Environment are contained in Annex 1.

1.2 Country Profile

The Republic of Seychelles is an archipelago of 115 islands scattered over 1.3 million square kilometres of sea, in the middle of the Western Indian Ocean, north of Madagascar. The group comprises of 41 granitic islands and 74 coralline islands. The total land area is approximately 455 square kilometres. The capital is Victoria, located on Mahé Island, and it has a harbour sheltered by a small group of islands off shore. The international airport of the republic is also on Mahé and it has the capacity to handle large passenger aircraft.

The Seychelles has a temperate climate. The hottest months are March and April (32 degrees Celsius), the coolest being July and August (23 degrees Celsius). Rainfall varies considerably from island to island and from month to month. December and January are the wettest months and June and July the driest. Mahé Island has a very high rate of rainfall - over 2,200 mm per annum. The rate of humidity is uniformly high, at an average of 80% and the mean temperature ranges from a minimum of 24 degrees Celsius to a maximum of 32 degrees Celsius.

The present population of Seychelles is about 91,000 according to the 2010 census. Mahé is the most populated of the islands with a population of about 79,000 people, followed by Praslin with about 8,600 people and La Digue with about 2,800 people. The annual population growth rate in the Seychelles is approximately 1.2%. About 200,000 tourists now visit Seychelles per year.

The Seychelles economy mainly depends on tourism and fisheries. The government has introduced various activities and incentives to attract local and foreign investors to develop other industries in the Seychelles.

1.3 Profile La Digue

La Digue is the fourth largest island in the archipelago and also the third most populated with a population of about 2,800 people, mostly concentrated around La Passe. La Digue is located around 48 km east from Mahé Island and 6 km east of Praslin Island. The island is about 5km in length from north to south and the width from western tip to its eastern tip is about 3km. It has a surface area of approximately 1400 hectares.

The greatest economic activity of La Digue is tourism, followed by domestic agriculture as another main economic activity. La Digue is accessible by boat from Praslin with the travel time between the two islands being about 15 minutes.

1.4 Institutional Context

1.4.1 Public Utilities Corporation

The promoter of the Project is the Public Utilities Corporation (PUC), a parastatal institution wholly owned by the Government of Seychelles. It reports to the Ministry of Environment, Energy and Climate Change (MoEE) through its board, and is regulated by the Public Utilities Act of 1st January 1986 and subsequent amendments. PUC is a vertically integrated utility company, which is responsible for:

- the generation, transmission, distribution and sale of electrical energy on the main islands of Seychelles;
- the production, transmission, distribution and supply of potable water to the main islands of Seychelles;
- the treatment and sanitary disposal of waste water to the environment on Mahé Island.

1.4.2 Other Key Institutions

Other key institutions involved in the Project implementation, with their individual roles, are:

- MoEE in relation to the ESIA and requirements on the effluent and sludge of the WWTPs;
- Department of Information Communication Technology, regarding telecommunication requirements and cables;
- Ministry of Tourism and Transport regarding access roads and requirements for road construction / rehabilitation and permits during construction;
- Ministry of Land Use and Housing (MLUH) regarding GIS information (e.g. cadastral, land use), planned construction projects and possibilities for reuse of effluent and sludge;
- National Bureau of Statistics; regarding population numbers; and
- Ministry of Health.

1.5 Financing

The Government of Seychelles has received funding from the European Investment Bank (EIB), the European Union, the African Water Facility, the French Development Agency (AFD) and other funding agencies towards the cost of the Seychelles Water & Sanitation Project.

Project Neptune is funded through GoS financing agreement with the EIB funding 49%, the French Development Agency (AFD) 18%, and other funding agencies and internal sources bringing the total to approximately EUR 54.6 million for the overall Project.

1.6 Objective of the ESIA Report

The purpose of this Environmental and Social Impact Assessment (ESIA) which also includes an Environmental and Social Management Plan (ESMP) is to guide the implementation of the Seychelles Water and Sanitation Project specifically this Project the "Construction of La Digue Wastewater System". Furthermore the aim is also to ensure that the Project has been prepared in accordance with the requirements of the GoS and the EIB Environmental and Social Standards.

1.6.1 Seychelles' Environmental Legislation

The Seychelles Islands legislation regarding environmental protection is covered mainly by the Environment Act 1994. The Neptune Project requires prior authorisation from the Authority, in this case the Department of Environment of the Ministry of Environment, Energy and Climate Change in accordance with the Environment Protection Act (Act 9 of 1994). The components being proposed in the project have activities that fall in category 10 of Schedule 1 of the Environmental Protection (Impact Assessment) Regulations, 1996, of the Environmental Protection Act (1994). The relevant category and sub-categories for the Project are as follows:

- Category 10 Sewage and waste water:
  - 10-1 Sewerage treatment plants.
  - 10-2 Sewage networks and outfall.

According to Regulation 3(1), of the Environment Protection (Impact Assessment) Regulations, the Seychelles Water and Sanitation Project (NP07) is considered as a prescribed project. Therefore, an Environmental Impact Assessment (EIA) is required if the project is to be submitted to the authority for approval, comments, or consent. In accordance with Regulation 5(1) of the same Regulations, the Authority has determined that a Class 1 Environmental Impact Assessment (EIA) Study is required for this Project. The preparation of this Environmental Impact Assessment Report is therefore part of the overall Class 1 EIA process involved within this application, implemented in terms of the procedures prescribed in the guidelines prepared by the authority.

1.6.2 The EIB Environmental and Social Standards.

Most of the EIB Environmental and Social Standards are prompted by the Project, namely:

- Assessment and Management of Environmental and Social Impacts and Risks;

- Pollution Prevention and Abatement, Energy and resource efficiency; Emissions to Atmosphere, Water and Soil
- Biodiversity and ecosystem;
- Involuntary resettlement: land acquisition, population displacement and compensation;
- Labour conditions; Migrant workers
- Occupational and Public Health Safety and Security.

In addition, the promoter is required to conform with the performance standards required by international funding agencies - in this instance the EIB - throughout the life of the investment, specifically:

- Assessment and Management of Environmental and Social Risks and Impacts;
- Labour and Working Conditions;
- Resource Efficiency and Pollution Prevention;
- Community Health, Safety, and Security;
- Land Acquisition and Involuntary Resettlement;
- Biodiversity Conservation and Sustainable Management
- Cultural Heritage.

The requirements laid out in the Environmental and Social Handbook of the EIB also apply, namely:

Environmental Assessment

According to EIB guidelines, the La Digue Project is not classified as an "Annex I" project (because the associated waste water treatment plant has a capacity not exceeding 150 000 population equivalent as defined in point 6 of Article 2 of Council Directive 91/271/EEC of 21 May 1991 concerning urban waste-water treatment). Accordingly (page 121 of EIB's guidelines), Annex II projects are screened out i.e. an E(S)IA is not required.

However, the Project is still subject to the Seychelles national requirements The Seychelles Government however does not give Environmental Authorization to any projects that may have irreversible adverse environmental Impacts. Therefore this ESIA has been prepared to identify environmental impacts so that these impacts can be avoided, mitigated or compensated.

The type and scale of the proposed physical investments through the Project will be at relatively small scale, site specific, short term and can be mitigated. Some potential negative impacts are associated with the disposal of the effluent, power failures and leaks in the sewer system.

An Environmental and Social Management Plan (ESMP) has been prepared for the Project in this ESIA Report.

Natural Habitats

This operational policy is triggered in the Neptune Project. Environmental monitoring will ensure that Project site selection avoids critical habitats, such as near the Veuve Reserve and within setback limits from water ways and the coastline, in order to mitigate potential negative impacts on other natural habitats such as streams and wetland areas.

Pest Management Inlet

Pest management may be necessary at the infiltration gallery, which is constructed as part of the Project, both where ground water recharge by excess treated effluent will be undertaken and at several locations where rodent and pest control will be necessary. The Pesticide Board will continue to be used to control pesticide imports and for overseeing the activities of the appointed pest controller. Enforcement of the regulation is the responsibility of the Ministry of Health and/or the Public Health Agency (PHA). A Pest Management Plan is required to ensure safety for human and the environment associated with the transport, storage, handling and disposal. Given the fact that pest control will be undertaken by an appointed Pest Controller, this ESMP does not include a Pest Management but it can be developed easily during the Project implementation by liaising with the Ministry of Health, which is the Administrator of the Pesticide Control Act.

Physical Cultural Resources

Project siting will avoid known physical cultural resources such as structures of spiritual value to communities, objects and structures having high landscape values etc. Chance Find Procedures will be included in the ESMP to address the cases where objects are found during ground excavation.

Forest

This policy is not triggered in the project as the sites will be located where development has taken place within existing communities. Since deforestation for infrastructure development will not happen and the forested Veuve Reserve will not be affected, it is envisaged that the Project will not affect forest, forest health and forest-dependent communities.

Indigenous Peoples Policy

The Project investments will be carried out on La Digue which is one of the main inhabited islands of the Seychelles. The population of the Seychelles does not comprise of indigenous groups, as is sometimes the case in SIDS but is instead composed of a mixed racial blend from the European, African and Asian continents. Therefore, a separate Indigenous Peoples Plan is not required, but provisions responding to the policy will be incorporated into overall Project design.

The ESMP will be carried out, including an inclusive, participatory community process. Community consultations will be facilitated and documented by suitably qualified personnel. Ongoing monitoring and community consultations by such personnel will assess whether broad community support is maintained during implementation.

The Project is driven by the recipient community which ensures that Free, Prior and Informed Consultation has been built into Project conception and development and that the Project will provide benefits that are culturally appropriate to the people. The community driven nature of the Project will further serve to ensure compliance with the EIB requirements.

Involuntary Resettlement

No involuntary resettlement as a result of the Project is anticipated. All the necessary acquisition of property will be undertaken as per the local regulations, namely Public Utilities Corporation Act (1986) by PUC; By the Ministry of Land Use and Housing (MLUH) as per the Acquisition of Land in the Public Interest Act (1986); Or by mutual consent or agreement between PUC or the GoS and a landowner.

With respect to acquisition of land the relevant sections of the Public Utilities Corporation Act (1986) states:

6. (1) Subject to this Act, the Corporation shall have power to do all the things necessary or convenient to be done for or in connection with, Corporation or incidental to the exercise of its functions.

(2) The Corporation shall not, without the approval of the Minister granted after consultation with the Minister responsible for finance-

(a) acquire any property, right or privilege which exceeds R.500,000 in value;

1.7 Legislative Framework

The key legislation governing this EIA study includes

- Article 30 of the Constitution of the Third Republic (1993), Chapter 42;
- Environmental Protection Act (1994), Chapter 71;
- Environmental Protection (Impact Assessment) Regulations (1996);
- Environmental Protection (Standards) Regulations (1995);
- Land Acquisition Act (1991) - Revised Edition - Chapter 105;
- Town and Country Planning Act (1972) - Revised Edition (1991) - Chapter 237;
- Breadfruit and Other Trees Protection Act (1917) - Revised Edition (1991) - Chapter 18;
- Occupational Safety and Health Decree (1978), Chapter 154;
- Public Utilities Corporation Act (1986); and
- Public Health Act (1960) - Revised Edition (1991) - Chapter 189.

The EIA procedures, as required by the Environmental Protection (Impact Assessment) Regulations (1996) under the Environmental Protection Act 9 (1994), is a pre-requisite for gaining Environmental Authorisation from the Ministry of Environment and Energy for the proposed project.

The steps in the process of preparing an EIA study for Class I projects in Seychelles with the approximate time taken for each step are shown in Table 1 which follows:

Steps	Approximate Time
Scoping meeting with the Department of Environment	2-3 days
Undertake scoping study & prepare report	15-30 days

Steps	Approximate Time
Upon submission of scoping report the ministry provides the detailed Terms of Reference to the EIA Consultant	14 days
EIA Class 1 is undertaken on the basis of the Terms of Reference	1-3 months
Specialist Studies (may or may not be required) depending on the type of project. E.g. Geotechnical survey, Microbiological survey, nutrient survey, bathymetry or topographic survey.	Variable
EIA Class 1 is submitted to the developer for review	14 days
EIA Class 1 is submitted for internal review	21 days
EIA Class 1 is submitted for public review	
EIA Class 1 undergoes final appraisal and client presented with/without environmental authorization	
Total Approximate Time	4-6 months

Table 1: Steps and approximate timelines of the EIA process for Class I projects

Under Schedule 1 of the Environmental Protection (Impact Assessment) Regulations (1996), of the above-mentioned Act (EPA), the desired level of development - its proposed activities and concept - comprises activities, which in accordance with Regulation 3 (1) of the same regulations, are projects or activities requiring Environmental Authorisation.

The process for preparing an EIA study for Class I projects in the Seychelles with its individual steps is shown in the following flow chart in Figure 1 below:

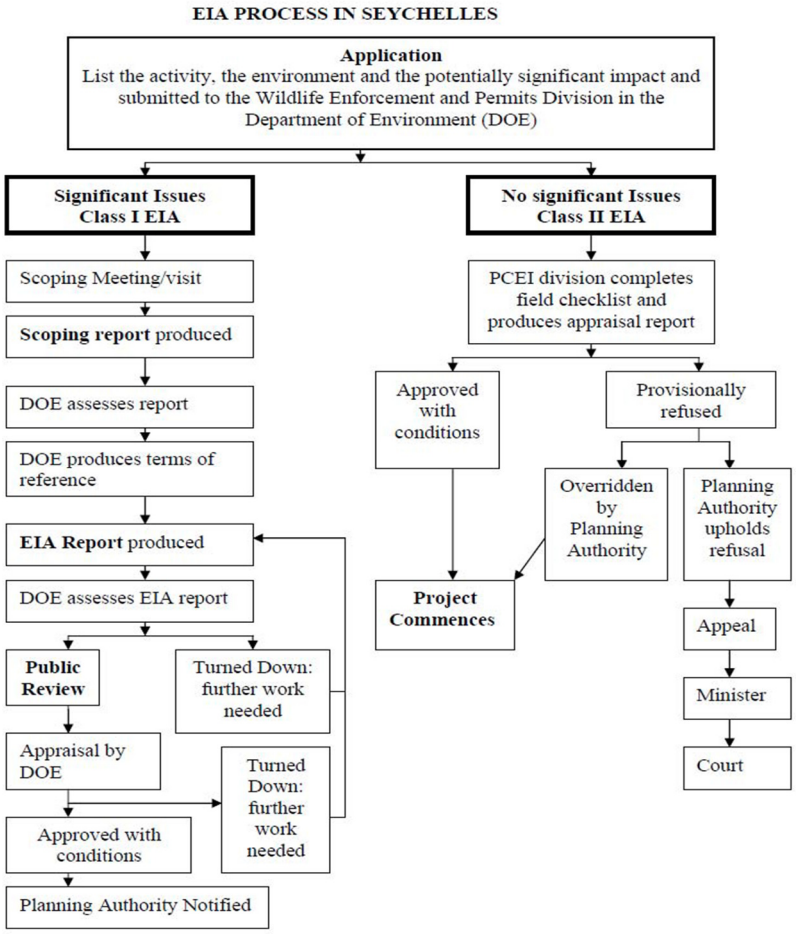


Figure 1: Steps of EIA process in Seychelles

1.8 Report Structure

The Report comprises the following sections:

- Executive Summary
- Chapter 1 Introduction to the Project
- Chapter 2 Description of the Project
- Chapter 3 Seychelles Legislation and Institutional Capacity
- Chapter 4 International Legislations and Agreements
- Chapter 5 Seychelles Environment and Conservation Initiatives
- Chapter 6 Detailed Study Sites
- Chapter 7 Potential Environmental and Social Impacts
- Chapter 8 Social and Environmental Management Framework
- Annexes

2 Description of the Project

2.1 Project Location

The Project location is in the La Passe area i.e. plateau area, of the island of La Digue. The proposed piped sewerage system is to be located only in the developed parts of the island. These are the only areas of La Digue where the density of population is sufficiently large to justify the construction of a piped sewerage system.

The central, eastern and southern parts of La Digue – outside of the service area – are primarily either a forest reserve or protected beach front/coastline. Some areas on the northern tip of the island and down along the north-east coast are shown as being suitable for low density residential development. There are already some houses in these areas and they are served with a PUC water supply pipeline along the coast. These areas will not be covered by the piped sewerage system.

The WWTP will be located to the south of the plateau area adjacent to L'Union Estate.

2.2 Alternatives to the Project

There are no prudent and feasible alternatives to the proposed development, if it is decided to construct a piped centralised sewerage system for La Digue. The various technical options were investigated and evaluated at the Feasibility Study stage of the Project. The Project works proposed are considered to represent the best option. The other main alternative is to do nothing and continue with the existing use of septic tanks and cess pits for sewage disposal.

The consequences of not proceeding with the Project would be a significant ongoing degradation of the quality of the groundwater and the creation of a potential health hazard.

2.3 Existing Wastewater Situation in La Digue

Significant development has taken place on La Digue over the past few years, especially in the tourism and housing sectors. Numerous guest houses have been established on the coastal belt and large housing developments have been implemented in the La Passe area by the Ministry of Land Use and Housing. Though projects were implemented to increase the water supply, the absence of sewerage facilities will result in an increase in pollution of the marine environment and the underground water resources. La Digue depends on a combination of surface water, groundwater and desalination for its water supply.

A situation has arisen to protect the pristine environment of La Digue, which is one of the main assets in the tourism industry. In view of the increased development which is taking place on the island a special emphasis therefore has to be placed on the protection of groundwater and marine ecosystem by having a proper wastewater treatment and a disposal system.

As the density of houses increases, the need to review the means of wastewater treatment and disposal has become an urgent necessity. In the absence of centralised sewer system, septic tanks are used to contain and treat sewage. Bearing in mind that only primary treatment is accomplished within the septic tanks, the effluent that is released from the tank has basically undergone 30%-40% of BOD removal and 60% suspended solid removal. During the rainy season when the water table rises, many soakaways become saturated and septic tanks overflow. Most of the water consumers on La Digue believe that the groundwater is contaminated and requires treatment.

2.4 Proposed Sewage Collection System

2.4.1 Sewer Network

In gravity systems the sewage flow is provided by natural gravity without any support of mechanical equipment. Pipes have to be laid at reasonable slopes in order to provide the required velocity. A purely gravity system is not possible in La Digue. It is flat with high groundwater levels, requiring deep trench excavations with pumping and/or lifting stations to pump the sewage.

The arrangement of the pipes and pumping stations is however different. Sewage flows by gravity to a pumping station and is then pumped to the next pumping station via a force main. Lifting stations are not used but rather more sewer pipes as in some places gravity sewers are parallel to force mains.

In the proposed piped sewer system there are 2 no. main pumping stations which collect the flow from gravity sewers and the small lifting/pumping stations and then pump this sewage either to the next main pumping station or to the WWTP. There are two main lines of force mains and several much shorter forcemains. The maximum depth of excavation is 3.5 m at the deepest PS. In addition there will be 18 no. small lifting/pumping stations.

In total there are approx. 17 km of gravity sewers with approx. 400 manholes and 3 km of force mains. For the gravity sewage pipes, a minimum diameter of DN200 is recommended. There are an estimated 700 house connections, 50 of which are estimated to need pumps. The minimum diameter for house connections is, according to required slope, proposed to be DN125.

The location of the pipelines, manholes, pumping and lifting stations and the WWTP are shown on Figure 2 below. The layout of the La Digue WWTP with the coordinates of the property boundaries is shown in Figure 3 and Figure 4 which follow.

2.4.2 House Connections

Proposals for La Digue house connections are outlined in the following paragraphs.

The Project proposes for each property (or in some cases groups of properties) to install a house connection chamber i.e. service pit, which in turn would be connected to the lateral or branch sewers. These service pits would be located at the boundary of the individual properties and the adjacent public roads or footpaths. These chambers/pits could either be located on the private property of the boundary or else on the public road (or footpath) side.

The cost of the supply and installation of the service pits and their connection to the piped sewer system are also part of the Project. The disconnection of households from their septic tanks and cess pits and their reconnection to their respective service pits including any changes to the internal plumbing are also needed.

The depth of each of the house connection chamber will be determined by two factors:

- The plumbing or the level of the existing connection from the house plumbing with the existing septic tank. Preferably the house connection chamber is at a depth that allows gravity flow from the house to the house connection chamber; and
- The general depth of the lateral and branch sewers. The depth of the lateral and branch sewers will be designed to be as shallow as possible. It would be uneconomical to lay them deeper for only a few house connections, since this influences the entire downstream section of the sewer pipes.

The standard level of the house connection chamber i.e. service pit, has been set at 70 cm below ground level. Where necessary it may be necessary for some property owners or the PUC to install small sewer pumps where it is not possible for them to connect by gravity. It is anticipated that this will occur along the road at the foot of the mountain at the eastern edge of the plateau area.

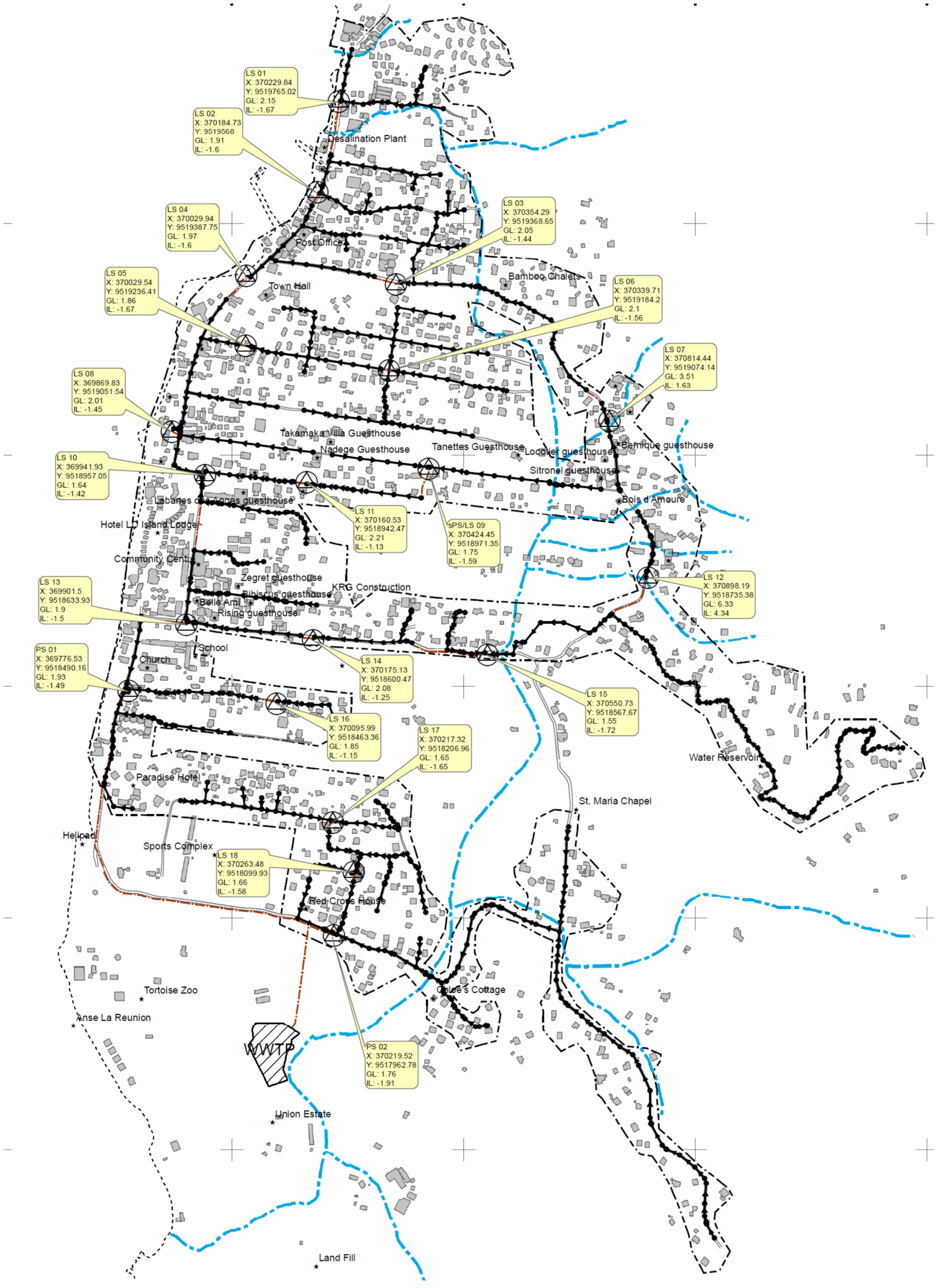


Figure 2: Layout of sewerage system

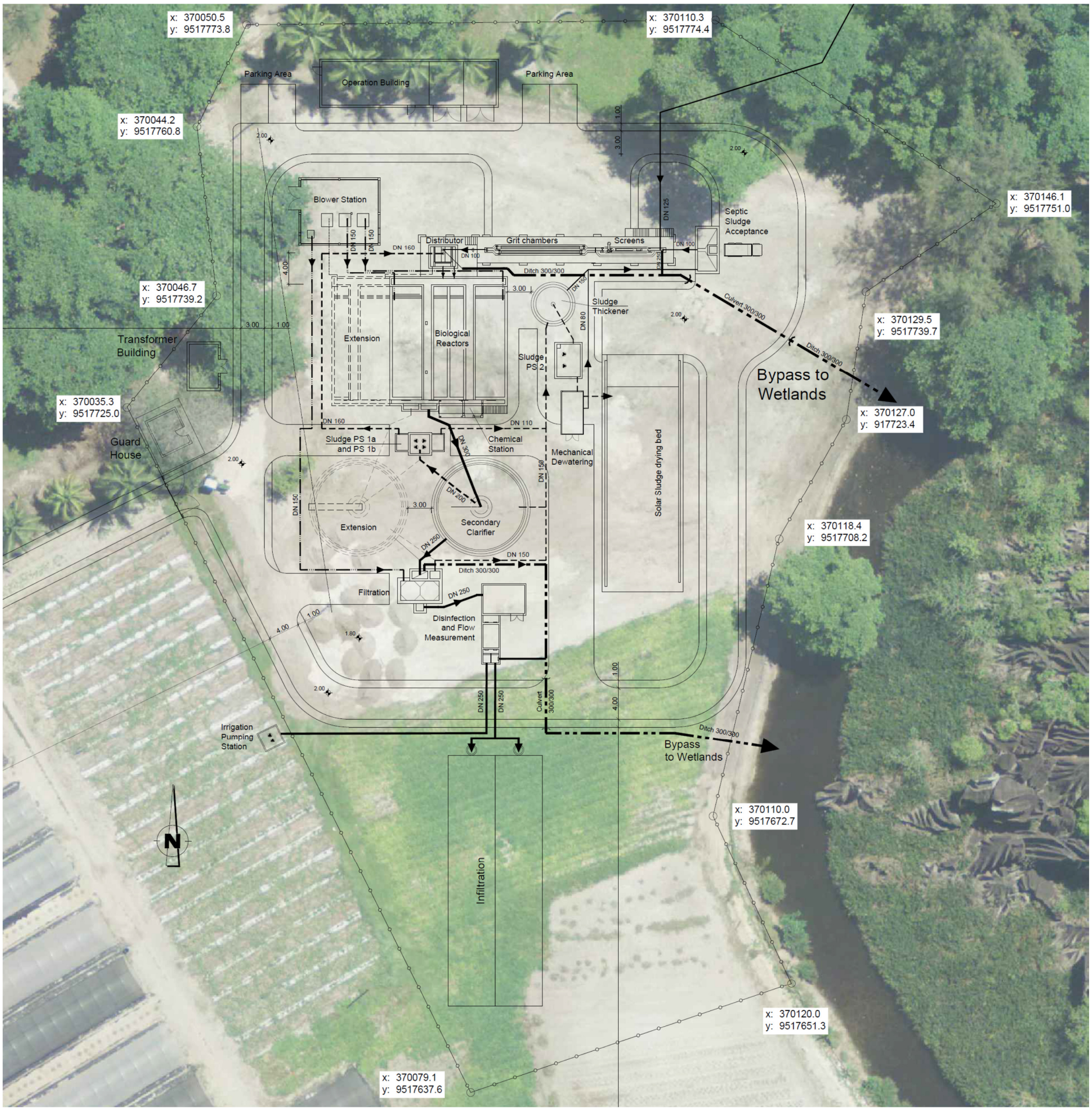


Figure 3: Layout of La Digue WWTP - 1

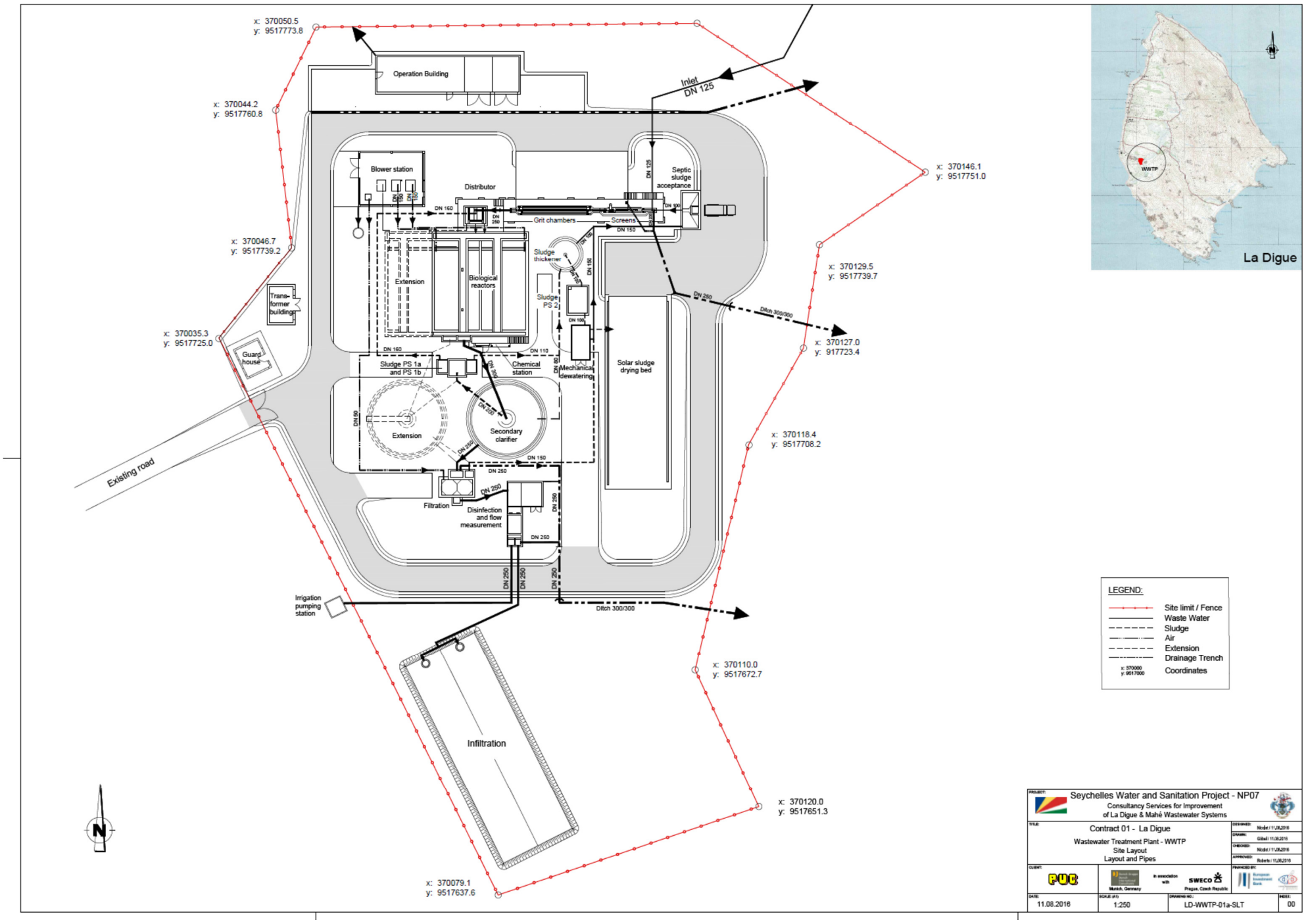


Figure 4: Layout of La Digue WWTP - 2

2.5 Proposed WWTP

2.5.1 General

Different process technologies were considered for the treatment of wastewater in La Digue. The design is for a population equivalent of approx. 5092 PE and a flow of 941 m^3/d.

The requirements for the effluent quality in accordance with law S.I.83 (1995) are quite stringent and require the removal of suspended solids, the biological degradation of organic matter, partial N and P removal, and finally disinfection.

Several steps are needed for the treatment of wastewater, the main one being the biological treatment. The removal of suspended solids can take place in the mechanical treatment and can also take place in a filtration step after the biological treatment. The last step for the wastewater treatment will be the process of disinfection. In addition, biological and mechanical treatment steps produce sludge which needs to undergo further treatment before it can be disposed of or reused.

2.5.2 Biological Treatment

The proposed process of conventional activated sludge with extended aeration, (similar to the one implemented in Providence and Beau Vallon WWTPs on Mahé) has the advantage that wastewater and sludge treatment are conducted in the same aeration process. This results in an effluent and stabilised sludge both of good quality. It has the advantage not to require a lot of land. However this process requires a lot of energy and the investment cost and the complexity of operation are rather high.

2.5.3 Filtration and Disinfection (Advanced or Tertiary Treatment)

Filtration

The filtration step is mainly required for an effective removal of the turbidity and suspended solids and so as to guarantee that the disinfection step works properly. For La Digue, the following main processes would be considered:

1. Sand filters, such as Dynasand filters which are backwashed continuously
2. Conventional sand filters: with intermittent backwash
3. Disc filters
4. Membranes for ultrafiltration and/or microfiltration

Membranes have the strong disadvantage of having high energy and chemical requirements. Disc filters are not as reliable as sand filters since they often have leakages. They are not recommended for La Digue.

Disinfection

Untreated and secondary treated effluent contains a range of pathogenic micro-organisms that pose a potential risk to the health of humans and livestock, such as:

- Helminths (for example, intestinal nematodes – Ascaris, Taenia)
- Bacteria (for example, those causing cholera, typhoid and shigellosis); Protozoa (for example, Giardia, Cryptosporidium)

The disinfection step should:

- reduce microbial pathogens to below the minimum criteria
- not result in an increase in the discharge toxicity of the wastewater;
- be reliable and cost effective; and
- not result in incremental risks to human health or the environment due to the transport, storage, or handling of disinfection chemicals or by-products.

On La Digue the Project will implement sand filters, followed by either UV-disinfection or ozone treatment.

2.5.4 Sludge Treatment

The sludge produced in the main treatment has to be processed for disposal or reuse. Sludge is usually removed with a dry solids content around 1%, depending on the type of main treatment processes. Therefore, it is mainly water and has large volume. It is usual to reduce the water content to reduce the volume by a combination of various processes, including gravity thickening, mechanical dewatering and drying.

Stabilisation is the process of reducing pathogens, eliminating odours and inhibiting, reducing or eliminating the potential of putrefaction. This makes the sludge easier to handle, reduces odours and suitable for use. Several solutions are possible, including drying, composting, extended aeration, aerobic or mesophilic / thermophilic anaerobic digestion.

Selection of the final means to produce stabilised sludge for beneficial use will depend on the end user requirements. However, other processes for sludge treatment are standardised. Gravity thickening is used to increase the solids content of sludge typically from 1% solids to 4%, followed by mechanical dewatering to reduce the volume to about 30% solids by removing a portion of the liquid fraction. The combination of these two processes reduces the volume of 15 m^3 of liquid sludge to about 1 m^3 of semi-solid “spadable” sludge that can be transported, stored and stacked as a solid material. Solar sludge drying beds are included in the Project for further sludge drying on La Digue.

2.5.5 Disposal of Treated Sludge

At the present time there are no regulations in place that specifically govern sewage sludge management. Only the Public Health Act makes mention that sewage sludge is a 'nuisance' which implies that it needs to be handled with care.

There are no specific requirements regarding dry solids content etc. for the sludge which is disposed of at the landfill. The only requirement is that the contractor conveying the sludge to the landfill is registered with the Land Waste Management Agency. To be able to dispose of treated sludge at the La Digue landfill the PUC will have to obtain the necessary permits and approvals.

The main elements of the sludge treatment at the La Digue WWTP will be as follows:

- A sludge thickener from which a dry solids content of about 3.5% is expected;
- Mechanical dewatering from which the dry solids content of the sludge should be increased to at least 18%; and
- Solar sludge drying beds which should achieve a dry solids content of 90%.

As a result of these processes a sludge quantity of less than 1 m^3 per day is expected to be produced with a dry solid content of 90%. This is a relatively small amount of sludge which can be easily handled.

Disposal to the La Digue landfill, along with use in agriculture, appears to be the best option for disposing of the sludge from the La Digue WWTP. The landfill is immediately adjacent to the WWTP site and transporting dried sludge to the landfill would not involve making trips through any populated areas.

The agricultural areas of L'Union Estate where the La Digue WWTP would be located may be suitable for use for disposal of sewage sludge. Issues of transport costs would not arise since L'Union Estate is closer than the La Digue landfill site. It is anticipated that L'Union Estate could use the sludge as either a soil conditioner or a fertiliser.

Whether the sludge is used in agriculture would depend entirely on L'Union Estate they will have to judge its suitability for the various crops that they choose to grow. The sewage to be treated at La Digue WWTP will be overwhelmingly domestic sewage. It is expected that L'Union Estate would carry out any necessary analyses, laboratory tests or field trials should they decide to use treated sludge in agriculture.

2.6 Proposed Disposal of Treated Sewage Effluent

2.6.1 Overview

The options for disposal of treated effluent are as follows:

- Reuse in agriculture, this would be at L'Union Estate which is adjacent to the WWTP;
- Disposal to the estuary immediately adjacent to the WWTP;
- Injection into the ground water; or
- Disposal to the sea via a sea outfall pipe.

It is considered that both the cheapest and the most environmentally acceptable solution is to reuse as much of the treated wastewater as possible with the reminder to be disposed of into infiltration trenches. This is discussed in the following sections:

2.6.2 Reuse of Treated Wastewater in Agriculture

Discussions were held between the PUC and the Consultant with L'Union Estate regarding their use of treated wastewater. L'Union Estate indicated that they would take wastewater all year around although they could not necessarily guarantee to take it all in the wet season. They would only really know the amounts they can use after they commence taking treated wastewater. They expect to take all of the treated effluent in the dry season.

At the present time L'Union Estate is pumping ground water all year round even in the wet season. In the wet season they can have problems with their pumps due to silt. They want to stop pumping altogether and switch to treated effluent. This would represent a major environmental benefit as it would be possible to reduce over-pumping of the aquifer.

L'Union Estate has no specific quality requirements for the treated wastewater as long as it meets international standards for use in agriculture. The relevant international regulations which must be met are from the WHO (World Health Organization) and the FAO (Food and Agricultural organisation) as well the Seychelles requirements must be considered.

2.6.3 Infiltration

With respect to the use of treated effluent in agriculture it will be necessary to provide an option for the disposal of wastewater not used in agriculture or for an emergency situation. The concept is to dispose of the treated wastewater through a combination of agricultural use and infiltration.

An alternative to an infiltration basin or an infiltration well is to discharge the treated wastewater into an infiltration ditch/trench (in German: Rigole). There are two principal systems:

- excavations filled with porous material; or
- pre-fabricated systems.

In excavations filled with porous material, the water is stored in the void space and infiltrates through to the bottom. Examples of this are shown in

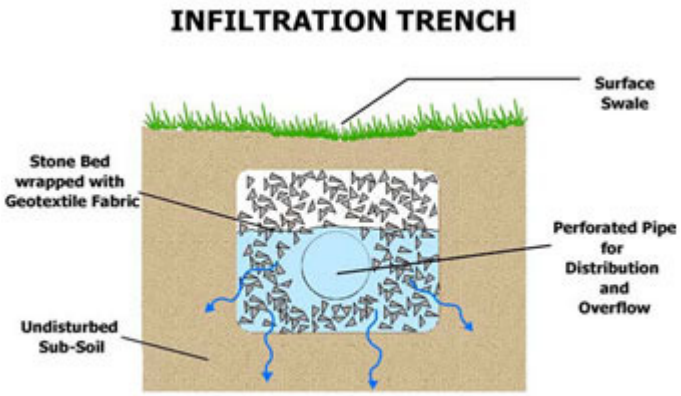
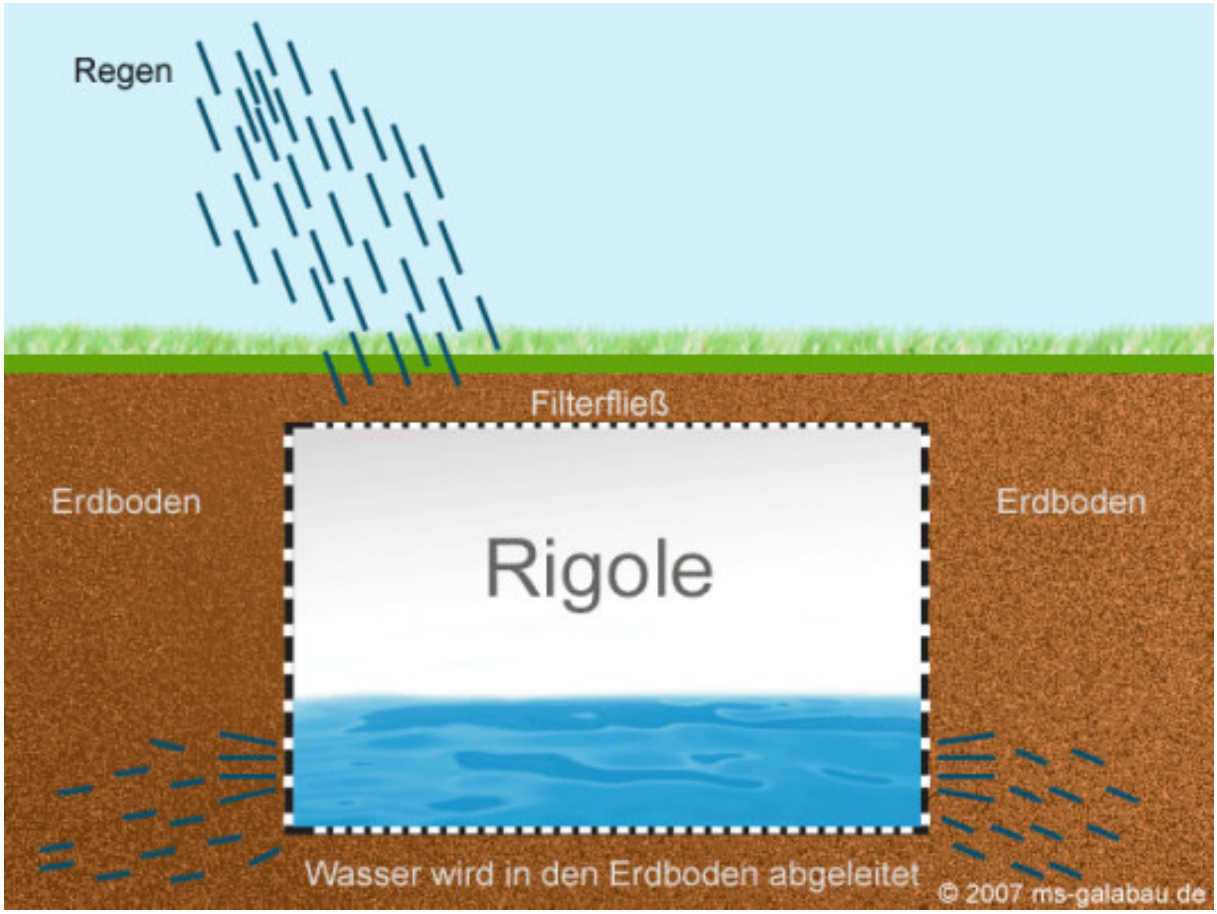


Figure 5 which follows:



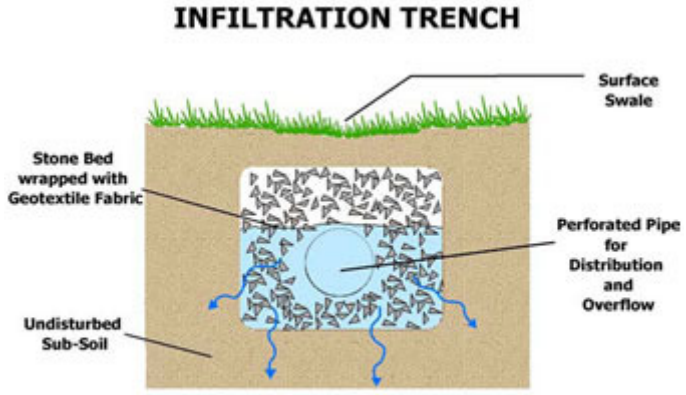


Figure 5: Examples of infiltration trenches

Prefabricated systems can be used these are bloc trenches made from plastic material, these bloc trenches have a very high storage capacity. An example of prefabricated infiltration systems are shown in Figure 6 below:

Source: DRAINFIX®BLOC

Figure 6: Example of prefabricated infiltration system

Among others, the advantages of both of these systems are:

- the infiltration ditch is placed in the underground;
- no flies or mosquitoes; and
- use of the natural filtration of the soil (at least in the times when the groundwater table is low enough.

The main requirement for this system is a sufficient level of permeability of the soil under the trench (minimum $5*10^{-6}$ m/s) to reduce the potential for clogging. Therefore, soil in the infiltration area should not have large quantities of fine particles like silt and clay.

2.7 Construction Activities

2.7.1 Working Hours

The regular working hours for the site will be from 07:00 hours to 17:00 hours Monday to Saturday excluding Public Holidays. Work outside of these hours will be subject to the approval of the Engineer and will not be automatically allowed.

2.7.2 Site Offices and Contractor's Storage

It is anticipated that the contractor's site offices will be located at the site of the La Digue WWTP. This is of course subject to approval by the PUC. Arrangements will have to be made for parking of construction equipment overnight, it is anticipated that this will also be at the La Digue WWTP site.

The main materials to be stored will sewer pipelines and manholes and the WWTP process equipment. In the case of the sewer pipes and manholes, delivery to site will be staged to avoid large lengths of pipe being delivered and then left laying along the pipeline routes.

2.7.3 Construction Materials

Construction materials will mainly be the WWTP process equipment and the sewer pipelines and manholes/inspection chambers for the sewer network. These will have to be imported through the small jetty at La Digue. Other imported material such at cement and reinforcement bar will also need to be imported through the small jetty at La Digue. The La Digue port is close to the site of the Project works and transport of materials is not expected to cause major disruption to traffic due to its relative absence. However the use of vehicles to transport the materials and equipment on La Digue will need prior approval.

With respect to concrete batching it is assumed that the contractor will need to set up their own concrete batching plant on La Digue. The most practical location for this would be the La Digue WWTP site.

2.7.4 Excavation and Backfill

For the pipelines excavations will in general be in verges or road shoulders within the road reserves. Where possible pipes will not be laid directly under roads, however this will not be possible in some locations. Some temporary road closures will be necessary in limited sections of roads as pipelaying proceeds. Refer to Section 7.2 later in this Report.

Where possible excavated material – both from pumping stations, manholes and pipelines - will be used as backfill to minimise the amount of the spoil produced. It is anticipated that all excavated material – being granular in nature – will be suitable to use as backfill. Surplus excavated material from the La Digue WWTP will also be reused as backfill to the maximum extent possible. Any surplus spoil would be suitable for use in other land reclamation activities however it is not known whether it will be necessary to remove it from the island of La Digue.

2.7.5 Construction Equipment

The exact mix of construction equipment used will be at the discretion of the contractor. It is however anticipated that the types of equipment used would include the following, among others:

- 2 no. excavators (bucket min. 1.0 m^3)
- 1 no. loader (tracked or wheeled, min. capacity 5 tonne)
- 3 no. trucks (min. capacity 5 tonne)
- 1 set concrete batching equipment
- 5 no. dewatering pumps (min. capacity 5 l/s)
- 1 no. crane (min. capacity 5 tonne)
- 1 no. pneumatic jack-hammer
- 1 no. soil compaction rammer

It will be necessary to gain the approval of the Department of Land Transportation to enable this construction equipment to be deployed on La Digue.

2.7.6 Construction Environmental Management Plan

The Contractor will be issued with the Employer's Environmental and Social Impact Assessment Report (ESIA). The ESIA will represent the minimum standard to be achieved but will not relieve the Contractor of any statutory duty.

The conditions of the Contract will require the Contractor to take all reasonable precautions to avoid any nuisance arising from the execution of the Works. This should be accomplished where at all possible by suppression of the nuisance at source rather than abatement of the nuisance once generated.

The conditions of the Contract will require the Contractor to employ appropriate construction methods and carry out the Works in a manner as to minimize any adverse impacts on air, noise and water quality and the existing environment within or outside any construction sites during the Contract.

The conditions of the Contract will require the Contractor to submit an Environmental Management Plan indicating how they will comply with the Contract requirements. Compliance with this plan by the Contractor will be monitored during the Contract.

2.7.7 Construction Schedules and Planning

The overall schedule for the contract is shown in **Error! Reference source not found.** above. The conditions of the Contract will require the Contractor to plan in detail the full scope of the Contract taking into account the complex nature and different phases and aspects of the Contract and should provide programmes which reflect the detailed planning undertaken and which are realistic, achievable and are accompanied by supporting information. Compliance with this will be monitored.

2.8 Decommissioning

There are no existing sewers, manholes or pump stations that have to be decommissioned in addition there is no centralised WTTP facilities or equipment which have to be decommissioned. There is however the packaged sewage treatment plant at L'Orangerie Hotel and also the packaged sewage treatment plant at their staff accommodation that will both no longer be needed once the sewerage system is operational.

2.8.1 Household Septic Tanks and Cess Pits

Once the sewerage system is fully operational the existing septic tanks and cess pits currently used by the individual households will need to be decommissioned. There is no particular need to demolish these septic tanks and cess pits as this will create unnecessary expense and also generate a large amount of rubble which would either have to be disposed of to the existing landfill or else removed from the island.

What however needs be carried out is to pump out the septage from all of the existing septic tanks and cess pits after they are decommissioned. This is necessary to remove a potential source of groundwater pollution.

A tanker truck will be brought to La Digue for this purpose and the septage collected discharged to the newly commissioned La Digue WWTP. A schedule for collecting and discharging septage will be prepared to ensure that the WWTP is not overloaded by septage.

2.8.2 Package Sewage Treatment Plants

There are two package sewage treatment plants in operation in the area to be covered by the piped sewerage scheme. These are both operated by L'Orangerie Hotel, one is for the hotel itself and the other is for the hotel staff accommodation. Discussions with the hotel management indicated that although both package plants would be shut once the connection was made to the sewerage system they would be maintained in reserve and kept in place.

No decommissioning is therefore planned in the near future. In any case any further decommissioning would be entirely the responsibility of the L'Orangerie hotel and not the PUC.

3 Seychelles Legislation and Institutional Capacity

This chapter looks briefly at the acts, regulations and policies that have direct relevance to the Project.

3.1 Environment Act (Act 9 of 1994)

The principal object of this act is to provide protection improvement and preservation of the environment and for the prevention, control and abatement of environmental pollution.

3.2 The Environmental (Impact Assessment) Regulation, 1996

In Schedule 1 of the Environmental Protection (Impact Assessment) Regulations, 1996, of the Environmental Protection Act (1994), the categories of projects that fall under prescribed projects (Refer to Regulation 3(1)) requires and an Environmental Impact Assessment is required if the project is to be submitted to the authority for approval, comments, or consent.

In accordance with Regulation 6(1) of the Environment Protection (Impact Assessment) Regulations, 1996, the Authority undertakes a scoping exercise, where the Proponent (and the Proponent's Consultant if applicable) first meets with the Authority to discuss the project and the list of stakeholders to be consulted during the scoping activity. This is followed by a process where stakeholders are consulted on the issues that need to be taken into account in the EIA. The EIA Report will be subjected to public inspection as required for Class I studies that need to be so in order to be in accordance with Regulation 8(1).

3.3 Main Environmental Requirements

Apart from the Environmental Authorisation that is provided simultaneously or shortly after Planning Authority Approval, the EPA Act states that a proponent may need authorisation from Ministry of Environment for the following:

- Discharge or burying any polluting or hazardous substance or waste
- Discharge of any effluent or otherwise dispose of any polluting or hazardous substance into any water course or the ocean
- Emit any air pollution, or establish or operate an industrial plant in an air pollution control area
- Emit noise in excess of the noise emission standards
- Dispose, transport or export any hazardous waste

3.4 The Environment Protection (Miscellaneous) Regulations, 1995

This Act sets the standard for Pollution Control. Section 6 of the EPA mentions that the Minister may prescribe standards for:

- Quality of air, water or soil for various areas and purposes;
- Effluent limitations for existing and new point sources;
- Emissions of air pollutants from mobile and stationary sources;
- Noise emissions from various sources including construction sites, plants, machinery, industrial and commercial activities;
- Odours as are required to preserve and maintain public health and the

environment.

3.4.1 Environmental Protection (Noise Emission Standards and Regulation 1999)

Emission standards have been published under the EPA for noise, the Environment Protection (Noise Emission Standards) Regulations, SI 49 of 1999 as shown in Table 2 below which sets out the limits of sound pressure in dB (A) that should be maintained in a residential, industrial and pristine area. A limit of Leq 75dB (A) is the maximum that should be reached at the boundary of an industrial area. Note that "Leq" is defined as the continuous sound level which gives the same total energy as the varying sound level.

Description Area	Time	Limits in Decibels, dB(A)
Residential	06h00 – 23h00	60 Leq
	23h00 – 06h00	55 Leq
Industrial	At all times	75 Leq (measured at the boundary of the industrial site)
Audible intrusion in pristine acoustic environment	At all times	60 Leq

Table 2: Noise Emission Standards

3.5 Public Health Act, Chapter 189, 1991 Edition

This Act sets the framework for the highest standards of cleanliness, sanitation, disease prevention, and the maintenance and improvement of public health.

Part II mentions that health officers have the right to undertake practical measures to protect and improve the health of the general public.

Part V gives medical officers the power to make a decision as to whether unhealthy dwellings are either repaired or evacuated if proposals to remedy the defects are unsatisfactory.

Part VI states that medical officers will investigate the following:

- Establishment that have poor ventilation
- Establishments that have inadequate provisions grease traps, waste water that are offensive to health
- Locations where noxious emissions is occurring.

3.6 Occupational Safety and Health Decree 54/1978

The decree states the basic precautions than an employer must take in order to protect its employees. It mentions the duties of the employer to ensure that the working environment is safe and that employees are well trained and informed about their safety. Employees should have regular medical examinations before and throughout the period that they are employed in such environment. The decree also clearly states that dust and other dangerous gases that are emitted should be controlled. It also mentions the fact that employees working in a hazardous area should not be exposed to factors that can put their health and safety at risk. In the 1999 amended act, there are the forms and the procedures that should be followed upon an injury or accident to an employee. The classes and particulars are given in part II and III. It is advisable that the proponent encourages its supervisors and workers to be familiar with the act.

3.7 The PUC Act, 1986 & the PUC (Water Supply) Regulations 1988

The Act mentions that damage or breakage of any part of a water system that leads to leakage or contamination of the treated water is unlawful.

3.8 The Water Supply (Abstraction License) Regulations, 1984 and the Public Utilities Corporation (Miscellaneous) (Amendment) Regulations, 1999

These regulations are specifically for the abstraction of surface, ground and seawater for private use. The Rivers' Committee that is chaired by the Water and Sewerage Division of the PUC is responsible for managing requests made for abstraction.

3.9 State Land and River Reserves Act, 1903

During the development of the site, consideration should be made on to the stream and any underground water sources that are found near the proposed Project area. Part IV states that the removal or planting of trees should be done only with the necessary authorisation.

3.10 The Road Transport Act, 1936, revised 1991

This Act and the 1996, 1998 and 2000 amendments, specifies the dimensions and weight of vehicles that can use public roads and restricts the use of specified roads for a particular period of the day. It gives specifications for speed, installation of traffic lights, traffics signs and crossings. It also mentions that authorisation is required for vehicles exceeding laden or unladed weights over 10,000 kilograms.

In the 1998 amendment it is stated that the load on each axle should be of a maximum of 10,000 kilograms. In the 1999 amendment (No. 3) it is stated that special purpose vehicles (e.g. trailers, excavators) should have a maximum driving speed of 50 km/hour. On La Digue the maximum only vehicles above 5 tons are allowed. The size of excavators currently allowed on La Digue is thus limited to only 5 tons. The Land Transport Authority is responsible to authorised the use of vehicle on La Digue.

3.11 The Town and Country Planning Act, 1972

This Act provides the primary instrument for land, infrastructure and physical development control. No person shall carry out any building operations without a planning permission issued by the Town and Country Planning Authority under the provisions of Section 3. Building operations must comply with the rules and codes of practice laid out in Sections 7 to 83 of the Regulations.

3.12 The Pesticide Control Act, 1996

This outdated Act regulates the manufacture, distribution, use, storage and disposal of pesticides for the protection of public health and the environment. This act makes provisions for an approval process for the use of new types of pesticides. A list of approved pesticides is available from the Pesticide Control Board, at the Department of Health, presently referred to as the Public Health Agency (PHA) or the Ministry of Health.

3.13 The Beach Control Act

This Act includes the definition of a beach and provides for the regulations of activities on the beach.

3.14 Removal of Sand and Gravel Act

This Act controls the extraction of sand and gravel. The current status is that it is prohibited to extract sand from the beaches and plateaux. This Act makes provision for an extraction licence and applicable to a property owner who wish to undertake sand extraction.

3.15 Breadfruit and Other Trees Protection Act (1917)

This Act provides for the protection of various plant species.

3.16 Animals (Disease and Imports) Act (1981)

This Act provides for the control of the import of animals and animal products into Seychelles through points of entry, and powers to act upon and eradicate animal diseases in-country. The regulations, however, omit fish and crustaceans from import controls. Certain breeds of ‘dangerous’ dogs are permitted entry subject to sterilization, so technically can establish but cannot multiply and become invasive.

3.17 Wild Animals and Birds Protection Act (1961) and Regulations

This legislation protects a number of keystone species in Seychelles, in particular all bird species, turtles and Giant Tortoises. However, the regulations specifically identify mynah birds, house sparrows, the African barn owl, and the cardinal bird as species that are exempted protection under this Act, allowing their population numbers to be controlled/ eradicated.

3.18 Quarantine Act (1948)

The Act is concerned with the control of human diseases, establishing vaccination and immunization requirements for serious transmissible diseases. Because they are vectors of human disease, rats are listed as prohibited imports under this legislation. Procedures for ensuring compliance with requirements at points of entry are specified.

3.19 Biosafety Act (proposed):

This Act will look at the intended importation of Genetically Modified Organisms and how to regulate its associated risks as stipulated under the Cartagena Protocol on Biosafety. The Act has not yet been fully drafted.

3.20 Land Tenure Issues

The Project will be undertaken on a number of parcels, which are either government or private. At the moment it can be assumed that most of the roads on La Digue, where a large majority of the sewer will be constructed, are historically used as accesses. In the case of the main roads on Mahé these are usually subdivided from their parent parcels and are legally declared as public roads. This may not be the case on La Digue.

A list of the land parcels affected with their parcel numbers is attached as an Annex to this Report.

3.21 Forestry Reserve

The Veuve Reserve on La Digue is protected by law. This implies firstly that construction activities should not disturb the habitat and secondly its wetland areas should be protected from all forms of pollution.

Biodiversity conservation and ecosystem protection are regulated under different legislation, notably the National Parks and Nature Conservancy Act (1969, as amended), the Fisheries Act (1987), the Wild Animals and Birds Protection Act (1961) and the Wild Birds Protection (Nature Reserves) Regulations (1966) Other Acts supporting keystone species protection (marine turtles, certain sea bird species, whale sharks and marine mammals) and their habitats include: The Wild Animals (Whale Shark) Protection Regulations (2003); the Environmental Protection Act (1994); the Forest Reserves Act (1955, as amended); and the Fisheries Act (1987). A forest policy dated 1993 exists and aims to establish the basic principles, broad objectives, main forest function and priorities and strategies for the forestry development in the Seychelles.

3.22 The Environment Management Plan of Seychelles (EMPS 2000-2010)

This plan provided the overarching policy framework for sustainable development which included a thematic chapter on biodiversity, agriculture and forestry.

3.23 The National Biodiversity Strategy and Action Plan (NBSAP, 1998)

This report identifies the country's vision and action plan for biodiversity conservation. The National Strategy for Plant Conservation, (2005-2010) provides a framework for the conservation of plants and their habitats in Seychelles whilst the National Research Agenda 2008-2013 identifies priority research avenues to enhance our understanding of plants and their associated environment.

3.24 The Seychelles National Strategy and Plan of Action (NBSAP)

The Seychelles National Biodiversity Strategy and Action Plan 2015-2020 (NBSAP) addresses Seychelles' obligations under Article 6a of the Convention on Biological Diversity (CBD) The report builds upon a review of its predecessor and preparatory documents addressing financing, capacity building and climate change related biodiversity issues.

The NBSAP was developed through a truncated iterative process with stakeholder consultations and development of a draft undertaken in 2012 and 2013. Following international independent review of the draft it was decided to re-align its content to the CBD's Aichi Biodiversity Targets a process which was undertaken in 2014.

3.25 Seychelles Sustainable Development Strategy 2012 - 2020

The Sustainable Development Strategy of Seychelles is composed of an institutional document (Volume 1) and a detailed action plan (Volume 2). The detailed action plan brings together the thirteen thematic areas identified to implement the strategy. It is envisaged, as suggested in the strategy, that the resource forecasts are revised every two years in order to take into consideration these factors. Water, Sanitation and Waste Management programs are expected to cost 179.5 million USD.

3.26 Plant Protection Act (1996)

The Act provides for the control of the import of plants and plant products into Seychelles through points of entry, and also establishes powers to contain and eradicate outbreaks of plant pests and diseases. The powers of inspectors under this Act include: Inspection of goods and persons, detention, treatment and/or destruction or release of consignments. The regulations list pests that are not permitted through import, which include a number of IAS. The regulations also identify a number of commodities such as potatoes, onions, citrus, and carrots etc. that are not subject to phytosanitary control. The legislation provides for the identification of offences under the Act and imposition of fines.

3.27 Integrated Coastal Zone Management in Seychelles

Integrated Coastal Zone Management (ICZM) is considered a priority in Seychelles given the fact that the whole archipelago is considered a coastal zone. The objective is to promote ICZM and at the same time implement ICZM programmes taking climate change concerns into consideration. Given the fact that almost 95% of all socio-economic activities and other forms of development are located on the coastal plateaux, the detrimental effect of a slight rise in sea level to the main sectors of the economy is of concern. These plateaux are also susceptible to landslides from the steep slopes that rise up to almost a thousand metres (or almost 3000 feet). The sensitivity of construction to the coastal zone is highlighted during the planning process.

3.28 The Seychelles Wetland Conservation and Management Policy, 2005

This is a framework targeting specific species and habitats which attempt to involve broad stakeholder participation. Unfortunately the policy is currently not being implemented effectively.

3.29 The National Climate Change Strategy (2009)

The Report addresses the priorities for addressing climate change impacts in Seychelles, including biodiversity and forestry sectors.

3.30 Seychelles' Protected Areas Policy

The vision of this policy is 'To have a Protected Areas System on land and in the sea that protects and conserves high quality, comprehensive and ecologically representative examples of the Seychelles' natural diversity and cultural heritage and that provides ample opportunities for the fair and equitable sharing of the benefits arising from the sustainable use of these resources'.

The specific goals and objectives of the policy are to achieve an effective and multi-use protected area system that is representative, comprehensive and balanced, to maintain the highest quality examples of ecosystems within the country by engaging all stakeholders. Thirteen national commitments will be targeted in order to achieve these objectives. The first commitment listed in the policy is 'to create new Protected Area (PA) categories in accordance to international norms'. Consequently, the policy simplifies the multiple existing PA Categories into five new categories which take into consideration both the local context and at the same time are aligning with International (IUCN) criteria.

This new system retains the best of the categories that were codified in law in 1969, but also rationalises and simplifies the categories. The policy further describes procedures to organise the PAs of Seychelles into a Protected Areas System Plan, which is both a national commitment set out in this policy and an International (CBD) commitment.

Other commitments include the developments of a standardised PA management plan and the measurement of management effectiveness for each existing and new protected areas, the adoption of an internationally recognized process for long-term monitoring of the Protected Areas system, the development of a new program to enhance capacity in PA systems with linkages to local and/or international academic and research institutions and the support of new initiatives to find sustainable financing mechanisms for the protected areas system.

The policy summarises best practices for the management and planning of PAs, for measuring management effectiveness, sustainable financing, capacity development and for stakeholder and public involvement in PAs. It introduces and outlines the concepts of co-management and proposes templates for co-management agreements for PAs in Seychelles. Lastly, to facilitate the re-formulation and extension of a new PA system, a new nomination process is proposed which includes clear and well-defined entry points and is based on the principle of transparency so that all stakeholders and government agencies will know when, where and how PAs may be established. This policy document encompasses all marine and terrestrial habitats and ecosystems of the Seychelles' territory and its Exclusive Economic Zone (EEZ) and the Ministry responsible for Environment, through the designated agency/ies shall oversee its implementation. Following revision of existing legislation governing Protected Areas, a new Protected Areas legislation will become the principle statute which is complimented by this policy. An objective, independent review and update of this policy will be completed every 10 years.

Other aspects of Environmental Management are as follows:

- Promote sustainable measures to increase potable water supply to the population in granitic islands with an integrated river-basin approach. Cooperation will focus on the improvement of safe yield of water resources for integrated river-basin management.
- Promote sustainability of wastewater management. Cooperation will focus on the improvement of wastewater systems and on their sustainable

management. Institutional and human-resource capacity will be strengthened through enhanced community and private-sector participation.

- Bio-diversity conservation, including community participation.
- Improve the institutional capacity for the conservation and management of terrestrial ecosystems of the granitic islands. Cooperation will focus on key forest ecosystems and identified priority threats. In view of the very small area of the islands and the fact that many socio-economic activities occur in the proximity of the habitat of vulnerable biodiversity, cooperation will involve local communities in decision-making and in management of the biodiversity resources. It is expected that biodiversity conservation will be improved through better management of natural habitats, improved techniques for controlling invasive species and bush fires.
- Enhance the role of NGOs and communities through the adoption of participatory approaches to biodiversity conservation in selected areas. A new mechanism for community and local group dialogue with the Government on environmental conservation will be developed.
- Climate change and energy efficiency.
- Establishment of key adaptive technologies for climate change. Being party to UNFCCC, Seychelles submitted its first national communication to the Conference of the Parties in 2001, cooperation will focus on establishing key technology needs for the mitigation of the impact of climate-change and for capacity-building in this area. It is expected that, at the end of the country programme, sufficient national capacity will exist in Seychelles to implement the action plan on climate change.
- Enhancement of land use and coastal management. Land use and coastal management are key management opportunities for the reduction of vulnerability to sea-level rise in small island states, especially when more than 90 per cent of all infrastructure and socio-economic activities occur on the coastal zone.

4 International Legislation and Agreements

The Seychelles is party to many Multilateral Environmental Agreements (MEAs) that commit the country to numerous obligations for safeguarding the environment and the sustainable utilization of the resources therein. Some of the major MEAs which are signed and ratified or acceded to by the Seychelles Islands are referred to below.

4.1 Convention on Biological Diversity (CBD)

The Seychelles was the second country to sign the CBD in 1992 and became a Party that same year. The Seychelles is recognized as a biodiversity hotspot by Conservation International and a centre of plant biodiversity by the International Union for the Conservation of Nature (IUCN) and the World Wildlife Fund (WWF). Endemism is high at 50-85% for different animal groups in general and approximately 45% for plants. Only one or two endemic species have agricultural applications (e.g. *Deckenia nobilis*) and mainstream agricultural production is centred entirely on introduced species.

4.2 The Stockholm Convention on Persistent Organic Pollutants

The Republic of Seychelles signed the Stockholm Convention on 25th March 2002 and acceded on 3rd June 2008 and has carried out some inventories of persistent organic pollutants prior to the adoption of the convention, as part of a region wide assessment programme. The Stockholm Convention on POP is a chemicals convention that addresses production, use import and export of POPs chemical at the global level. It opened for signature on 23rd May 2001 and came into force on 17th May 2004. In 2007, the Seychelles completed its National Implementation Plan (NIP) with support from UNIDO. This “previous” NIP is being reviewed in view of recent additions of 11 as mentioned new chemicals to the convention. The new chemicals are pesticides and industrial chemicals that are flame retardants.

4.3 The World Heritage Convention

Apart from the Aldabra Atoll, the Vallee de Mai on Praslin is one of the World Heritage site under this convention. The Vallée de Mai was designated a World Heritage Site by UNESCO in 1983 as an outstanding example of low- and intermediate-altitude palm forest characteristic of the Seychelles. The area is rich in biodiversity and the habitat of rare and endangered species of flora and fauna. The region is the type locality and world’s stronghold for the Coco de Mer (*Lodoicea maldivica*), Seychelles Black Parrot (*Coracopsis nigra barklyi*) and the endemic freshwater fish (*Pachypanchax playfairi*). Vallee de Mai is managed and protected by the Seychelles Island Foundation.

Source: (SIF website-www.sif.sc)

4.4 International Conventions Pertaining to the Control of IAS 33.

The applicable international agreement that relates to plant quarantine, the International Plant Protection Convention (IPPC), and standards agreed there under, now expands coverage to include control and management of alien invasive species. The Seychelles is a signatory to the IPPC, having ratified the Convention on 31 October 1996. The international standard-setting system under the IPPC is the International Standard for Phytosanitary Measures (ISPM) set by the Commission on Phytosanitary Measures.

5 Seychelles Environment and Conservation Initiatives

5.1 Introduction and Regional Context

The Seychelles archipelago lies between latitudes 3° and 7° south and longitudes 45° and 56° east in the South-Western Indian Ocean. Its 115 islands are scattered over a 1,374 million square kilometers exclusive economic zone (EEZ), which can be considered substantial compared to that of the total land surface area, which is only 455.3 square kilometers. 43 islands make up the granitic groups of the archipelago in all, with mountainous peaks and narrow coastal lands, and the remainder of the islands consists of low-lying islands, all coralline or of calcareous sand. Figure 7 shows the geographical location of the Seychelles.

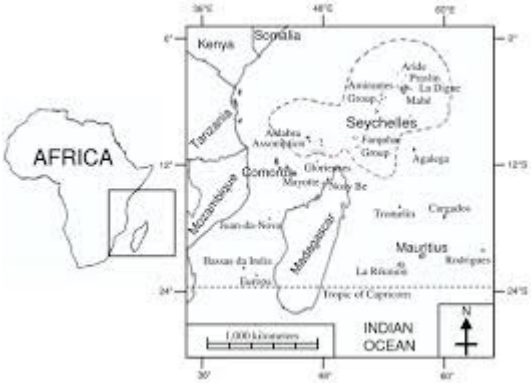


Figure 7: Seychelles EEZ

The granitic islands are located within a radius of only 50 kilometers from the main island Mahé (Figure 8), which has a land surface area of 148 square kilometers or roughly one-third of the total land area. The granitic islands rise from the Seychelles Bank, which is considered as sunken micro-continent and shoal area of about 31,000 square kilometers, with depths ranging up to 60 meters.

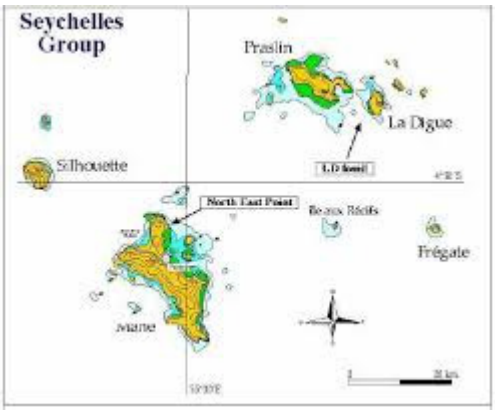


Figure 8: Seychelles Inner Island Group

La Digue is located 43 km North-east from Mahé, respectively and, along with Praslin, are two of the granitic islands that contribute considerably to the land mass and population.

Just over 50% of the Seychelles' land territory has been designated as nature reserves whereas 228 km^2 of its ocean are legally protected in the form of national parks and reserves. Furthermore, an additional 20-25% is considered as sensitive areas and may be classified as protected areas in the near future. At least 1,000 endemic species of flora and fauna thrive in the Seychelles. One of these protected areas, the Veuve Reserve, is found on La Digue and it is home to the rare and endemic Seychelles Black Paradise Flycatcher (*Terpsiphone corvina* or as is known locally, Veuve).

Due to its small land area, population size, remoteness from the main continents and major markets, limited natural resources and environmental vulnerability, Seychelles possesses the inherent vulnerabilities of Small Island developing State (SIDS). These characteristics are considered as being contributing factors or challenges that the country is faced with. Tourism is considered as the main engine of growth and its success is inextricably linked to the quality of the islands' natural and physical environment. To ensure that the islands are developed sustainably, conservation, environmental health protection of its inhabitants and foreign visitors and sustainable use of the natural and biological resources need to be properly implemented or managed.

5.2 Floral Biodiversity

Most of the floral species on La Digue are dispersed in two different ecosystems that are related to altitude, namely coastal and lowland (<200 m) and intermediate (200-500 m). With around 50% of its terrestrial territory being safeguarded by legislation, the Seychelles boast having over 250 indigenous floral species, of which 54 taxa or almost 21% are presently under threat by natural and anthropogenic activities.

Benchmark studies have been performed bearing in mind the positive benefits of the project towards wetland areas. Two easily accessible locations were chosen. These two areas provides a better insight on the type of biodiversity that La Digue has.

5.3 Faunal Diversity

Compared to the floral diversity, the fauna is seen as being more diverse especially in the granitic islands where there is a higher level of endemism than the coralline islands. The sections below highlights the key elements of diversity exhibited amongst the faunal species.

5.3.1 Vertebrates

Birds

The island of Mahé has two Important Bird Areas (IBA) more precisely in the Morne Seychellois National Park and the Montagne Glacis.

These two areas are found in the Mahé highlands where most of the population of Seychelles bare-legged Scops Owl (*Otus insularis*), 10% of Seychelles White-eye (*Zosterops modestus*) and 25% of Seychelles Kestrel (*Falco araea*) are found as well as the major populations of the endemic Cave Swiftlet (Collocalia elaphra), Blue Pigeon (*Alectroenas pulcherrima*), Seychelles Bulbul (*Hypsipetes crassirostris*) and Seychelles Sunbird (*Nectarinia dussumieri*). The largest colony of Seychelles Cave Swiftlet (*Collocolia elaphra*) has been spotted in the region of Montagne Glacis in the northern areas of Mahé.

Eight of the thirteen endemic species of birds are classified as globally threatened. These include the Magpie Robin (*Copsychus sechellarum*) and Seychelles White-eye (*Zosterops modestus*).

The largest population of the Seychelles Black Parrot (*Coracopsis nigra barklyi*) but also the Seychelles Kestrel (*Falco araea*) as well as significant populations of endemics such as the Seychelles Cave Swiftlet Seychelles Bulbul, Seychelles Blue Pigeon and Seychelles Sunbird are found on IBA on Praslin which is located in the Praslin National Park.

Mammals

Among the five endemic bat species found in Seychelles, the Sheath-Tailed bat is currently classified as critically endangered. Table 3 below provides the list of bats:

Endemic Mammals	Common Name
Coleura seychellensis	Sheath-Tailed bat
Pteropus seychellensis seychellensis	Seychelles Fruit bat
Triaenops furculus	Free tailed bat
Chaerophon pussilla	Triple nose leafed bat
Pteropus aldabrensis	Aldabra fruit bat

Table 3: List of Bats in Seychelles

Amphibians

The Seychelles archipelago is thought to have the highest ratio of amphibian endemics of any island group in the world. The 7 endemic caecilians and 5 endemic frogs amongst which is the smallest frog in the world (*Sooglossus gardineri*) are listed below in Table 4:

Caecilians	Frogs
Grandisonia alternans	Tachycnemis seychellensis
Grandisonia brevis	Nesomantis thomasseti
Grandisonia diminutiva	Sooglossus gardineri
Grandisonia larvatae	Sooglossus sechellensis
Grandisonia sechellensis	Sooglossus pipilodryas
Hypogeophis rostratus	
Praslinia cooperi	

Table 4: List of Amphibians in the Seychelles

5.3.2 Pisces

Freshwater Pisces

Golden Panchax (*Pachypanchax playfairii*) and the newly discovered Larkansyel (*Parioglossus multiradiatus*) in 2004 are two endemic freshwater fish that exists in Seychelles.

Marine Pisces

There is approximately 1000 species of fish in the Seychelles of which 400 species confined to the reefs.

Endemism in marine fish is low. Endemic marine species include the Seychelles Clown fish (*Amphiprion fuscocaudatus*) and Seychelles squirrel fish (*Sargocentron Seychellense*).

5.3.3 Reptilia

Snakes

Of the three terrestrial snakes found on the granitic islands, two are endemics, namely the harmless Seychelles wolf snake (*Lycognathophis seychellensis*) and the Seychelles house snake (*Boaedon geometricus*).

Lizards & chameleons

More than 20 species of lizards, skinks and geckos are present in the Seychelles. There are 14 species and subspecies of geckos and skinks, with one chameleon being endemic to the islands

Terrapins

Three species of terrapins have been described in the genus Pelusios including *Pelusios seychelensis*

Sea Turtles

There are presently four species of marine sea turtles that are threatened. Two species, namely the Hawksbill turtle (*Eretmochelys imbricate*) and the green turtle (*Chelonia myda*) are found in the Seychelles waters and actively nest in the Seychelles granitic and coralline islands.

Tortoises

The largest surviving and remaining wild population of giant land tortoises (*Aldabrachelys gigantea*) is found on Aldabra in the Indian Ocean (around 150,000). Tortoises from Aldabra have been introduced to other islands within the Seychelles, such as Curieuse.

5.3.4 Higher Invertebrates

Arthropoda

The list of native arthropods includes endemic scorpions, spiders (150 species), whipspiders, sea spiders (22 species) and insects, the world's largest millipede (*seychelleptus seychellarum*). whipspiders. One species of scorpions (*Lychas braueri*) is endemic to the granitic islands.

Of the 32 species of land and freshwater crabs and estimated 165 different species of shrimps, there are a number of endemics that includes endemics such as, *Leander tenuicornis, Conchondytes pteriara, Coralliocaris macrophthalma, Eupontonia noctalba, Jocaste platysoma, Periclimenaeus manihinei, Periclimenes. compressus, Periclimenes difficilis*. Other arthropods include the familiar Palinurus spiny lobsters, 4,000 species of insects, of which 75 species are found uniquely in Seychelles.

5.4 Forest Biodiversity

5.4.1 General Description

Since the establishment of the first human settlement (1770), native forests have undergone dramatic structural changes. The exploitation of forest resources and the deliberate or accidental introduction of species have resulted in the destruction and loss of pristine habitats.

5.4.2 Threats to Forest Biodiversity

Habitat Destruction

Development is an increasing factor contributing to the loss of forest biodiversity. Developments are increasingly being carried out in the mountains as coastal area become increasingly scarce and expensive. The Government has been implementing a no-development policy above the 50 m contour line on the island of Praslin (the second largest granitic island) which effectively preserves forest biodiversity. The State Land and Rivers Reserves Act 1965 also affords protection to any species found within 30 feet of a river bank. Unsustainable agricultural practices are also a threat to forest biodiversity.

Forest fires

Forest fires remain one of the greatest threats to forest ecosystem. There is on average 2-3 bush fires recorded per year. A forest fire contingency plan (1997) exists focusing on preparedness and response is now outdated. The Authorities maintain fire breaks on the granitic islands and continues to strengthen institutional capacity to combat forest fires. There is currently a control on fire lighting (Fire Lighting Act Year) in the Seychelles and involves a fire permit issued by the Department of Environment. In all cases the officers ensure that the permit is issued to responsible individuals who have the means to stop fires from spreading should an accident result. This means access to water and observance of strict fire management principles.

Invasive Alien Species

Invasive Alien Species remain a serious threat to island biodiversity.

A greater portion of the native plant species is being severely affected by invasive creepers. Native faunal diversity is also affected by IAS through direct competition for food and habitat. Several eradication programmes have been carried out. A number of invasive animals have been eliminated on specific islands which include House sparrows, barn owl, rats, cats. In contrast the eradication of invasive creepers on the granitic islands remains a challenge.

Over exploitation

There is concern that certain species of high commercial value such as the Coco de Mer (*Lodoicea maldivica*) are being overexploited. The long life cycle of these species in some cases (as with Coco de Mer more than 25 years) poses certain difficulties in assessing this risk. The list of the different endemic plant species found in the above-mentioned habitats are shown in Table 5 which follows:

Endemic Species	Local Name
Memecylon eleagni	Bwa Kalou
Nephrosperma vanhoutteanum	Latannyen milpat

Endemic Species	Local Name
Roschenia melanochaetes	Latannyen oban
Verschaffeltia splendida	Latannyen latte
Phoenicophorium borsigianum	Latannyen fey
Pandanus hornei	Vakwa parasol
Pandanus balfourii	Vakwa montany
Pandanus seychellarum	Vakwa maron
Pandanus multispicatus	Vakwa de rivyer
Paragenipa wrightii	Kafe maron gran fey
Erythroxylon seychellarum	Kafe maron pti fey
Pittosporum wrightii senucia	Bwa zoli ker
Pouteria obovata sideroxylon	Bwa mon per
Psychotria pervillei	Bwa koulev
Soulamea terminaloides	Kolofant
Syzygium wrighti eugenia	Bwa ponm
Tarenna sechellensis	Bwa dir blanc
Viscum triflorum	Bwa marmay
Euphorbia pyrifolia	Bwa dile
Medusagyne oppositifolia	Bwa mediz
Premna serratifolia	Bwa siro
Timonius seychellensis	Bwa kasan-d-montanny
Angraecum eburneum	Pay-en-ke
Curculigo seychellensis	Koko maron
Cynura seychellensis	Zakobe
Secamone schimperiana	Lalyann dile
Vanilla phaaenopsis	Lavannir maron
Ficus bojeri	Neant
Begonia seychellensis	Begonya sovaz
Hypoxidia rhizophylla	Pti koko maron
Impatiens gordonii	Belsamin sovaz
Protarum sechellarum	Larout de lenn maron
Campnosperma seychellarum	Bwa-d-montanny
Deckenia nobilis	Palmiste
Dillenia feruginea	Bwa rouz
Imbricaria seychellarum	Bwa-d-natte
Northea Hornei	Kapisen

Endemic Species	Local Name
Vateria seychellarum	Bwa-d-fer
Achyrospermum seychellarum	Bwa sevret
Allophylus pervillei	Bwa kafoul
Aphloia theiformis	Bwa merl
Brexia madagascariensis	Bwa kato
Canthium bibracteatum	Bwa dir rouz
Canthium acuminatum	Bwa dir blan
Carissa edulis seychellensis	Bwa sandal
Colea seychellarum	Bilenbi maron
Craterispermum microdon	Bwa dou
Diospyros seychellarum	Bwa sagay
Dodonea viscosa	Bwa de rennet
Dracaena reflexa	Bwa sandel
Drypetes riseleyi	Bwa mare pti fey
Excoecaria benthamiana	Bwa zasmin
Ficus lutea	Lafous gran fey
Gastonia crassa	Bwa bannann
Grisollea thomassetii	Bwa grolapo
Ixora pudica	Ikzora blan
Ludia mauritiana	Prinn maron
Nepenthes pervilleii	Lalyann potao
Garnotia seychellensis	Lerb montanny
Lophoschoenus horneii	Lerb razwar
Rapanea sechellarum	Bwa klate
Scleria sieberi	Zerb koupant
Seychellaria thomassettii	Lafisel mov
Lodoicea maldivica	Koko-d-mer
Barringtonia racemosa	Bonnen kare-d-rivyer
Justicia gendardussa	Ayapana sovaz
Ochrosia oppositifolia	Bwa sousouri
Wielandia elegans	Bwa fourmi
Guettarda speciosa	Bwa kasan bor-d-mer

Table 5: Scientific and Local Names of Seychelles' Endemic Plants

5.5 Inland and Coastal Waters

5.5.1 General description

The Environment Protection Act 1994, in the NBSAP 1997 and the Seychelles National Wetland Conservation and Management Policy 2002 highlights the importance that Seychelles gives to wetland ecosystems. The Seychelles recognizes the importance of wetland ecosystems as ecologically sensitive areas under The Seychelles wetlands support many endemic aquatic species including the endemic crab (*Seychellum alluaudi*), terrapins, certain species of mayflies, caddisflies, and the snail *Paludomus ajanensis*. Endemic fishes found in the freshwater habitats are *Pachypanchax playfairii* and *Parioglossus multiradiatus*, a new species recently discovered in 2004.

5.5.2 Mangroves

Seychelles acceded to the Ramsar Convention on 22nd November 2004 and designated Port Launay Wetland on the main granitic island of Mahé as a Ramsar site. The site is composed of 29 hectares of wetland supporting all seven species of mangroves of the Seychelles. It also provides habitat for the endemic Golden Panchax (*Pachypanchax playfairii*). Important mangrove habitats are also found in the lagoons of certain coral islands such as Aldabra, Cosmoledo and Astove Island groups, where they provide important nesting, nursery and resting habitats for a variety of seabird species, as well as nursery grounds for fish. The seven species of mangroves found in the Seychelles are listed below in Table 6:

Species Name	Common Name
Bruguiera gymnorhiza	Mangliye latte
Ceriops tagal	Mangiye zonn
Lumnitzera racemosa	Mangliye pti fey
Rhizophora mucronata	Mangliye rouge
Sonneratia alba	Mangliye fler
Xylocarpus granatum	Mangliye ponm
Avicennia marina	Mangliye blan

Table 6: List of Mangrove Species in the Seychelles

5.5.3 Threats

Development is the main threat to wetlands with many marshes reclaimed due to unavailability of sufficient useable land along the coastal zone. Polluted runoff, disruption of feeder streams, blockage of outlets, sediment and waste are detrimental to the ecological function of wetland ecosystem. Wetland in the Seychelles are fragmented due to pressure from development and degraded through over exploitation for wood products.

6 Detailed Study Sites

Given the benefits and potential positive and negative impacts of the Project, two locations have been chosen for benchmarking and have been inventorised in depth. The two locations, namely at Anse Severe and La Mare Soupape are easily accessible, despite being near private property and can be used to monitor the long term effects of the Project. Other monitoring points, such as in boreholes and in other water bodies, can be established once the construction contract is awarded.

6.1 Investigation of Pollution Sources in Marshes

Sources of pollution or potential risk of pollution were identified along the Anse Sevère and Soupape marshes (refer to Figure 9). This included areas where cattle, pigs and tortoises were being reared adjacent to marshes, machinery stored near marshes with oil spilling into the water, landfill, and farmlands adjacent to the wetlands. Soak-away pits of all houses along the wetlands were not mapped although these are potential sources of pollution. Dumping of rubbish in marshes was not identified as a major problem since little waste was observed during the survey. Areas infested by invasive alien species – water lettuce were also identified since water lettuce has a negative effect onto the environment.

6.2 Choice of Sites

Three experimental sites where chosen based on factors impacting on the water quality. Refer to Figure 9 for a map showing some of the potential pollution sources (red circles), the 3 trial sites (green circles) and the PUC wells and barrages for water extraction.

6.2.1 Study Site 1- La Mare Soupape

La Mare Soupape - is near an area where there are several houses at less than 20 m distance from the wetland.

6.2.2 Study Site 2- La Mare Soupape

The site is adjacent to Site 1 and where a portion of the wetland is infested with water lettuce. Both the MEECC nor contractors are removing this invasive species and hence the site provided the best location to test the removal of water lettuce. Secondly, there are evidence of waste disposal, and potential pollution from the nearby soak-away pits.

6.2.3 Study Site 3 - Anse Sevère Marsh

This site (refer to Figure 10) was chosen to test the rehabilitation of the marsh mainly through replanting and channeling. During the site visit, it was observed that the owner of the adjacent property had made some modifications to the marsh (bridge building and channeling of storm water) which was affecting water flow. In addition there were signs of eutrophication which indicated nearby source of nutrients like nitrates and phosphates. This was confirmed by the presence of a tortoise pen nearby. Discussions with the owner and his assistant were fruitful and they informed us that they had plans to improve the conditions of the wetland.

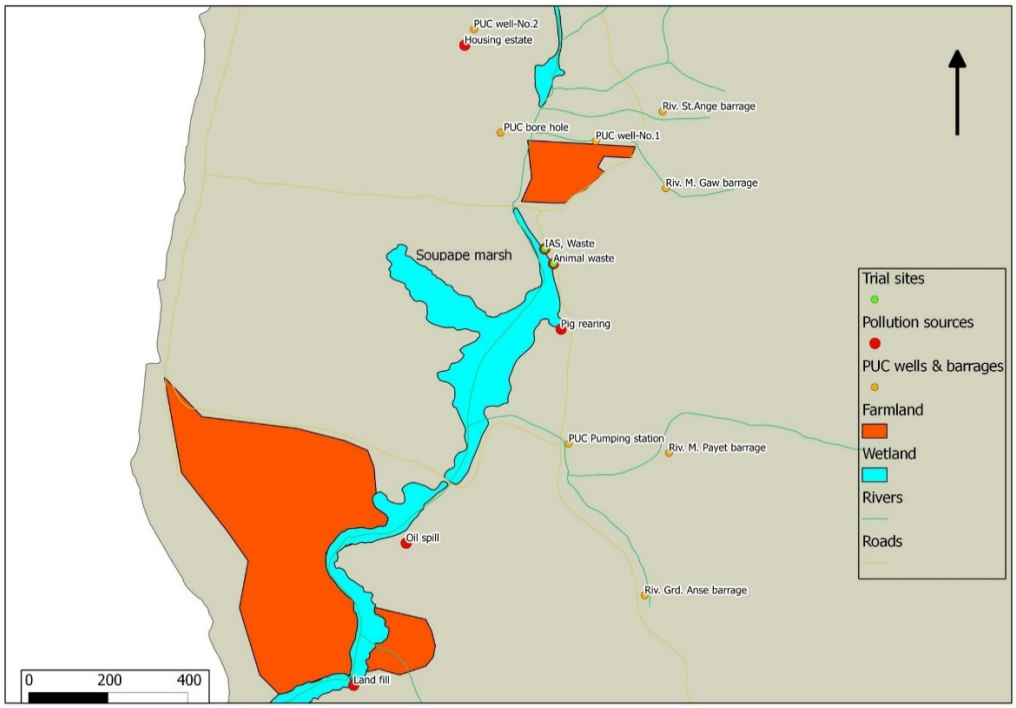


Figure 9: Soupape Marsh Potential Pollution Sources

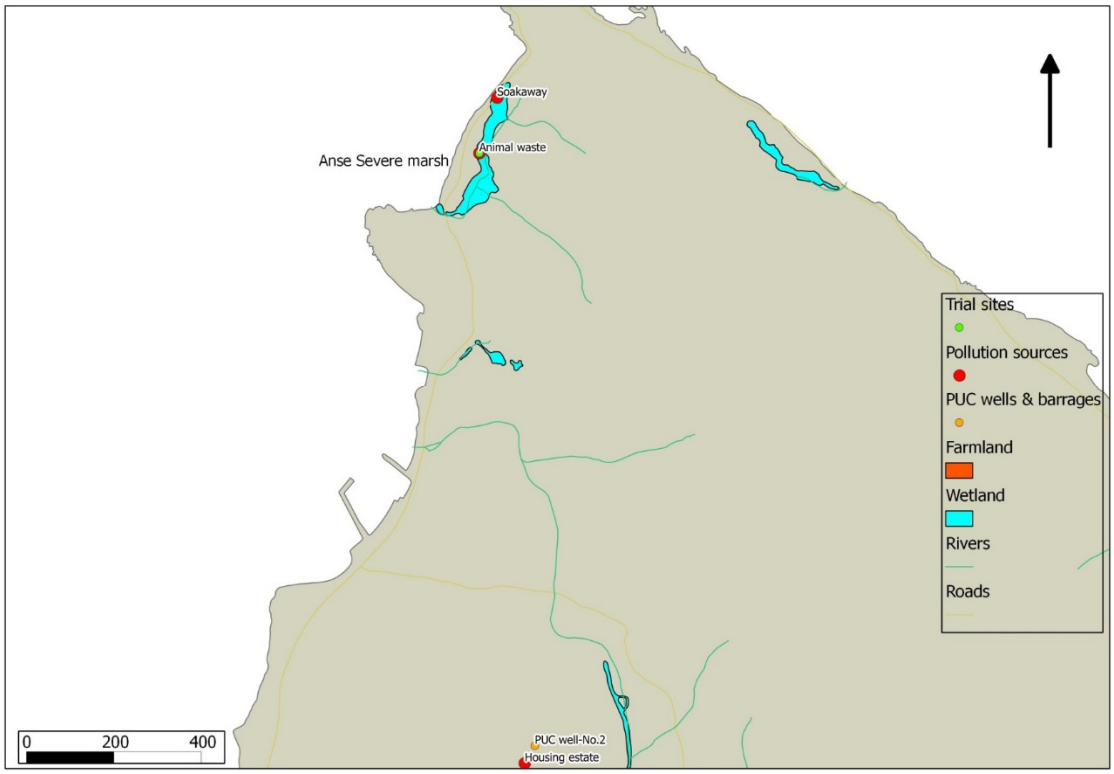


Figure 10: Anse Sevère Marsh

6.3 Anse Sevère Study Area

A total of 29 species were recorded at Anse Sevère: 22 animals and 7 plants (refer to Table 7 and **Error! Reference source not found.**(a)). Amongst the species, only one i.e. the Golden panchax (Gourzon) is considered as a species of special concern i.e. a key biodiversity area (KBA) species (Table 12). Most of the animal species present were invertebrates particularly insects (Table 8 and **Error! Reference source not found.**(b)). Above 60% of the organisms recorded are native, whilst 17% are introduced with a further 21% of unknown origin (Table 9 and **Error! Reference source not found.**(c)).

Group	No. Species
Plants	7
Animals	22
Total	29

Table 7: Number of animals and plants

Animal group	No. Species
Invertebrate	14
Reptile	1
Bird	5
Fish	2

Table 8: Number of organisms in different animal groups

Origin status	No. Species
Native	18
Exotic	5
Unknown	6

Table 9: Number of native to exotic species

Scientific name	Vernacular name	Origin Status	IUCN status	KBA
Acrostichum aureum	Fouzer lanmar	Ind		No
Agriocnemis pygmaea	Pigmy wisp damselfly	Ind		No
Apis mellifera	African Honey bee, Mous dimyel	Exo		No
Arachnidae spp.	Jumping spider, Bib	Ind		No
Butorides striatus	Green-backed heron	Ind		No
Cardisoma carnifex	Giant Mangrove crab, Tyongomon	Ind		No
Ceriagrion glabrum	Common pond/Orange damselfly	Ind		No

Scientific name	Vernacular name	Origin Status	IUCN status	KBA
Diplacodes trivialis	Blue percher, Sigal	Ind		No
Diptera spp.1.	Flies, Mous ver	?		No
Diptera spp.2.	Flies, Mous	?		No
Diptera spp.3.	Flies, Mous	?		No
Drosophilia spp.2	Fruit flies, Mous fri	?		No
Foudia madagascariensis	Madagascar fody, Sren	Exo		No
Gallinula chloropus	Moorhen, Pouldo	Ind		No
Geopelia striata	Barred ground dove, Tourtrel koko	Exo		No
Green algae	Green algae	?		No
Hibiscus tiliaceus	Var	Ind		No
Ipomea pes-caprae	Beach morning glory, Patatran	Ind		No
Leucena leucocephala	Kasi	Exo		No
Lumnitzera racemosa	Mangrove, Mangliye pti fey	Ind		No
Mabuya sechellensis	Seychelles skink, Lezar Mangouya	End		No
Nectarinia dussumieri	Seychelles sunbird, Kolibri	End	LC	No
Ophiocara porocephala	Northern mud gudgeon, Makanbale latet ron	Ind		No
Pachypanchax playfairii	Golden panchax, Gourzon	End		Yes
Paspalidum germinatum	Grass, Zerb	Ind		No
Polistes olivaceus	Yellow wasp, Mous zonn	Ind		No
Polychaeta spp.	Polychaete	Exo		No
Rhyothermis semihylina	Phantom flutterer, Sigal	Ind		No
White worm	White worm, Lever blan	?		No

Table 10: List of species inventoried

Table 12 which follows summarises the Biodiversity inventory at Anse Severe trial site. Chart a) shows the percentage of animals and plants; Chart b) shows the percentage of different animal groups; while Chart c) shows the percentage of native to exotic species.

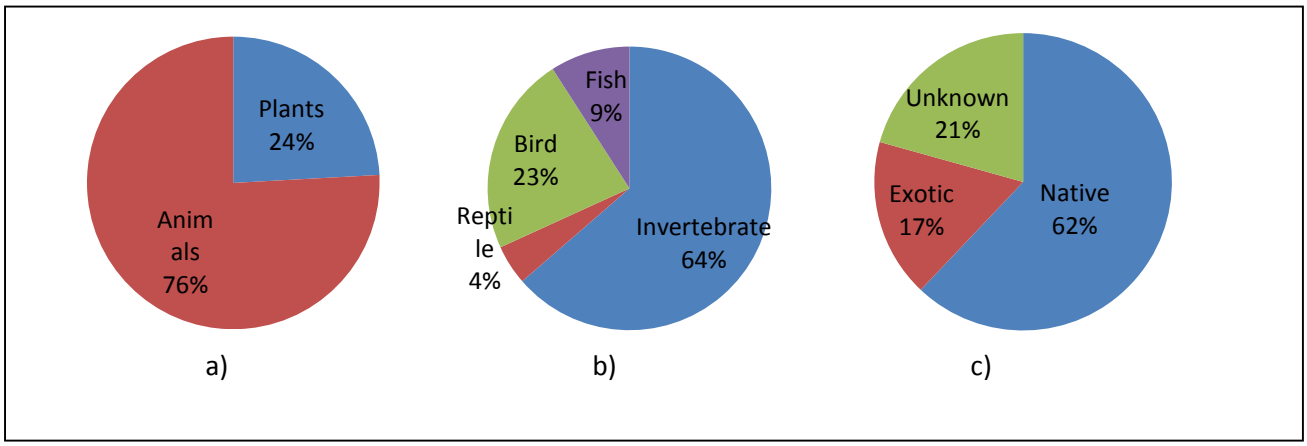


Figure 12: Biodiversity Inventory at Anse Severe Trial Site

3.3.1. Soupape Marsh Trial Site 1

A total of 15 species were recorded at near the Soupape Marsh trial site 1: 9 animals and 6 plants (Table 11 and Figure 11a). Most of the animal species present were invertebrates in the form of insects, freshwater snails and worms (Table 12 and Figure 11b). 67% of the organisms recorded are native, whilst 33% are introduced (Table 13 and Figure 11c). Amongst the species only one i.e. the Golden panchax (Gourzon) is considered as a species of special concern i.e. a key biodiversity area (KBA) species (Table 14).

Group	No. Species
Plants	6
Animals	9
Total	15

Table 11: Number of animals and plants

Animal group	No. Species
Invertebrate	6
Reptile	1
Bird	1
Fish	1

Table 12: Number of organisms in different animal groups

Origin status	No. Species
Native	10
Exotic	5

Table 13: Number of native to exotic species

Scientific name	Vernacular name	Origin Status	IUCN status	KBA
Barringtonia racemosa	Bonen kare de rivyer	Ind		No
Calophyllum inophyllum	Takamaka	Ind		No
Cocos nucifera	Coconut, Koko	Ind		No
Dieffenbachia sequine	Dumb cane, Vya tang	Exo		No
Gyraulus mauritianus	Snail, Kourpa	Exo		No
Halobates spp.	Water scatter	Ind		No
Mabuya sechellensis	Seychelles skink, Lezar Mangouya	End	LC	No
Nectarinia dussumieri	Seychelles sunbird, Kolibri	End	LC	No
Odonata spp.	Dragonfly larvae	Ind		No
Pachypanchax playfairii	Golden panchax, Gourzon	End		Yes
Physella acuta	Snail, Kourpa	Exo		No
Polychaeta spp.	Polychaete	Exo		No
Sceliphron fuscum/Delta alluaudi	Mud Dauber/Potter wasp, Mous mason	Ind		No
Syngonium podophyllum	Arrowhead vine creeper	Exo		No
Terminalia catappa	Indian almond, Bodamyen	Ind		No

Table 14: List of species inventoried

Figure 11 which follows shows the Biodiversity inventory at Soupape Marsh trial site 1. Chart a) shows the percentage of animals and plants; Chart b) shows the percentage of different animal groups; while Chart c) shows the percentage of native to exotic species.

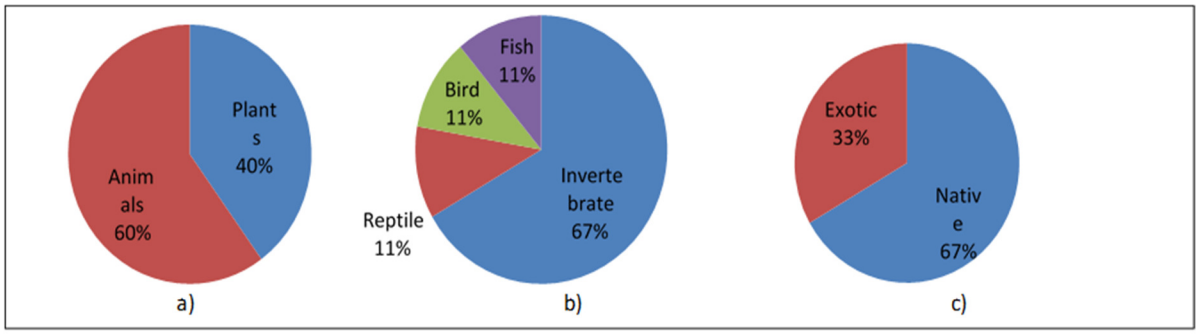


Figure 11: Biodiversity Inventory at Soupape Marsh Trial Site 1

3.3.1. Soupape Marsh 2

A total of 34 species were recorded at Soupape Marsh trial site 2: 22 animals and 12 plants (Table 16 and Figure 12a). Most of the animal species present were invertebrates in the form of insects and freshwater snails (Table 17 and Figure 12b). 62% of the organisms recorded are native, whilst 26% are introduced with a further 12% of unknown origin (Table 18 and Figure 12c). Amongst the species only one i.e. the Golden panchax (Gourzon) is considered as a species of special concern i.e. a key biodiversity area (KBA) species (Table 19).

Group	No. Species
Plants	12
Animals	22
Total	34

Table 15: Number of animals and plants

Animal group	No. Species
Native	21
Exotic	9
Unknown	4

Table 16: Number of organisms in different animal groups

Animal group	No. Species
Invertebrate	14
Reptile	2
Bird	4
Fish	1
Amphibian	1

Table 17: Number of native to exotic species

Scientific name	Vernacular name	Origin Status	IUCN status	KBA
Acridotheres tristis	Myna, Marten	Exo		No
Acrostichum aureum	Fouzer lanmar	Ind		No
Barringtonia racemose	Bonen kare de rivyer	Ind		No
Ceratopteris cornuta	Kreson lanmar	Ind		No
Ceriagrion glabrum	Common pond/Orange damselfly	Ind		No
Cocos nucifera	Coconut, Koko	Ind		No

Scientific name	Vernacular name	Origin Status	IUCN status	KBA
Colocasia esculenta	Taro, Sonz	Exo		No
Cyperaceae spp.	Zerb	?		No
Diptera spp.1.	Flies, Mous ver	?		No
Diptera spp.2.	Flies, Mous	?		No
Drosophilia spp.1	Fruit flies, Mous fri	Ind		No
Formicidae spp.	Ant, Fourmi	?		No
Foudia madagascariensis	Madagascar fody, Sren	Exo		No
Gallinula chloropus	Moorhen, Pouldo	Ind		No
Halobates spp.	Water scatter	Ind		No
Lissachatina fulica	Pale-lip Giant African snail	Exo		No
Ludwigia octovalvis	Lerb lanmar	Exo		No
Mabuya sechellensis	Seychelles skink, Lezar Mangouya	End	LC	No
Nectarinia dussumieri	Seychelles sunbird, Kolibri	End	LC	No
Nephila inaurata	Palm spider, Bib	Ind		No
Odonata spp.	Dragonfly larvae	Ind		No
Pachypanchax playfairii	Golden panchax, Gourzon	End		Yes
Panicum maximum	Fatak	Exo		No
Pelusios spp.	Terrapin, Torti soupap	Ind		No
Physella acuta	Snail, Kourpa	Exo		No
Pistia stratioles	Water lettuce, Leti lanmar	Exo		No
Poligonum senegalense	Persiker	Ind		No
Polistes olivaceus	Yellow wasp, Mous zonn	Ind		No
Ptychadena mascareniensis	Mascarene frog, Grenwir	Exo		No
Ranatra grandocula	Water Stick insect, Seval dibwa delo	Ind		No
Sceliphron fuscum/Delta alluaudi	Mud Dauber/Potter wasp, Mous mason	Ind		No
Syngonium podophyllum	Arrowhead vine creeper	Exo		No
Terminalia catappa	Indian almond, Bodamyen	Ind		No
Xylocopa caffra	Carpenter bee, Mous Brenzel	Ind		No

Table 18: List of species inventoried

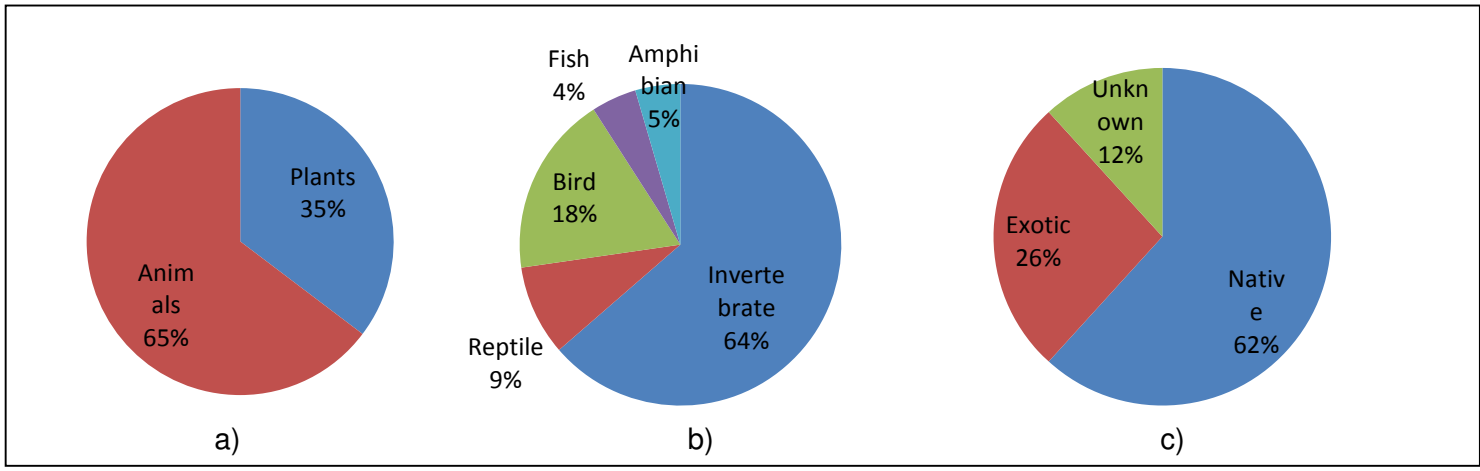


Figure 12: Biodiversity Inventory at Soupape Marsh Trial Site 2

Figure 12 above shows the Biodiversity inventory at Soupape Marsh trial site 2. Chart a) shows the percentage of animals and plants; Chart b) shows the percentage of different animal groups; while Chart c) shows the percentage of native to exotic species.

7 The Potential Environmental and Social Impacts

It is expected that the implementation of the Project will give rise to some negative and positive impacts some of which will be monitored after the onset of the works and some of which will become apparent after the commissioning of the sewerage system. Given that the Project will impact the vast majority of the La Digue community and its visitors, sensitization and consultations have been held at early stages of the Project, meaning the design stage, and will continue throughout the Project implementation (construction and operation) stages.

The impacts that are foreseeable are as follows:

- Land Ownership regarding the location of the infrastructure
- Conflicts with road users
- Pollution control
- Potential impacts to land use
- Potential Social Impacts
- Effluent Recycling

7.1 Potential Land Ownership Issues

The centralised sewerage system will serve both the public and private establishments. The main components of the sewerage system, namely the sewer mains, the lifting and pumping stations and the wastewater treatment plant will be located on either public or private land.

In order to be in conformity with EIB policies and local legislation, the locations of these components have been identified and will be secured so that works can progress as planned. Property owners will be notified in a manner that is appropriate and legal so as to prevent any dispute or damages. Properties that will be affected have been identified during the design stages and confirmed by either PUC or by a licenced topographical surveyor. The exercise will eventually lead to a clearer demarcation of areas on the GIS and the land use plans. It is expected that there may be a possible loss of value of neighbouring parcels hence it is important that the infrastructures are built soundly and the system is well maintained.

Agricultural areas may require public consultation, door to door consultations and legal representations for neighbouring and affected parcels. The use of media and effective forms of communication will be maximised to ensure that the community is aware and participates in the process.

It is possible that some land owners may suggest that their land be considered so that during its development it can benefit to the maximum. As an example, a landowner may wish that the sewer mains or lifting stations be placed at a location that will benefit his/her property.

The land parcels that will be affected by the Project are listed in **Annex 5**.

7.2 Potential Impacts with Road Users

The main area that will be affected during the Project implementation is undoubtedly the roads. Given the type of machinery that will be employed (such as excavators) and the type of works that will be involved (such as excavation, dewatering) the active areas during the construction of the sewer mains and the lifting stations will have to be secured. As a result it may be necessary for sections or entire stretches of roads to be closed off and diverted for health and safety reasons or to allow the works to progress uninterrupted.

It is possible that temporary roads or footpaths may have to be created. Any damage to the existing roads and infrastructures must be repaired or re-instated. Similar to other construction in areas used by the general public, notices will have to be placed in the media. Given the small size of the La Digue community, it is possible for sensitization be made on the undesirable Project impacts but also at the same time highlighting the long term benefits of the Project.

7.3 Potential Impacts on Pollution Control

Centralised sewerage systems have the potential of ensuring that the impacts of discharging raw or partly treated sewage in the environment are mitigated. The treated effluent is then discharged at an acceptable location and disposed of in a convenient manner. The operation of the sewer system and level of treatment is maintained so that the number of locations that were being affected in the absence of a centralised sewer system is maintained at an acceptable manner. The frequency of pollution by the proposed centralised system should be kept to the minimum. In the case of La Digue, given the presence of the plateau and the high water table, pollution along the sewer mains, where there is sufficient volume of sewage, may affect a larger part of a community and thus defeat the purpose of having a centralised system.

Despite the fact that treated effluent has reduced levels of organics, nutrients and microorganism an appropriate location for its disposal has been selected and agreed upon by the Authorities, land owner and PUC. Consideration has also been given to flooding events whereby the final effluent will essentially flow towards the sea and not towards the establishments. Restrictions in the use of the contaminated areas and quarantine measures must be imposed to avoid risk of infection to humans, animals and crops.

Even low levels of nutrients may affect water bodies and have consequences such as increased levels of algal growth. The same holds for the level of microorganisms that may be ingested by other organisms and eventually be a potential public or environmental issue. The Project will treat the wastewater to a level that makes it suitable for re-use for irrigation by the farm at L'Union Estate and for disposal on land into an infiltration trench that is setback from the nearby wetland area.

Frequent sampling of the effluent will be made and any adjustments or modifications to the treatment will be considered and implemented so as to ensure compliance. The operator of the sewerage system i.e. PUC, will have to ensure that biochemical parameters are monitored and sufficient data is collected and analysed.

Application for a Permit to Discharge must be done on an annual basis with the Environment Department. The procedure involves submitting laboratory reports from a National Laboratory and submitting specifications of the WWTP and any chemicals used during its operation.

The re-use of the effluent will improve the management and sustainable use of agricultural land and ground water. The expected impacts are: reduced use of fertilizers; better use of water resources and reduced pollution loads of fertilizers to downstream habitats and ecosystems. The activity will further promote water associations and the role of the Rivers' Board, which is currently being revamped.

It is expected that as a result farmers - in this case L'Union Estate - may use better techniques that may reduce loss of soil fertility and topsoil, improve drainage and reduce leaching of essential minerals and improvement in application of organic fertilizers, reduction in the use of chemical fertilizers. The resultant expected environmental benefits are less contaminated runoff from farming areas to adjacent and downstream ecosystems including wetlands and coastal areas. It is expected that the Soil Laboratory of the Seychelles Agricultural Agency (SAA) is involved in this activity given the potential for changes in the chemistry and soil fertility during the application of the recycled effluent.

With regards to the proposed provision of recycled treated effluent for irrigation, the potential benefits are as follows:

- Reduced abstraction of ground and surface water resources;
- Reduced conflicts between users of water resources;
- Reduced potential for depletion of water and minerals to downstream ecosystems;
- Reduced potential for stagnation in downstream water bodies; and
- Increased frequency of flushing out and replenishing of ground water in the plateau.

The potential impacts are as follows:

- Changes in soil salinity and mineral content; and
- Over irrigation due to the readily available supply of treated effluent.

7.4 Potential Impacts to Land Use

With the availability of a centralised sewerage system, land owners and developers may shift towards higher rise establishments. Given the definition of density for land use purposes, which specifies ground coverage only, the number of beds per parcel may increase and as a result this may lead to a change in population density. The call for the locals to participate in the tourism sector encourages households to provide and rent out rooms to visitors. This may provide additional income to the household.

The availability of treated waste water may encourage farmers – in this case L'Union Estate - to further develop their property and possibly for land owners to invest in agriculture. The scope for this is however expected to be limited. The emergence of agroforestry may boost fruit production in forested areas that are being affected by "invasive" plants. Agroforestry development in mid-forests or on low lying coralline islands have their own particular issues and the impacts may not be immediate and may require the expertise in conservation to note these changes. As a result of the introduction of new tree species, which may bring back scenarios when the early settlers introduced fruit trees mainly from Asia, the obvious results will be a possibly change in the ecology of the woodlands, the changes in the types and quantity of insects (bees, fruit flies) usually associated with the introduced fruit trees, and other types of vertebrates and mammals such as fruit bats and birds.

The main impacts of increasing local crop production through the use of better farm technology and irrigation methods will provide health benefits as these substitute imports and provide much needed support to the Seychelles National Investment Plan (SNAIP) for agriculture. The increased production may also provide a better encouragement to the farmers as they revenue increases.

7.5 Potential Health and Safety Issues

With respect to the employment of expatriate labour, all members of the expatriate workforce will be required to obtain a Gainful Occupation Permit (GOP). Obtaining this involves a prescribed medical examination prior to being issued. Adherence to this procedure involves screening for communicable diseases which could trigger an epidemic.

The conditions of the Contract will require the Contractor to devise and implement a Project specific Health and Safety Plan to fully comply with the requirements of the Contract, all relevant Enactments, Code of Practice, safety guidelines, the requirements of the independent risk assessment, project conditions, proposed work activities and relevant international standards. This Health and Safety plan will be subject to the approval of the Engineer and compliance with it provisions will be monitored throughout the Contract.

7.6 Air / Odour / Noise

7.6.1 Air Pollution

Impacts during Construction

The major impacts with respect to air pollution will occur during construction. These will primarily be air pollution generated from the operation of construction plant and equipment. Where necessary, restrictions may be necessary on the use or the hours of use of certain types of plant and equipment. Refer to Section 2.7.6 above, provision exists to control this in the technical specifications.

Impacts during Operation

The impacts on air pollution during operation of the pumping stations and the La Digue WWTP are considered to be minimal since the pumps and treatment plant equipment are electrically powered. The electric power to be used comes from Praslin its generation therefore does not affect La Digue. There will however have to be an increase of the number of vehicles operating on La Digue to service the new sewerage network.

The issues relating to reduction in odour, which could also be considered as contributing to air pollution, are dealt with Section 7.6.2 below.

7.6.2 Odour

The design of the La Digue sewer network incorporates a number of measures to mitigate the risk of odours being emitting from the sewerage system during normal situations after completion of the works. To prevent odour causing a nuisance various O&M measure will also be necessary such as flushing at the start of lines where low velocities occur.

For the separate sewer system proposed for La Digue, in combination with the closed manholes foreseen in the design and the high temperatures which occur, odour will be a potential problem and risk at the pumping and lifting stations. To deal with this potential problem compact activated carbon filters will be installed in the vent pipes leading from the pumping/lifting stations.

The natural ventilation of drainage systems should be sufficient to prevent odour problems and this can be achieved by the provision of vent pipes associated with house connections. This arrangement is the norm in the Seychelles and site inspections in La Digue verified that most household sewer outlets to septic tanks or cess pits are currently vented. It is essential that when house connections are made to the piped network these are properly vented.

Low flows at the start of sewer lines can result in low velocities and deposition of sediments which in turn create odour. To prevent this occurring the beginning of any sewer lines, where deposition of sediments is most likely to occur will need to be flushed. This can be done with treated wastewater from the WWTP. A tanker truck will be procured through the Project for this purpose. The exact frequency of flushing will be determined from experience after the sewer network is operational.

In order to minimise the entrance of rain water, surface drainage water, sand and grit all manholes will be of the sealed type. This sealing may be achieved by the design of the manhole cover seating arrangement or by the use of a dedicated sealing arrangement. This will prevent the egress of odour from individual manholes.

Although odour will be generated at the WWTP since the site of the WWTP is some distance from any houses, hotels or other accommodation, it is unlikely to cause a nuisance. Odour control is therefore not required at the WWTP. It will be necessary however to ensure that the WWTP is operated correctly. It should be noted that there is forest both to the north and the east of the WWTP which will represent a natural barrier to odour and will provide some natural treatment similar to the action of a biological odour filter.

It should be pointed out that the WWTP is located at L'Union Estate where there are livestock and where fertiliser is used, there is also a landfill in the vicinity. It is not considered that the odour from the WWTP will present any more problem than the present activities in the area.

7.6.3 Noise Pollution

Impacts during Construction

Significant impacts with respect to noise will occur during construction. These will primarily be noise generated from the operation of construction plant and equipment. This generation of noise – while largely unavoidable - is temporary, however it could have an impact on a specific locality for a certain limited duration. Limitations to working hours especially at night will need to be strictly enforced to avoid disturbance to the neighbouring residents. Provisions exist for this in the technical specifications.

Impacts during Operation

The location of the La Digue WWTP most of the treatment which is replaced or rehabilitated is the same as was installed previously. There should therefore be no increase in noise from these facilities. At the La Digue WWTP the most probable cause of noise would be the blowers which are to be installed. The blowers will be housed in an acoustic enclosure to mitigate noise but it would be normal practice for all persons entering a blower room to wear ear defenders. Appropriate warning signs will have to be displayed at the entrance to the building and form part of the O&M Manual to be prepared for the La Digue WWTP.

Noise generated by the operation of pump stations will be intermittent and only created when the pumps switch on during an emergency situation. Pumps will be located in manhole pumping stations and the level and frequency of noise emanating from them should be reasonable and not cause a major disturbance to neighbouring residences. There are a total of 20 no. pumping or lifting stations where this will occur.

More noise will be created when the emergency generators are operated. This is however unavoidable and considered to be acceptable given the consequences if the generators do not operate. There are a total of 4 standby generators around the network of which one is located at the WWTP.

7.7 Emergency Situations

7.7.1 Sewage Overflow

The design of the Project includes the implementation of measures to mitigate the risk of sewerage overflows that would expose the public to health hazards during emergency situations of the completed works.

The new piped sewerage system will require provision to be made for emergency measures to deal with breakdowns and disruptions. This would be in the case of breakdowns in the pumps or the WWTP, blockages in the pipes or power outages.

The power supply for La Digue comes via an underground cable from Praslin, it is understood that there can be power outages for up to an hour and sometimes longer up to 2 hours.

Breakdowns in the sewerage system will occur mainly for two reasons: a breakdown in one or more of the pumps and/or a period of power outage. Either of these could result in a build-up of raw sewage in the network and eventually an overflow in one or more places. Depending upon the pumping/lifting station in question there is however a buffer period of a few hours before any overflows would occur. In addition in some cases when a pumping/lifting station does not operate the sewage will fill the PS/LS and then overflow into the next sewer line.

The issue of the breakdown of pumps can be addressed by having a combination of standby and duty (1/1) pumps in some of the larger pumping/lifting stations (bearing in mind that these pumping stations are still quite small). For all pumping/lifting stations which have either a single or two pumps a spare pump of the same type and capacity should be kept in storage on La Digue. It should be possible to exchange any pump which breaks down quickly enough to avoid an overflow of sewage. In this context it is important that the PUC staff responsible for La Digue sewerage include an emergency breakdown and repair team.

In addition to the emergency generator at the WWTP there will be 3 additional generators to serve the majority of the pumping /lifting stations in the network. This leaves only two lifting stations not connected to a standby generator, a single mobile generator should be sufficient to maintain these two lifting stations in operation during any power outages.

In addition to the above, the following measures will be adopted to provide emergency measures for the sewer network in La Digue:

- Utilisation of the sewer network for emergency storage: Should there be a mechanical failure at a pumping station the pumping station sump will provide possible storage of 2 to 4 m^3 and in addition, by using the pipe to the PS as a storage chamber there would also be a storage volume in the upstream sewer pipe and the manholes. These together give a total storage in the range of

approximately 12 to 13 m^3. This emergency measure should be used only to allow sufficient time for operatives to get to site to resolve the failure and therefore the time is considered to be of the order of 30 minutes.

- Procurement of mobile generators for use at the pumping stations: The design of the electrical panels incorporates a facility for connecting a mobile electricity generator and a mobile generator will be procured through the Project for the PUC operations in La Digue. This could be taken to individual manhole pumping stations to maintain flows during extended power blackouts; and
- Procurement of a tanker truck: A tanker truck of at least 6 m^3 capacity will be procured to be used to pump out sewage from PS sumps, in an emergency event, and transport it to the WWTP. This same tanker could also be used for general maintenance on the system. A jetting pump will be added to the vacuum tanker together with a 2 compartment tank, this would mean that a single truck could be used to both pump out sewage and to flush the sewer network.

7.7.2 Prevention of Flooding at La Digue WWTP Site

The situation with respect to potential flooding events at the site of the WWTP has been analysed. A map showing the areas flooded following the rain event of January 2014 was made available by PUC and was checked in relation to the elevations of topographical survey undertaken for the Project. This drawing clearly showed that only elevations below 1.7 masl were flooded at the WWTP site during periods of heavy precipitation.

Therefore all internal access roads and buildings are planned at an elevation of 2.0 masl or higher, so as to increase the probability that at no time, buildings and roads will be flooded.

Most structures such as inlet works, biological reactors, final settlers are - similar to Providence WWTP - elevated. In addition, in case structures are underground (such as the pumping stations or the sand filters), the embankments are significantly higher than 2 masl and made of reinforced water tight concrete so that no water will be able to seep in.

In addition to those considerations on flooding protection, the drainage and roads have been designed so that the storm water will be evacuated from the site rapidly towards the wet land, which has an elevation of 1 masl under normal circumstances. All paved and concrete roads have side slope between 1 and 2.5% and are at 2 masl or above.

The natural soil has a high permeability so that outside the roads, therefore most rain will infiltrate quite rapidly. The layout of the roads and drainage at the La Digue WWTP is shown in Figure 13 which follows.

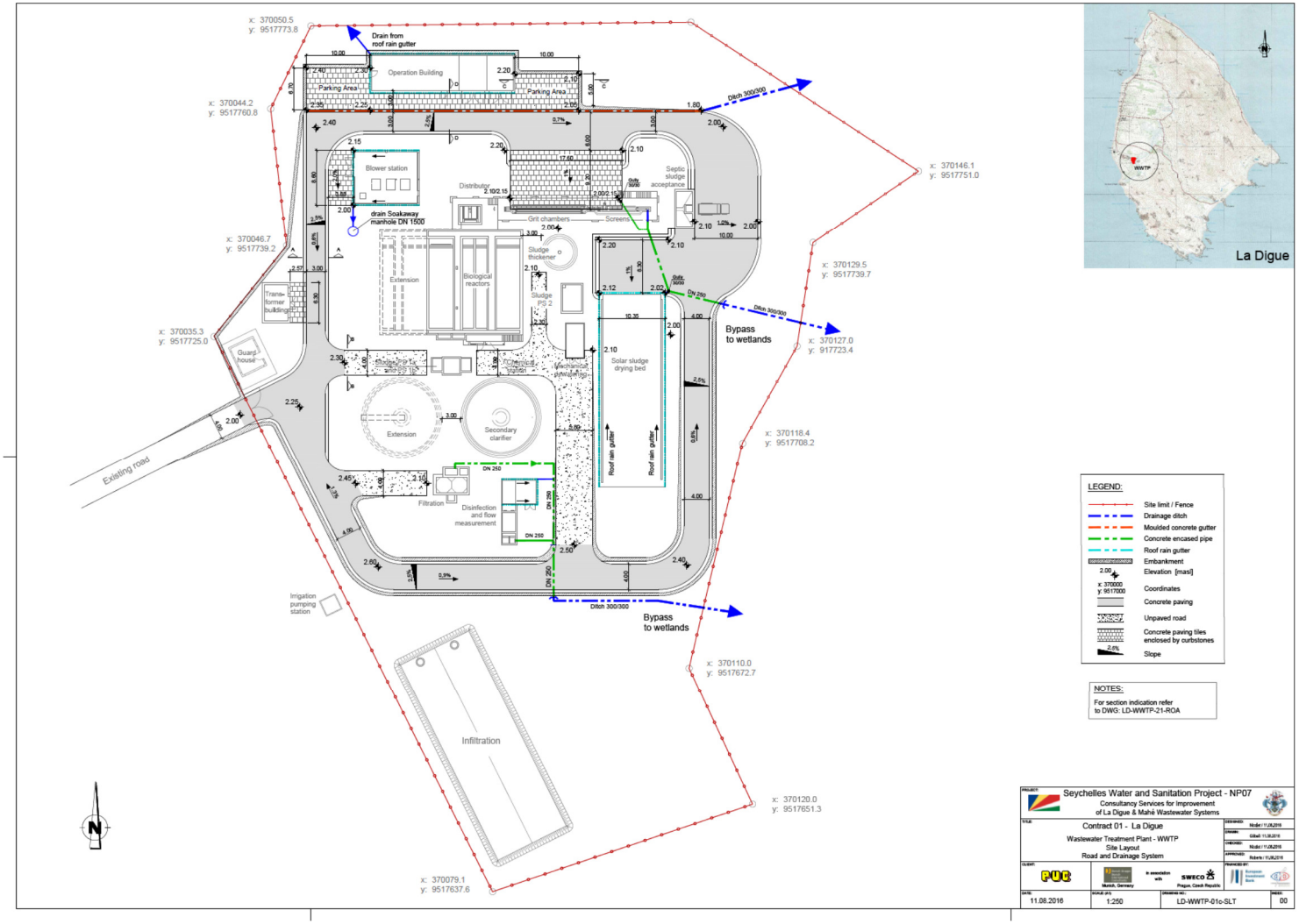


Figure 13: WWTP Drainage Layout

7.8 Potential Social Impacts

Some of the issues related to the Project and the associated wastewater management are as follows.

7.8.1 Impacts by Construction Activities

Interference with accesses and roads may affect the livelihoods of the ordinary citizen of La Digue and visitors. In addition to the common nuisances such as noise caused by machinery and dewatering pumps, dust, potential structural damage to property, disposal of pumped water, these may create tensions and conflicts between the population, PUC and the contractor.

The mitigation of such possible conflicts requires good publicity and personal relations with the public. The media and notices at public spaces and around the Project area should be made. The quality of work should be at a high standard so as to avoid or minimise re-works and further interference.

7.8.2 Impacts of Waste Water Recycling

The availability of treated recyclable effluent will benefit farmers and other persons interested in agriculture which in turn will boost up local production on La Digue, which enjoyed high crop output a few decades ago. It is it is clear that by improving the agricultural productivity this will in turn enhance the livelihoods of the community, raise their income and change their lifestyle. At the present time it is anticipated that L'Union Estate will be main user of treated wastewater. Treated wastewater would however be available for other farming activities should these be developed. The scope for this is however expected to be limited given the lack of agricultural land in La Digue.

7.8.3 Impact on Employment

As a direct or indirect result of the Project there will be employment opportunities for those participating in the construction activities, the operation of the sewerage system, associated development such as construction of new establishments, and growth in the agricultural sector. As a result of new employment opportunities, the youth would have an opportunity to practice a trade and refrain from anti-social behaviours, committing crime offences, and alcohol and drug abuse.

Any growth in local employment in construction will be limited to the duration of the construction contract. There will however be permanent positions created on La Digue for the operation, maintenance and management of the sewerage system.

7.8.4 Other Social Impacts and Issues

The main social impacts and other related issues are discussed as follows:

- Declaration of sewerage areas: It is necessary for PUC to declare the Project area as a sewerage area, as per Public Utilities Corporation (Sewerage) Regulations. Only when such a declaration is made are the inhabitants legally obliged to connect to the sewerage system. By doing so establishments will be in a position to operate their own individual sewage disposal system and they will have to connect to the centralised sewerage system within a specified number of days. Reactions to these declarations are more related to the cost involved for the investment made in the existing disposal system and the investment required for connection to the centralised sewerage system. Experiences should be gathered from the Greater Beau Vallon and Victoria Sewerage Projects on Mahé and public sensitization should be made to facilitate the connection process.
- The capacity building activities and training will enhance the community basic skills and people will be able to benefit from the outputs and outcomes of the Project. The skilled population will improve the development of the country and assist in reaching its sustainability goals.
- The Project will target the increase of food production, this will improve food security, people will have easier access to locally produced food and as a consequence the dependence on food imports will be reduced and the population less anxious.
- The Project will increase the local agricultural products and improve the quality of life. For the society, this means huge human capital investment.
- The Project will be inclusive for women and youth. Both groups will participate in the Project implementation, in the representation and decision making and obtain Project benefits.
- The Project will contribute in keeping the country's unemployment rate at very low levels (4%) while providing opportunities for the youth in particular employment and greater opportunities to develop their entrepreneurial potential.
- A lack of transparency during the Project implementation may have a negative social impact and the participants may be skeptical and untruthful. In the absence of proper information, the participant will be unaware of the sequences of the activities, and may not be proactive, and may lose interest and become demotivated. The Project will not achieve its objective in the assigned time. The proposed mitigation measure will be to use the communication unit, build a good network among all the stakeholders, update the players about the progress of the implementation and get their maximum commitment for the successful implementation of the Project.

7.9 Type of Interventions

The potential impacts and risks of a Project activity depends on the kind of physical interventions caused to the existing environment during both construction and operation phases. The types of structures that the Project provides include:

- Sewerage system including pumping/lifting stations, connection chambers, risers, gravity line, manholes for inspection and maintenance purposes, vents:
- Facilities for sewage treatment and its disposal;
- Temporary facilities such as footpaths, roads, foot bridges, drains, culverts;
- Fencing, hoardings; and

- Worker facilities such as work sheds, mobile toilets.

The source /the causes of the impacts are the physical activities to be carried out during construction and operation phases. These are listed below in Table 19:

Activity	Scope of Work	Physical Activities	Operations
Construction of Sewer System (2 no. main pumping stations, 18 no. small pumping stations, 506 no. manholes, 14.95 km pipeline gravity lines with dia DN200 & DN250, 2.2 km force mains with dia. DN125) Reinstatement of roads, 17 km	Provision of sewage connection to 700 establishments and population of 5011 PE. Construction of 1 Nos. WWTP and disposal facilities	Mobilisation of construction tools, equipment, vehicles, plants, materials, workers Site clearance Removal of old road surfaces Excavation Compaction Pipe Laying Levelling Concrete mixing, materials preparation Concrete works Excavation, back fill Building, construction Road and infrastructure re-instatement	Sourcing of materials. Use of water for concrete mixing, Use of fuel for concrete mixing and for machinery. Waste oil and lubricants and cement. Old surface may need to be disposed of or used as fill material Natural resources such as water is used Energy/fuel supply is needed There is safety risk during operation Waste and wastewater will be generated

Activity	Scope of Work	Physical Activities	Operations
Irrigation of 1 no. farm i.e. L'Union Estate	Project to be undertaken at L'Union Estate 23 locations or rivers Abstraction of water, construction of weirs, barrages and water reservoirs. Laying of pipes and fittings	Excavations Drilling Installation of gabions Pipe fitting Mobilisation of construction tools, equipment, vehicles, plants, materials, workers Concrete mixing, materials preparation Excavation, back filling Building, construction	Same as above. Diversion of river water

Table 19: The Types of Physical Activities Financed by the Project

7.10 Potential Impacts and Risks

The potential impacts and risks are summarized in Table 20 which follows. It is expected that the scale of the activities to be undertaken during the Project will be small scale and the impacts that will be created will be easily contained and managed. Liaising with the Planning Authority and the respective agencies are crucial to ensuring inconveniences and avoid stop notices from being issued. To minimise inconveniences to the general public, it is recommended that notices are placed in the media and road signs should be placed along the roads or near the Project areas.

The positive impacts of the Project are as follows:

- Improved sanitation and achievement of MDGs;
- Improved environmental benefits and protection of ecosystems including reduction of dead de-oxygenated zones in the marine environment;
- Lower risks of disease and parasitic infections;
- Employment opportunities for the locals and skills acquisition; and
- Reduction in pumping of groundwater for agriculture at L'Union Estate and reduction in sea water intrusion into the aquifer.

Beside the positive impacts, construction and operations of the proposed facilities will have some potential negative socio-environmental impacts and risks. The objects that may be affected by construction or operational activities:

- The air environment: dust, noise, odour, vibration
- Water bodies: changes in turbidity, sediment, dissolved and undissolved pollutants coming into water
- Soil, land: erosion and wastewater contamination of soil
- Biological resources: grass/vegetation cover, shrubs, trees, plants, animals, insects, pest, forest, etc.
- Existing facilities in Project area, such as residences, roads, water supply, drains, etc.
- Human beings with social settings, economic/production activities etc.

	Potential Impacts/ Risks	Description of the issues/risks	Typical activities that cause the potential impacts/risks
	CONSTRUCTION PHASE		
C1	Damages or loss of vegetation cover and trees	Vegetation cover and/or trees at the Project areas may be removed or disturbed during construction phase. This impact can be avoided, minimised or mitigated.	site clearance for construction site, workers' site office & camps, construction material exploitation and/or storage
C2	Loss or degradation of valuable natural/ ecological resources	Coral should be protected, not extracted as this is a valuable marine resource. It grows very slowly and it takes a long time to recover from damages. Coral reefs protect the shoreline from wave actions and storms, it is habitat from great variety of fish and marine life, is breeding ground for fish and shellfish. If sand, gravel and stones from river bed is extracted, river flow pattern may be seriously affected. The river may scour around bridge, culverts and abutments and endanger their stability. The river may erode other sections of the river beds and banks and thereby cause serious problems elsewhere Illegal timber may be logged without a licence, in protected area, or logged without sustainable manner. Such practices may lead to damage to the Veuve Reserve or permanent loss of forest patches Sourcing timber from a licenced importer or tree cutter facilitates monitoring and encourages sustainable resource harvesting practices". Protected areas, wetland, mangrove area, swamp, and bird sanctuary, sea grass beds are important to biodiversity and earth and may also have valuable landscape. Some sites may be very important to local communities in cultural/religious/ historical/archaeological aspects. If construction takes place at or nearby such sensitive socio-environmental features, threats or serious/ permanent damages may be caused to such sites. Human access to undisturbed area may cause damages to (from plant collection/removal, wildlife catching, hunting, fire setting, littering etc.)	Site clearance Construction Extraction natural resource for construction materials at important sites particularly corals from sea, trees from protected area, gravel from river beds etc.

	Potential Impacts/ Risks	Description of the issues/risks	Typical activities that cause the potential impacts/risks
		damage to vegetation cover as habitats of wildlife or cause fire risks Such potential high impacts should be identified in early stage of sub-project planning and avoided.	
C3	Degrade existing landscape	This impacts may occur when vegetation cover/top soil is removed, or a man-made structures are introduced into least disturbed nature, or when new structures obstruct view to existing beautiful landscape	Site clearance Construction of new facilities in areas with beautiful/valuable landscape
C4	Solid Waste generation	Excavation works generate waste. Removal of all road surfaces. Waste is also be generated from unused materials: timber/glass/metal, packaging materials or by the workers: lunch containers, leftover food etc.	Excavation Construction Workers daily domestic activities
C5	Wastewater generation	Wastewater generated by workers from washing and toileting. Uncontrolled generation of wastewater may cause environmental pollution, nuisance, and health concerns to workers and the public	Excavation Use of construction materials Workers domestic activities at the sites
C6	Chemicals, hazardous wastes generation	Used oil, paints, lubricant, batteries, and asbestos-containing materials are toxic. Some of the solid waste may be cross-contaminated with oil, paints etc. that may be toxic and pose public health risk	Site clearance Vehicle maintenance Painting Illegal dumping
C7	Dust, air pollution	Exposure to high level of dust and smoke may have health impact: affect respiratory system, eyes	Site clearance Excavation Running engine Machinery Construction material loading and unloading
C8	Noise and Vibration	Noise disturbance affects tranquillity and hearing/listening activities and may cause stress/headaches Vibration may cause cracks /damages to existing structures	Pile driving Soil compaction Drilling
C9	Increased erosion risks/siltation/ sedimentation	Water stagnation can occur due to changes in soil profile or gradient,. Stockpiling of excavated soil Washing away of soil by rainfall or stormwater causing highly turbid water and siltation/sedimentation of river bed/stream	Site clearance excavation activities create unsealed/barren area without vegetation cover during and after construction Construction works carried out in

	Potential Impacts/ Risks	Description of the issues/risks	Typical activities that cause the potential impacts/risks
			depressions in the plateau
C10	Water quality degradation, salinity intrusion risks	- Waste and wastewater, construction materials from construction may leak or be disposed of into water sources nearby construction sites or downstream of construction sites. - Water quality in streams and rivers may also be degraded if soil from slopes in the catchment run into water bodies due to erosion/landslide initiated by earthworks at the sites. - Careless water use activities by workers, for example washing working tools directly at water sources. - Oil, fuel or any other liquid substance used during construction, including on-site machinery maintenance, may be leaked or spilled into the soil. Then rainwater may wash such contaminant to nearby water bodies	- Construction of bridges, pier on streams, river beds - Construction waste and waste water discharge - Tools and machinery washing and maintenance
		During dewatering localised water level drawdown will occur. If the salt-fresh water interfere is located in vicinity, saline water intrusion may occur.	Groundwater extraction and dewatering during construction phase
C11	Increase localised flooding risk	The area surrounding the area disturbed by construction activities may be subjected to increased flooding risk if large loads of solid construction materials/waste are created in low-lying area where drainage is poor, Blockage of natural or fabricated or drainage	Construction solid materials and waste loading, dumping
C12	Impacts Cultural sites such as church, historical site, grave yard, etc.	Cultural sites may be affected with dust, noise from material and waste loading/disposals Some artefacts may expose during execution of earthworks at the sites	Dust and noise generated activities Loading/unloading construction materials and wastes
C13	Social disturbance to local community: - traffic/ transportation - water supply - irrigation - farming - Community meetings events/ etc.	If the works are carried out on or near existing road, construction activities may disturb or disrupt traffic and pedestrian movement Excavation may also cause loss to vegetation cover or disturbance to the ground Excavation works may disrupt the operations thus the services provided by local existing facilities such as water supply, drainage, power supply etc. if the	Site clearance Excavation Machinery operation Temporary blockage of rivers/streams/ existing irrigation canal for construction Temporary block of road for construction of connection section to

	Potential Impacts/ Risks	Description of the issues/risks	Typical activities that cause the potential impacts/risks
		pipes/lines cross excavated areas Stockpiles formed from excavated materials If construction activities takes place near farming area, access to farm land may be interrupted; materials, waste, and wastewater from construction sites may enter farms causing productivity reduction and social conflicts If a construction site is located near community centre of church, material loads or noise from material cutting, drilling, welding, may block access to community centres or disturb hearings in public meetings.	new alignment
C14	Health/ sanitation /hygiene in local community	Stagnant water formed from disturbed area at construction site is favour for mosquito breeding, which is a vector of water-borne diseases Waste generated from workers staying at the site may attract vermin and insects Wastewater generation may cause nuisance and health risks to human	Excavation create holes or low laying spots
C15	Safety risk to community	Construction-related activities may cause safety risks for local community, particularly children if they access to open holes or present at the site during materials transports/loading/unloading.	Transportation of materials/wastes Materials loading/unloading Excavated holes Machinery operations
C16	Workers health and safety	Some toxic materials such as paint, oil, battery may be used during construction. Some construction materials may contain asbestos. If workers are in contacts such materials without proper protection, health hazard may be resulted from the handling, breathing from such materials. Unprotected holes at the sites, exposure to traffic at road side, improperly installed electrical wires, operating and handling of construction plants, machinery and tools may cause safety risks to workers	General construction activities, operations of tools and plants in contact with hazardous substances such as paints etc.
	OPERATION PHASE		
OP1	Water/soil pollution	Leakage or discharge of wastes and wastewater generated from the facilities provided	Water use activities taking place at buildings/ shelters

	Potential Impacts/ Risks	Description of the issues/risks	Typical activities that cause the potential impacts/risks
OP2	Water/soil pollution	Effluent from septic tank can pollute groundwater or surface water, particularly if piped to an open drain Partly treated effluent from septic tank can easily pollute the groundwater in the dug well, even after many years; Polluted surface water from around the septic tank may percolate into the groundwater	Sanitation facility
OP3	Visual impacts	In the event that the facility dominates landscape in public area and degrade the surrounding landscape value	Construction in areas visible from other establishments. May give rise to complaints despite sufficient buffer.
OP4	Nuisance, odour, unhygienic condition, public health risks	Emission from septic tank during its decommissioning and connection to sewer and from centralised sewerage system. Septage services to decommissioned septic tanks, manholes, lifting stations. Septic tank effluent is only partially treated thus can spread infection and disease thus pose health risk. Lack of proper drain around taps used for cleaning, and servicing of sewers create muddy conditions and stagnant water. Stagnant water become potential mosquito breeding ground and contamination by vectors and harmful microorganisms. Becomes an inconvenience for water users Open or missing facet can spill a lot of water in a day. Wastage of treated water	Sanitation
OP5	Pollution caused by hazardous wastes	The operation of WWTP generate hazardous sludge (biological and/or chemical).	Sludge storage and disposal
OP6	Unhygienic condition, public health risks	Muddy condition/siltation at water points used by contractor and operator lead to unhygienic conditions and/or mosquitoes breeding	Water used during construction and operation
OP7	Conflict (past or present) with downstream river water users	When water is partly stored upstream of a water source by one group of water users, other groups may have less access to the water they need and that may need to social conflict between different community groups. Project provides readily available treated effluent for use for irrigation	Lack of water supply and for irrigation

Table 20: Potential Negative Impacts of the Works under the Project

The main social and environmental concerns of the Project would relate to the construction activities, wastewater generated and collection from establishments, wastewater disposal and water recycling and sludge disposal. PUC will in addition to the management of electricity and water on the island, will also manage wastewater.

With the availability of treated wastewater, which will support the farming community, the amount of fertilizers may decrease but the health risks to humans and the environment during the irrigation may become apparent if the quality of the effluent deteriorates.

The packaging, transport, store, handling, usage and disposal of pesticide that will be necessary at the facilities may need to be considered during the Project.

The impacts and risks associated with the Project will be addressed through the procedures described in Chapter 8 of this ESIA.

7.11 Classification of Potential Impacts and Risks

The above Section 7.10 identifies, describes and distinguishes between impacts during construction and operation phases.

In this Section 7.11, a standard classification of these impacts according to their intensity (strong, medium, low), extent (punctual, local, regional), duration (brief, temporary, permanent) based on which the impact's importance is determined (low, medium, high) is provided in Table 21 below.

	Potential Impacts/ Risks	Intensity	Extent	Duration	Importance
	CONSTRUCTION PHASE				
C1	Damages or loss of vegetation cover and trees	Medium	Punctual	Temporary	Low
C2	Loss or degradation of valuable natural/ ecological resources	Low	Punctual	Brief	Low
C3	Degrade existing landscape	Low	Punctual	Brief	Low
C4	Solid Waste generation	Low	Punctual	Brief	Low
C5	Wastewater generation	Low	Punctual	Brief	Low
C6	Chemicals, hazardous wastes generation	Low	Punctual	Brief	Low
C7	Dust, air pollution	Medium	Punctual	Brief	Low
C8	Noise and Vibration	Medium	Punctual	Brief	Low
C9	Increased erosion risks/siltation/ sedimentation	Low	Punctual	Brief	Low
C10	Water quality degradation, salinity intrusion risks	Low	Punctual	Brief	Low
C11	Increase localised flooding risk	Low	Punctual	Brief	Low
C12	Impacts Cultural sites such as church, historical site, grave yard, etc.	Medium	Local	Temporary	Low

	Potential Impacts/ Risks	Intensity	Extent	Duration	Importance
C13	Social disturbance to local community: - traffic/ transportation - water supply - irrigation - farming - Community events/ etc.	Low	Punctual	Brief	Low
C14	Health/ sanitation /hygiene in local community	Low	Punctual	Brief	Low
C15	Safety risk to community	Low	Punctual	Brief	Low
C16	Workers health and safety	Low	Punctual	Brief	Low
	OPERATION PHASE	Low	Punctual	Brief	Low
OP1	Water/soil pollution	Low	Punctual	Brief	Low
OP2	Water/soil pollution	Low	Punctual	Brief	Low
OP3	Visual impacts	Low	Punctual	Brief	Low
OP4	Nuisance, odour, unhygienic condition, public health risks	Low	Punctual	Brief	Low
OP5	Pollution caused by hazardous wastes	Low	Punctual	Brief	Low
OP6	Unhygienic condition, public health risks	Low	Punctual	Brief	Low
OP7	Conflict (past or present) with downstream river water users	Low	Punctual	Brief	Low

Table 21: Classification of Impacts of the Works under the Project

As classified in Table 21 above: Most of the impacts during construction and operation phases will have low intensity, punctual extent and brief duration, and thus low importance. All of these impacts will also be strictly supervised by the Engineer during construction, and thereafter managed by the Promoter during operation as part of the Promoter's routine operations.

For Impact C1 with medium intensity: Site clearance for the last part of the forcemain from pump station PS-01 to the WWTP will require clearance of trees and vegetation to gain access for the route of the forcemain. Upon reinstatement, the cleared site is expected to remain undeveloped, in which case new trees and vegetation will grow back in natural manner in soil not affected by the forcemain. Overall, the importance of this impact is still low, even for the possibility that the cleared site may later become a public or private road and thus become permanent.

For Impact C7 with medium intensity: Dust and air pollution will have a medium impact wherever these occur. But not because of the excessive quantity of dust and air pollution generated during construction. But because the existing dust and air pollution is almost non-existent. Overall, the importance of this impact is still low, as the quantities generated are low enough to be easily tolerated to peoples not previously exposed to any level of dust and air pollution, and anyway will be strictly supervised by the Engineer.

For Impact C8 with medium intensity: Noise and vibration will have a medium impact wherever these occur. But not because of the excessive quantity of noise and vibration generated during construction. But because the existing noise and vibration is almost non-existent. Overall, the importance of this impact is still low, as the quantities generated are low enough to be easily tolerated to peoples not previously exposed to any level of noise and vibration, and anyway will be strictly supervised by the Engineer.

For Impact C12 with medium intensity, local extent and temporary duration: The new WWTP will be constructed on land of L'Union Estate, which is a historical site on La Digue. Nonetheless, the site of the new WWTP is located on the boundary of L'Union Estate farthest from areas frequented by tourists and not near any areas inhabited by island residents. Overall, the importance of this impact is still low, because the impacts during construction are remote enough to be easily avoidable, and anyway will be strictly supervised by the Engineer.

8 Environmental and Social Management Plan

8.1 Overview

The Project has been designed for the construction of infrastructure intended for wastewater collection, treatment and disposal. The Project is classified as Environmental Class I as per the Seychelles EIA Regulations.

However, the Project is not subject to an Environmental Impact Assessment per Directive 2011/92/EU, because the associated waste water treatment plant does not have a capacity exceeding 150,000 population equivalent as defined in Point 6 of Article 2 of Council Directive 91/271/EEC of 21 May 1991 concerning urban waste-water treatment. Most of the Project activities will be small scale and the associated potential negative socio-environmental impacts and risks would be small and localised and manageable.

In reference to Chapter B.2.8 of Volume II of EIB's Environmental and Social Handbook (version 9.0 of 02/12/2013): Underlying projects that do not require an EIA/ESIA may not have a stand-alone ESMP. In these cases, specific actions will be included in the environmental approvals and/or as stand-alone conditions in the finance contract and agreements.

In reference to Annex 11 of Volume II of EIB's Environmental and Social Handbook (version 9.0 of 02/12/2013): Among the aims and objectives of the ESMP are:

- To provide goals and targets for environmental control;
- To provide a basis on which the prospective contractor can accurately price for environmental management in the tender document;
- To specify particular roles, responsibilities and time scales;
- To provide a basis for monitoring compliance; and
- To provide a site management tool.

Among others, the ESMP includes environmental and social requirements: that are incorporated into the tender and contract documents; and that shall be complied by the construction Contractor and supervised by the supervising Engineer. These environmental and social requirements are provided in Section 8.2 that follows.

8.2 Requirements of Contract Documents

8.2.1 General Provisions

The Contractor shall take all reasonable precautions to avoid any nuisance arising from the execution of the Works and also during the O&M Period. This should be accomplished where at all possible by suppression of the nuisance at source rather than abatement of the nuisance once generated.

The provision listed herein regarding environmental protection shall apply to and be binding upon the Contractor for any part of the Works on the Site and the subcontractors. The Contractor shall ensure that proper and adequate provisions to this end are included in all subcontracts.

The Contractor shall employ appropriate construction methods and carry out the Works in a manner as to minimize any adverse impacts on air, noise and water quality and the existing environment within or outside any construction sites during the Contract.

The Contractor shall take account of the particular situation in La Digue where the economy relies on tourism and construction activities, if not properly managed, will be particularly disruptive, It should be noted that the majority of traffic on La Digue are bicycles and that construction vehicles and equipment will have a major impact.

A particular important issue is the maintenance of road access to private properties, hotels and guesthouse as the construction works proceed. Excavations at several places along pipes and at pumping/lifting stations will be particularly deep. The construction of the main collector sewer along the main road along the coast will represent a particular challenge due to the deep excavation, high water table and the need to maintain access along the road.

La Digue is also home to a number of endemic species of flora and fauna which will need to be protected. The protection of local vegetation and waterways and of flora and fauna is of high importance. In some places sewers will have to be constructed under natural waterways.

The Contractor shall submit an Environmental Compliance Plan for the Engineer's approval indicating how the Contractor will comply with the Contract requirements for execution of the Works and also during the O&M Period. The Environmental Compliance Plan shall be properly implemented by the Contractor during the Contract.

8.2.2 Contractor's Obligations

The Contractor shall comply with the environmental requirements contained in the Contract. In particular, the Contractor shall:

- Ensure environmental awareness among his personnel, suppliers and sub-contractors so that they are fully aware of, and understand, these environmental requirements;
- Notify the Engineer immediately in the event of any accidental infringements of these environmental requirements to enable appropriate remedial action to be taken immediately by the Contractor;
- Notify the Engineer, at least ten working days in advance, of any activity it has reason to believe may have significant negative impacts, so that mitigative measures may be implemented in a timely manner;
- Undertake rehabilitation of all areas affected by his works and to restore them to their original states, as determined by the Engineer; and
- Undertake the required works within the designated working areas.

8.2.3 Engineer's Role and Duties

The Engineer will designate all working areas, and monitor and enforce the Contractor's compliance with these environmental requirements. In particular, the Engineer will:

- Communicate to the Employer, at least ten working days in advance, any proposed actions which may have negative impacts on the environment;
- Maintain a record of complaints from the public, and communicate these complaints to the Contractor and Employer; and
- Facilitate communication between all role players in the interest of effective environmental management.

8.2.4 Employer's Arrangements

The Employer will appoint an Environmental Officer, who will monitor and liaise with the Engineer to ensure that the Contractor's activities under the Contract complies with the environmental requirements of the Contract.

Among others, the Contractor shall be obligated to attend a meeting to be arranged by the Employer prior to commencing any works under the Contract. This meeting shall be held with the Ministry of Environment, Energy & Climate Change during which all stakeholders involved in the implementation of the works under the Contract will be present. Among others, the purpose of this meeting is to ensure that the Contractor shall be fully aware of the provisions and mitigating measures of the environmental requirements of the Contract in order to minimize adverse negative impacts on the environment.

Where possible, the Employer shall facilitate the issuing of the relevant permits, approvals etc. from the Relevant Authorities. Such assistance shall not however relieve the Contractor of his responsibilities under the Contract to obtain such approvals.

8.2.5 Environmental Compliance Plan

The Contractor shall prepare an Environmental Compliance Plan which shall be submitted to the Engineer for approval within 60 days after the Commencement Date. This Contractor's Document shall represent the Contractor's environmental management plan for complying with the environmental requirements under the Contract.

In this Environmental Compliance Plan, the Contractor shall elaborate its methods and procedures to mitigate any negative environmental impacts of its contract activities, among which shall include the following as minimum:

- Soil contamination from the storage of fuel and chemicals and from waste water flows or leaks when performing the work;
- Disruption of water and sewage services to users when performing the work which would result in among others disturbing schedules or taking time away from informal trading activities of local communities;
- Water quality deterioration when performing the work;
- Reduced storage capacity of freshwater;
- Occupation health hazards to employees when performing the work;
- Environmental pollution from the wastewater sludge and all other forms of waste generated when performing the work;
- Increased erosion of the excavated topsoil and growth of alien plant vegetation;
- Health problems and nuisance from waste water flows or leaks including possible dust, odour and noise emissions from any excavations and the transportation of waste and other materials; and
- Increased waste generation from any de-sludging activities.

The Environmental Compliance Plan shall include a Waste Management Plan for the proper disposal of all forms of waste and the prevention of any environmental pollution as a result of the Contractor's activities.

The Environmental Compliance Plan shall also include an Emergency Plan for all possible hazards to people and property as a result of the Contractors activities, including the identification of high risk jobs and the prevention against accidents and injuries to workers, with consideration also given to local communities within the vicinity of the working areas.

The Environmental Compliance Plan shall also provide a detailed Containment Plan for emergencies during the construction period of the Contract which shall clearly define locations of discharge points of raw sewage during emergency.

8.2.6 Protection of Natural Resources and Cultural Sites

Mitigation of Effects on Natural and Ecological Resources

The Contractor shall be fully aware and materially respect that the natural and ecological sensitivity of La Digue requires the implementation of protective measures. They shall include as follows:

- Erect temporary fences to protect the preserved trees before commencement of any works within the site;
- No plant species may be removed unless agreed by the Engineer or unless they are listed as invasive or alien species;
- All fauna (including domestic livestock) within and surrounding the site shall be protected, and they shall not be caught or killed;
- Avoid disturbance of marine environment (e.g. logging, hunting, catching, shooting, poisoning, littering) especially breeding grounds of fishery resources such as swamp/lagoon/sea grass bed, mangrove areas, or grassland seasonally inundated, or any area that is protected as a green space;
- Natural features shall not be defaced or painted or otherwise tampered with, even for survey purposes, and any features defaced by the Contractor shall be reinstated by the Contractor to the satisfaction of the Engineer;
- Only use local native species of vegetation for planting and restoration of natural landforms;
- All rock boulders shall be secured; Rock blasting shall not be allowed on site;
- Avoid the extraction of excessive amounts of sand, gravel or rocks from rivers for construction; and
- Avoid the extraction of materials from live coral reef for construction materials (note that dead coral play an important role in the restoration cycle of coral ecosystems and protection of the shoreline).

Mitigation of Disruption of Vegetative Cover and Tree Cutting

As a matter of principle there shall be minimal clearing of vegetation so as not to affect stability of the sites and reduce the chances of erosion as well as the visual impacts. Among others, the Contractor's obligations under the Contract shall include the following requirements as minimum:

- Store topsoil from excavated area for vegetation planting / reinstatement at the end of construction. Removed vegetation cover shall be restored on barren soil at the end of construction.
- The loading and/or covering of pipes, timbers, construction tools on vegetated areas shall be avoided.

- Trees which are to be retained or which are not required to be removed in order to carry out the Works shall be protected from damage at all times.
- Removed trees are to be replanted with native species.

If any trees or other similar obstructions are required to be removed during the Execution of the Works, the Contractor shall draw the attention of the Engineer to them and shall not remove them without approval of the Relevant Authority.

Among other requirements, the Contractor shall notify the Engineer – in prompt and timely manner to prevent any delay in the progress of carrying out the Works – about the possible need for any felling of Protected Trees prior to any such clearance of Protected Trees. The Contractor shall not take any such actions unless and until the Engineer gives approval accordingly. For this purpose, the Contractor shall make himself fully aware of what types of trees are Protected Trees as determined by the Relevant Authority in Seychelles.

For this purpose, the Contractor shall liaise with the Forestry, Conservation Sections and the Climate Change Division within the Ministry of Environment, Energy & Climate Charge, prior to any clearance, and to obtain the necessary permission for any felling of Protected Trees.

Mitigation of Effects on Cultural Sites

The Contractor shall avoid any and all disturbances to cultural sites such as churches, community centres, retirement homes and schools on La Digue. The Contractor shall coordinate with local authorities e.g. leaders of local wards or communities, leaders of villages for agreed schedules of construction activities at areas near sensitive places or at sensitive times e.g. religious and/or festival days.

The Contractor shall inform local residents about construction and work schedules, interruption of services and demolition where applicable and carry out consultation with those affected as early as possible if it is not avoidable to use these sites.

In particular the Contractor shall avoid unloading materials, parking vehicles / construction plants within 20 m of any cultural site. If this is unavoidable, the unloading / parking should be finished within 3 hours. Water shall be sprayed regularly for dust suppression, if construction is near any cultural structure.

The Contractor shall inform community at least one week before site clearance is started near any cultural site. The Contractor shall maintain open communications with both the local government and concerned communities. In particular they shall erect notification boards in local language/s at construction sites providing information about the project and contact numbers. The Contractor shall respond to telephone inquiries and written correspondence in a timely and accurate manner and in addition monitor community concerns and information requirements as the project progresses.

8.2.7 Protection of Landscapes

General

The Contractor shall during his construction activities protect the landscape of La Digue and should maintain vegetation cover where possible, along with mitigation of disruption of vegetative cover and tree cutting.

Prevention of Soil Pollution

The Contractor shall prevent the occurrence of soil pollution both through his construction activities and through the disposal of construction waste.

The Contractor shall though proper operation, storage and containment measures ensure that oil, grease, diesel and petrol are not allowed to pollute the soil. The Contractor shall ensure that wastewater, solid wastes, sludge wastes, chemical wastes and hazardous wastes are disposed of properly to prevent pollution of the soil, in total compliance with the Contract, and also according to any additional procedures and methods, as elaborated in the Contractor's Environmental Compliance Plan, and as approved by the Engineer.

Conservation of Topsoil

The Contractor shall not excavate topsoil prior to, and not longer than five days, before the start of such work, such as:

- All areas to be excavated for the construction of the permanent works;
- Areas to be occupied by roads, including temporary roads;
- Areas for the storage of fuels and oils;
- Areas to be used for batching/mixing of concrete;
- Areas for stockpiling of construction materials; and
- Areas for the Contractor's site camps.

The Contractor shall store topsoil from excavated area for vegetation planting / reinstatement at the end of construction. Topsoil shall be stored in piles less than one meter in height. This soil shall be used for rehabilitation purposes. Grass shall not be removed prior to stripping of topsoil. Topsoil shall not be mixed with any other material, and erosion of topsoil stockpiles shall be prevented.

Control of Flooding

The Contractor shall ensure that the area surrounding the area disturbed by construction activities shall not be subject to increased flooding risk as a result of blockage of natural or fabricated or drainage caused the Contractor's activities. Among others, the Contractor's obligations under the Contract shall include the following requirements as minimum:

- Maintain existing drainage if possible;
- Create drains surrounding material loads stored at the work site; and
- Periodically clean up drains at the site.

Where necessary, as determined by the Engineer, the Contractor shall provide roadside drains, culverts and cross drains as Temporary Works, which shall be well maintained at all times by the Contractor. When such Temporary Works are not anymore needed, as determined by the Engineer, then the Contractor shall remove such Temporary Works and reinstate the original site conditions, to the full satisfaction of the Engineer, and at no extra cost to the Employer.

The Contractor shall be aware that, on La Digue, rainfall can occur frequently during the day during working hours and is expected to disrupt construction activities. Periodic flooding can occur during and after periods of heavy rainfall.

The Contractor shall be aware that the site of the La Digue WWTP is adjacent to a river and that part of the site – prior to the construction works being completed – may be subject to flooding. The Contractor shall schedule his construction works at the La Digue WWTP so that those parts of the works which protect the site against flooding and allow for site drainage are completed prior to major works on the WWTP structures.

Control of Soil Erosion

The Contractor shall take all reasonable measures to prevent soil erosion resulting from a diversion, restriction or increase in the flow of storm water or stream flow caused by the presence of temporary or permanent works, and activities. Acceptable measures to control soil erosion shall be implemented by the Contractor to the full satisfaction of the Engineer.

All storm water run-off shall be adequately controlled and disposed. No erosion will be tolerated at the work sites. Areas affected by construction related activities shall be monitored regularly by the Contractor for evidence of erosion. Areas particularly susceptible to erosion are areas stripped of topsoil, soil stockpiles and earth slopes of steep gradient.

Among others, the Contractor's obligations under the Contract shall include the following requirements:

- Where soil erosion does occur, the Contractor shall reinstate such areas and any other areas damaged by the erosion, all to the satisfaction of the Engineer;
- The Contractor shall design slope stabilisation solutions if the works are to be built on slopes; also provide a permanent drainage structure if the works is on a slope;
- All rock boulders shall be secured; Rock blasting shall not be allowed on site; Should there be a need to remove any rocks, it shall be done by use of wedge / jack hammer so as to minimize land destabilization;
- As far as appropriate, the Contractor has to include energy-dispersion structures in drainage system;
- Excavation works during wet season shall be avoided;
- Ground clearance areas shall be kept to minimal levels as possible;
- Reinstate vegetation cover at earliest opportunity;
- Carry out shaping and re-profiling cutting of slopes to minimise erosion potential;
- Replant trees on exposed land and slopes to prevent or reduce land collapse and keep the stability of slopes; and
- Maintain drainage system to ensure they are free of mud and other obstructions.

Stockpiling of Materials

All stockpiling sites shall be subject to the approval of the Engineer. The stockpiles shall be located in designated sites, or areas such as exhausted borrow pits or quarries. Material stockpiled shall be done so in such a way as to minimize the spread of materials and the impact on the natural vegetation. The Contractor shall provide permanent reinstatement of areas used for stockpiling upon completion of the works.

The Contractor shall be responsible for making all arrangements for the disposal of all surplus material from any excavation or stockpile, which is material extra-over the selected excavated material needed for use in the backfilling, grading or other purpose.

The location and size of stockpiled material including excavated material within the Site shall be submitted to the Engineer for his approval. All stockpiles shall be maintained in a stable condition at all times.

Among other requirements, areas shall be designated on Site for the collection of all spoil materials. These stockpiles shall be properly located so as not to block any land accesses and water courses. For this purpose, the Contractor shall notify the Engineer – in prompt and timely manner to prevent delay in the progress of carrying out the Works – about possible and acceptable locations of such spoil sites. The Contractor shall not take any associated actions unless and until the Engineer gives approval accordingly. For this purpose, the Contractor shall also liaise with the Environment Department in order to obtain prior approval about the locations of such spoil sites.

The Contractor shall be aware that places on La Digue which would be available to store the contractor's materials, plant and equipment are limited.

Disposal of Materials

Among other requirements, unless instructed otherwise by the Engineer, the Contractor shall dispose of surplus excavated material generated from the Works to the dumping areas designated by the Relevant Authority within 5 km (not along the road) from the Site. In addition, unless instructed otherwise by the Engineer, the Contractor shall dispose of contaminated material generated from the Works to the dumping areas designated by the Relevant Authority as being suitable to receive this contaminated material within 5 km (not along the road) from the Site.

8.2.8 Protection of Air Quality

Prevention of Air Pollution

The Contractor shall ensure that all vehicles used at Site comply with the local Seychelles regulations on allowable emission limits of exhaust gases. In addition, the Contractor shall ensure that drivers and operators turn the engine off if the vehicle is idle for more than five minutes. The Contractor shall also ensure that construction and other wastes are not burnt on-site.

If after commencement of the Works that the Contractor's Equipment and/or method of working are found to be causing serious air pollution impacts, they shall be inspected and remedial proposals shall be drawn up by the Contractor. In developing these remedial measures, the Contractor shall be required to inspect and review all dust sources that may be contributing to the pollution impacts. The proposed remedial measures shall be subject to the approval of the Engineer.

Control of Odours

The Contractor shall take reasonable measures to control nuisance odour whenever such odours arise. The Contractor shall maintain the work sites free of trash, garbage, and debris as part of its activities to control nuisance odour, and shall fully cover and secure haul truck cargos during material transport on public roadways.

The Contractor shall clean-up and properly dispose of excavated material that is deemed odourous. If odourous material is located on public roadways or walkways, clean-up methods shall consist of wet spray sweeping or vacuuming.

Other control measures may include reducing the amount of time that excavated material is exposed to the open atmosphere, or covering such stockpiles of excavated material with polyethylene sheeting and securing with sandbags or an equivalent method to prevent the cover from being dislodged by the wind. Permission of the Engineer must be obtained prior to the use of any chemical application for controlling odour. This method shall be used only when other methods are impractical.

The Contractor shall locate combustion engines away from sensitive receptors such as fresh air intakes, air conditioners, and windows. The Contractor shall establish a staging zone for trucks that are waiting to load or unload material at the work site, in a location where the diesel emissions from the trucks will not be noticeable to the public.

The Contractor shall control nuisance odours associated with diesel emissions by turning off diesel combustion engines on its equipment not in active use and on dump trucks that are idling while waiting to load or unload material for five minutes or more.

The Contractor shall also establish communication platforms for complaints and compliments measures as part of its odour control activities.

Control of Dust

As a result of the Contractor's activities under the Contract, exposure to high level of dust and smoke may directly impact the health conditions of persons exposed to such dust and smoke, especially the respiratory system and the eyes of such persons. The Contractor shall then ensure that dust generated from construction activities is minimal and at acceptable level. Among others, the Contractor's obligations under the Contract shall include the following requirements as minimum:

- During dry weather periods and in areas where dust generation is likely water spraying shall be applied (as far as appropriate several times per day);
- Materials including earthwork material from which dust may be generated when being transported to or from the Site shall be sprayed with water or covered;
- Trucks carrying granular material shall be covered;
- Screens, dust sheets, tarpaulins shall be used to prevent generation of dust;
- Stop construction and spray the site when there are complaints about dust;
- Vehicles used shall comply with the Relevant Authority's regulations on allowable emission limits of exhaust gases;
- There shall be no burning of any type of waste on-site; and
- Drivers must turn engines off if the vehicle is idle for more than five minutes.

8.2.9 Protection of Surface and Ground Waters

Prevention of Water Pollution

The Contractor shall take all necessary precautions to secure the efficient protection of all waterways against pollution including spillage of oil or concrete mixer wastes, site drainage or any other deleterious materials. The Contractor shall seek the Engineer's approval for discharging any matter that may impair the groundwater quality. If, nevertheless, such spillage occurs, the Contractor shall clean the waterway at his own expense, and keep the Employer indemnified against any claim arising from such pollution during the execution of the Works.

Natural streams or rivers within the Site where no work is being carried out shall be kept clean and free of any floating debris. All equipment and working methods to be used in or near the natural streams or rivers shall be planned to reduce disturbance. No material storing and no parking of the Contractor's Equipment or other vehicles near the streams or rivers shall be allowed.

The Contractor shall not discharge directly or indirectly (by runoff) or cause or permit or suffer to be discharged into any public sewer, storm water drain channel, stream course or river, any effluent or foul or contaminated water or cooling or hot water without a valid discharge license. The Contractor shall provide, operate and maintain within the premises or otherwise, suitable works for the treatment and disposal of such effluent or foul or contaminated or cooling or hot water.

The Contractor shall prevent pollution of drains and watercourses by sanitary wastes, sediment, debris and other substances resulting from construction activities. No wastes shall be permitted to enter any drain or watercourse or any sanitary sewer, unless satisfactorily treated to the approval of the Engineer.

The Contractor shall use appropriate sludge management measures, including the re-use of the sludge, whenever its activities require such measures, which shall be subject to the Engineer's approval prior to performing such measures. Such measures shall include the use of vacuum trucks to remove impounding sewage and other contaminants spillages.

Among others, the Contractor's obligations under the Contract shall include the following requirements as minimum:

- Ground disturbance near water sources shall be avoided;
- Sediment traps to collect sediment from rainwater before surface flow enters water bodies shall be installed;
- Washing of tools or any type of machinery in streams, rivers or lakes shall not be allowed;
- Avoid disposing of construction materials and waste in water bodies; and
- Chemical management instructions to prevent chemical leaks into water bodies shall be followed.

Mitigation of Effects on Surface Water

The Contractor shall provide for the drainage of storm water and such water as may be applied or discharged on the site in performance of the work at his own cost.

Drainage facilities shall be adequate to prevent damage to the work, the site, and adjacent property. Dikes shall be constructed as necessary to divert increased runoff from entering adjacent property (except in natural channels) to protect property owner's facilities and the works and to direct water to drainage channels or conduits. Stilling pools shall be provided as necessary to prevent downstream flooding.

Mitigation of Effects on Ground Water

The Contractor shall prevent the occurrence of the pollution of ground water both through his construction activities and through the incorrect disposal of construction waste.

The Contractor shall though proper operation, storage and containment measures ensure that oil, grease, diesel and petrol are not allowed to pollute the groundwater. The Contractor shall ensure that wastewater, solid wastes, sludge wastes, chemical wastes and hazardous wastes are disposed of properly to prevent pollution of the groundwater, in total compliance with the Contract, and also according to any additional procedures and methods, as elaborated in the Contractor's Environmental Compliance Plan, and as approved by the Engineer.

Control of Water Siltation

The Contractor shall take all reasonable measures to prevent siltation of surface water bodies resulting from a diversion, restriction or increase in the flow of storm water or stream flow caused by the presence of temporary or permanent works, and activities. Acceptable measures to control water siltation shall be implemented by the Contractor to the full satisfaction of the Engineer.

8.2.10 Management of Waste Disposal

Disposal of Wastewater

The Contractor shall ensure that wastewater from construction activities shall not leak or be disposed of into water sources nearby construction sites or downstream of construction sites. Among others, the Contractor's obligations under the Contract shall include the following requirements as minimum:

- The Contractor shall ensure accessibility to toilets for workers;
- Discharge of wastewater from toilets directly into any water body is not allowed;
- Cover and seal off all water collection tanks and septic tanks at the end of construction works;
- Runoff from the Site shall be controlled to ensure that adjacent areas are not affected and disturbance to the public is to minimum; and
- The Contractor shall ensure that under no circumstances foul sewage flow can be diverted into a storm water drains and vice versa.

Disposal of Solid Wastes

The Contractor is expected to generate solid waste during excavation works and also the removal of all road surface, structural and building demolition waste and disused pipelines. Another waste source is referring to unused materials such as timber/glass/metal, packaging materials or generated by the workers including lunch containers, leftover food etc. Among others, the Contractor's obligations under the Contract shall include the following requirements as minimum:

- The Contractor shall provide waste bins for litter/garbage and refuse collection; These waste bins shall be covered, tip-proof, weatherproof and scavenger proof;
- Burning of any type of waste on-site is not allowed;

- Storage of solid waste temporarily on site shall be in a designated area which shall be subject to the approval of the Engineer;
- Disposal of construction waste shall only be allowed in areas approved by the Relevant Authorities;
- Disposal of any material in environmentally sensitive areas such as swamp / lagoon / sea grass bed, mangrove areas, or grassland seasonally inundated, or any area that is protected as a green space in watercourses is not allowed; and
- The Contractor shall maximise the reuse of recyclable materials where possible. Materials such as wooden plates, steel, scaffolding material, site holding, packaging material shall be collected and separated on-site from other waste sources for reuse, for use as fill or provided to recycling vendors.

Potential storage / dumping capacity is available at the La Digue landfill facility adjacent to the proposed site of the La Digue WWTP. It shall be the responsibility of the Contractor to verify this, obtain the necessary permits and pay the appropriate fees, all of which shall be deemed covered by the Contractor within the rates and prices of the Contract.

Disposal of Sludge Wastes

The Contractor shall use appropriate sludge management measures, including the re-use of the sludge, whenever its activities require such measures, which shall be subject to the Engineer's approval prior to performing such measures. Such measures shall include the use of vacuum trucks to remove impounding sewage and other contaminants spillages.

After the existing households are connected to the piped sewerage system, the Contractor shall be responsible for pumping out and disposing of the sludge from the household septic tanks or cesspits. This activity forms part of the O&M Services of the Contract.

Disposal of Chemical Wastes

For the purpose of the Contract, all chemical wastes shall be considered to be hazardous wastes. Where it does not prove to be possible to obtain the approval of the relevant authorities to dispose of chemical wastes, oil, lubricants, cleaning materials etc. on La Digue the Contractor shall remove them to Mahé for disposal at an approved site.

Disposal of Hazardous Wastes

As a result of the Contractor’s activities under the Contract, generation of chemical and/or hazardous waste may include used oil, paints, lubricant, batteries, and asbestos-containing materials are toxic.

Some of the solid waste may be cross-contaminated with oil, paints etc. that may be toxic and pose public health risk. Among others, the Contractor’s obligations under the Contract shall include the following requirements as minimum:

- Handling of hazardous materials and other toxic substances shall only be carried out by specially trained and certified workers;
- Materials containing asbestos for construction shall not be used;
- All chemicals or potentially hazardous substances shall be stored in a designated site (fenced, locked); used oil, lubricants, cleaning materials, filters etc.shall be collected in holding tanks; and

- The Contractor shall ensure the correct storage of chemicals with appropriate labelling and signboards.

Where it does not prove to be possible to obtain the approval of the relevant authorities to dispose of hazardous wastes on La Digue, the Contractor shall remove them to Mahé for disposal at an approved site.

8.2.11 Mitigation of Construction Activities

Management of Site Camps

Where site camps are to be established, the need for removing topsoil from the site, before site establishment, shall be investigated by the Contractor. Removed topsoil shall then be stockpiled by the Contractor for use in rehabilitation of the site camp.

The Contractor shall not locate any site camp in an environmentally sensitive area. Runoff from site shall be prevented from entering any water bodies; all water requiring discharge shall be discharged in a manner approved by the Engineer.

The Contractor shall maintain all site camps and surrounding areas in a clean, tidy and orderly condition at all times.

Temporary living accommodation only for the use of watchmen and a limited number of emergency personnel may be provided by the Contractor within the Site in accordance with the number of persons to be accommodated. The accommodation shall be maintained in clean and sanitary condition at all times.

The Contractor shall be aware that potential accommodation options for the Contractor's workforce on La Digue are limited.

Management of Working Areas

Working Areas are those areas which are required by the Contractor to perform the works, and shall be subject to the Engineer's approval. Working Areas include areas associated with permanent and temporary works at the sites of the associated facilities, and areas outside the sites of the associated facilities, such as burrow areas and haul roads between the sites and burrow areas.

The Contractor shall not be permitted beyond the Working Areas, except for temporary or exceptional cases, subject to the Engineer's approval.

Working Areas shall be designated by the Engineer according to proposals submitted by the Contractor in his Programme, Working Drawings, Method Statements and other documents and notices.

The Contractor shall keep all work sites clean and litter free. The Contractor shall provide refuse bins at the work sites and shall be responsible for the disposal of all litter generated by all his staff and his sub-contractors in an approved manner.

Erection and Removal of Fences

All existing fences affected by the works shall be maintained by the Contractor until completion of the works at no additional cost to the Employer. Where construction activities require the removal of fences from around private land, the Contractor shall inform occupants at least three days in advance to obtain their prior permission.

Fences which interfere with construction operations shall not be relocated or dismantled until written permission is obtained from the owner of the fence and the period the fence may be left relocated or dismantled has been agreed upon.

Where fences must be maintained across the construction easement, adequate gates shall be installed. Gates shall be kept closed and locked at all times when not in use.

On completion of any work across any tract of land, the Contractor shall restore all fences and/or boundary markers to their original or to a better condition and at their original location without any additional cost to the Employer.

The Contractor shall be responsible for the design, installation, maintenance and removal of all hoardings, fences, gates and signboards including protective measures necessary to provide security of the Site and to protect public from the construction activities and hazards associated with the Works.

Among other requirements, the Contractor shall notify the Engineer – in prompt and timely manner to prevent delay in the progress of carrying out the Works – about the possible need to undertake any earthworks for the erection of fences or construction of gates. The Contractor shall not take any such actions unless and until the Engineer gives approval accordingly. For this purpose, the Contractor shall also liaise with the Planning Authority for advice.

Provision of Temporary Drainage

With respect to the temporary diversion of existing watercourses and drainage systems, the Contractor shall provide temporary drainage works. The proposed diversion plans shall be acceptable to the Relevant Authorities and shall be subject to the approval of the Engineer.

Runoff from the Site shall be controlled to ensure that adjacent areas are not affected and disturbance to the public is to minimum. Under no circumstances shall foul sewage flow be diverted into a storm water drains and vice versa.

Control of Vehicles and Machinery

The Contractor shall obtain the relevant approvals and permits from the Road Transport Authority and other Relevant Authorities before – moving heavy vehicles and construction equipment and machinery on public roads.

The Contractor shall be aware that the use of vehicles on La Digue is limited by the Road Transport Commission and that their permission must be obtained prior to bringing vehicles and plant onto the island. The Contractor shall be responsible for obtaining the necessary permission and shall be responsible for complying in full with the terms and condition of any such permits issued.

The Contractor shall be aware that the primarily mode of transportation on La Digue are bicycles. The Contractor's drivers and vehicle/machine operators shall exercise due care and drive shall their vehicles safely and within the speed limit with due regard to the safety of other road users, in particular cyclists and pedestrians.

Control of Oil and Fuel Spills

The Contractor shall take all measures necessary to protect surface and groundwater from contamination by fuels and lubricants. This shall include:

- Bund all tanks for fuels, oils etc. to contain any possible spills;
- Provide spill mitigation equipment including absorbents; and
- Take immediate actions according to approved methods in case of spills.

Control of Fire Hazards

The Contractor shall take all the necessary precautions to ensure that uncontrolled fires are not started as a consequence of his activities on site. The Contractor, his subcontractors and all his employees are expected to be conscious of fire risks.

The Contractor shall hold fire prevention talks with his staff to create an awareness of the risks of fire. Regular reminders to his staff on this issue are required.

The Contractor shall ensure that there is adequate fire-fighting equipment on site.

The Contractor shall be liable for any expenses incurred by any organization called to assist with fighting fires and for costs involved in the rehabilitation of burnt areas, property and/or persons, should the fire be the result of the activities of the Contractor.

8.2.12 Mitigation of Social Impacts

As a result of the Contractor's activities under the Contract, interference with access and roads may affect the livelihoods of the ordinary citizen travelling within La Digue and those residing or running businesses near the project areas. In addition to the common nuisances such as noise caused by machinery, dust, potential structural damage to property, disposal of pumped (waste) water, these may create tensions and conflicts between the affected individuals, the concerned communities and the Contractor. For this purpose, the Contractor shall fully comply with the requirements for controlling both odour and dust, particularly in the vicinity of pumping stations.

Protection of Public Health

The Contractor shall be responsible for the protection of the public health, and public and private property, from any dangers associated with construction activities, and for the safe and easy passage of pedestrians and traffic in areas affected by his activities.

The Contractor shall provide an Occupational Health and Safety (OHSMS) Plan prior to the commencement of works.

The Contractor shall install fences, barriers, dangerous warning/prohibition signs around the construction area. Traffic control measures shall be implemented including road/rivers/canal signs and the use of flag persons to warn of dangerous conditions. The Contractor shall also ensure that no children allowed to be around construction activities in particular during excavation and the installation of structures.

Any excavations, material dumps, or other obstructions likely to cause injury to any person or thing shall be suitably fenced off and at night marked by red warning lights.

Protection of Worker Safety and Health

As a result of the Contractor's activities under the Contract, health risks at the workplace, such as heat, noise, dust, hazardous chemicals, unsafe machines and psychological stress, cause occupational diseases and can aggravate other health problems. Conditions of employment, occupation and the position in the workplace hierarchy also affect health.

The Contractor shall ensure that all workers have access to protective measures, particularly (as minimum):

- Workers shall be briefed regularly on occupational health and safety regulations;
- Prior to the commencement of works the Contractor shall prepare an Occupational Health and Safety Management System (OHSMS) for approval by the Engineer;
- Workers exposure shall be reduced with the use of and proper care of protective clothing and equipment;
- Traffic control measures, including road/rivers/canal signs and flag persons to warn of dangerous conditions shall be implemented; and
- The Contractor shall install fences, barriers, dangerous warning/prohibition signs around the construction area in order to protect the workers.

Protection of Public and Private Property

The Contractor shall obtain permission from property owners prior to entering any private property.

The Contractor shall protect, shore, brace, support, and maintain all structures, underground pipes, conduits, drains and other underground constructions uncovered or otherwise affected by his construction operations. All pavement, surfacing, driveways, curbs, walks, buildings, utility poles, guy wires, fences and other surface structures affected by construction operations, together with all sod and shrubs in yards and parking, shall be restored to their original condition, whether within or outside the easement. All replacements shall be made with new materials, at no additional cost to the Employer.

The Contractor shall be responsible for all damage to structures, streets, roads, highways, shoulders, ditches, embankments, culverts, bridges, and any other public or private property, regardless of location or character, which may be caused by transporting equipment, materials, or men to or from the works, or any part or site thereof, whether by him or his sub-contractors. The Contractor shall make satisfactory and acceptable arrangements with the owner of, or the agency or authority having jurisdiction thereupon, the damaged property concerning its repair or replacement or payment of costs incurred in connection with the damage, at no additional cost to the Employer.

In the event of any claims for damage or alleged damage to property as a result of work under the Contract, the Contractor shall be responsible for all costs in connection with the settlement of or defence against such claims. Before the Performance Certificate will be issued, the Contractor shall furnish satisfactory evidence to the Engineer that all claims for damage have been legally settled.

The Contractor shall minimize the cutting and removal of trees and other vegetation. All cutting and removal shall be with the approval of the Engineer, and if necessary with the approval of the Relevant Authority.

Among other requirements, the Contractor shall liaise and conduct discussions to obtain agreements between private landowners and other public utilities companies to have necessary way leaves for carrying out the Works under the Contract.

Mitigation of Social Disturbances

The Contractor shall at all times minimise and mitigate any effects of construction of the works which could lead to social disturbances on La Digue.

As a result of the Contractor's activities under the Contract, the construction works have the potential to impact the community life, particularly rights and interests of vulnerable (population) groups. Here the Contractor shall implement protective measures as follows (as minimum):

- The Contractor shall maintain open communications with the local government and concerned communities (erect notification boards in local language/s at construction sites providing information about the project and contact numbers).
- Concerned community(ies) shall be informed at least one week before site clearance is started.
- The Contractor shall coordinate with local authorities (leaders of local wards or communities) for agreed schedules of construction activities at areas near sensitive places or at sensitive times (e.g. religious and/or festival days).
- Local residents shall be informed about construction and work schedules, interruption of services and demolition, where applicable.
- Community concerns and information requirements shall be monitored in line with the project progresses.
- Contractor shall provide warning signs at the start and end of any trench when excavating and laying pipes for the new force mains.
- If approriate, the Contractor shall mitigate disturbance to cultural sites (e.g. church, temple, mosque, community) by avoiding unloading materials, parking vehicles/construction plants within 20 m of any cultural site. If this is unavoidable, the unloading/parking shall be finished within 3 hours.
- Water shall be sprayed regularly if construction is near any cultural structure or complaints will be raised by individuals or community leaders.
- The Contractor shall carry out consultation with those affected as early as possible if it is not avoidable to use these sites.
- The Contractor shall respond to telephone inquiries and written correspondence in a timely and accurate manner.

The Contractor shall carry out construction of the works while avoiding inconvenience as far as possible to the owners and occupants of properties adjacent to the works. Any costs for any measures provided in this regard shall be borne by the Contractor.

The Contractor's staff shall in no way be a nuisance to nearby residents. Any complaints received by the Engineer will be addressed and the relevant persons shall be removed from the work site.

The Contractor shall ensure that access to property is not unreasonably disrupted. When it is necessary to temporarily deny access to owners or tenants to their property or when any utility service connection must be interrupted, the Contractor shall give written notice as prescribed herein or by the Relevant Authority sufficiently in advance to enable the affected persons to provide for their needs. Notices shall include appropriate information concerning the interruption and instructions on how to limit their inconvenience.

Control of Traffic at Work Sites

The Contractor shall comply with all the Applicable Laws with regard to road safety and transport. The Contractor shall instruct its drivers and equipment operators that vehicles shall comply with all road ordinances, such as speed limits, roadworthiness, load securing and covering.

The Contractor's vehicles shall be permitted only within the designated work sites or on existing roads, as would be required to complete their specific tasks. Vehicles are not permitted on re-vegetated areas, and site traffic shall be limited to prevent unnecessary damage to the natural environment.

The Contractor shall not enter for any deliveries or occupy for any other purpose with men, tools, equipment, construction materials, or with materials excavated from any trench or pit in any private property outside the designated way-leaves, without written permission from the owner and/or tenant of the property.

The Contractor shall note that the construction of the sewers and manholes in La Digue sewerage network shall take place under public roads in the majority of cases.

The Contractor shall arrange with property owners to establish and maintain temporary access roads to various parts of his site as required to complete the works at his own cost.

Such roads shall be available for the use of all others performing work or furnishing services in connection with the Contract.

Existing public access roads used by the Contractor in connection with the execution of the Contract shall also be maintained by the Contractor.

The Contractor shall not keep the trenches open for a long time in the built up areas in the town centre of La Digue or in the places where it affects the traffic except as otherwise instructed by the Engineer.

Noise Control

The Contractor shall take reasonable measures to avoid unnecessary noise. Such measures shall be appropriate to maintain the legal noise levels applicable to each area.

All construction machinery and vehicles shall be equipped with practical sound muffling devices and shall be operated in a manner to cause the least noise consistent with scheduled performance of the work. The Contractor shall install silencers/mufflers on exhaust of noisy machines in acoustically protected areas.

During construction activities on or adjacent to occupied buildings and when appropriate, the Contractor shall erect screens or barriers effective in reducing noise in the building, and shall conduct his operations to avoid unnecessary noise which might interfere with the activities of building occupants.

The Contractor shall where possible avoid construction activities outside of normal working hours i.e. 07:00 hours to 17:00 hours Monday to Saturday excluding Public Holidays. Where this is unavoidable the Contractor shall inform local communities at least two days before construction takes place during early morning and/or late at night. Any proposal by the Contractor to work outside of normal working hours shall be subject to the approval of the Engineer.

The Contractor shall also establish communication platforms for complaints and compliments measures as part of its noise control activities.

Vibration Control

All mechanical equipment and construction processes on or off the Site shall not cause excessive vibration which may disturb any occupant of any nearby dwellings, schools, hospitals or premises with similar sensitivity to vibration. Vibration caused by any construction activities, including movement of construction equipment, shall be in accordance with the relevant local laws and regulations, the requirements of the Relevant Authorities and any other statutory approvals issued for the Works.

8.2.13 Liaison with Engineer and Third Parties

Liaison with Relevant Authorities

The Contractor shall make all necessary arrangements with and obtain all necessary approvals, permits and consents from the Relevant Authorities, utility companies and other government departments for the design, execution, commissioning and hand over of the Works. The Contractor shall be deemed to be fully aware of the requirements and procedures of all Relevant Authorities, utility companies and other government departments. All correspondence, meeting notes and submissions made pursuant to this Clause shall be submitted to the Engineer for information.

The Contractor shall maintain close liaison with utility companies and contractors employed by the other organizations who are carrying out works on or adjacent to the Site. The Contractor shall ensure that the progress of the Works is not adversely affected by the activities of such other parties and vice versa. The Contractor shall inform the Engineer – in prompt and timely manner to prevent delay in the progress of carrying out the Works – when the potential disruptions due to the other parties are anticipated.

Liaison with Private Persons

The Contractor shall be responsible for liaising with and obtaining permission from all owners and/or occupiers of private lands and properties in order to gain access to such properties for the execution of the Works and the purpose of carrying out survey works, monitoring works, investigation works, utilities connection works, materials and plant storage and the like. No access to private lands shall be permitted at any time without the private agreement of the landowner, occupiers or other users and the approval of the Engineer.

The Contractor will need to work on private property to make the house connections to the piped sewer system. This shall be in two stages, firstly trial pits will be constructed by the Contractor as part of the investigation works. Secondly the existing house connection to the cess pit or septic tank will be disconnection and a new house connection made to the piped sewer system.

In cooperation with the PUC and the relevant authorities in La Digue the Engineer and the Contractor shall jointly first obtain permission to enter each private property to undertake an inventory of the house connection and the trial pit excavation works associated with it.

In cooperation with the PUC and the relevant authorities in La Digue the Engineer and the Contractor shall then jointly first obtain permission to enter each private property to undertake the construction of the house connection works.

8.2.14 Management of O&M Activities

Protection of Air Quality

In addition to the requirements above, the Contractor shall provide protection of air quality during the O&M Services, and among others shall ensure that waste generated during the O&M services is not burnt.

The main issue with odour control will occur during the O&M Period with the operation of the pumping and lifting stations. To prevent this occuring the Contractor shall first ensure that house connections are properly vented when they are connected to the sewer network. In addition the Contractor shall properly maintain the odour control units - using activated carbon - of the sump vent pipes of all of the pumping and lifting stations. This is critical to ensure that odour does not become a nuisance to neighbouring properties.

Protection of Surface and Ground Waters

In addition to the requirements above, the Contractor shall provide protection of surface and ground waters during the O&M Services.

During the O&M services, among others the Contractor shall ensure the proper operation of the La Digue WWTP so that only fully treated effluent is discharged into the infiltration trenches. Although the discharge of treated effluent in to the water table will be minimised if an agreement is reached between the Employer and L'Union Estate for the L'Union Estate to take treated effluent from the WWTP for irrigation, nonetheless the Contractor shall still ensure that the WWTP is properly operated to provide treated effluent that can be safely and satisfactorily discharged into the infiltration trenches for disposal purposes for the entire volume of treated effluent of the WWTP.

Management of Waste Disposal

In addition to the requirements above, the Contractor shall provide management of waste disposal during the O&M Services.

The main elements of the sludge treatment to be operated at the La Digue WWTP will be as follows:

- A sludge thickener from which a dry solids content of about 3.5% is expected;
- Mechanical dewatering from which the dry solids content of the sludge should be increased to at least 18%; and
- Solar sludge drying beds which should achieve a dry solids content of 90%.

As a result of these processes being operated correctly a sludge quantity of less than 1 m3 per day is expected to be produced with a dry solid content of 90%.

During the O&M Period, the quantities generated shall be disposed at the adjacent La Digue landfill once the sludge is sufficiently dried, unless instructed otherwise by the Engineer.

After the existing households are connected to the piped sewerage system, the Contractor shall be responsible for pumping out and disposing of the sludge from the household septic tanks or cesspits. This activity forms part of the O&M Services of the Contract.

Mitigation of Social Impacts

In addition to the requirements above, the Contractor shall provide mitigation of social impacts during the O&M Services.

Health and safety plans shall be submitted by the Contractor to the Engineer for approval. These shall specify the manner in which the operational and occupational health and safety shall be protected. Included shall be:

- Identification of operational hazards and respective measures;
- Identification of occupational hazards and respective measures;
- Safe working procedures and definition of authorized personnel;
- Required hazard warning notices for toxic chemicals, or restricted areas; and
- Safety training and vaccination of personnel.

Liaison with Engineer and Third Parties

In addition to the requirements above, the Contractor shall liaise with the Engineer and third parties during the O&M Services.

During the O&M Period, the Employer shall retain the responsibility of the billing and collection of water tariffs and any associated sewerage charges. The Contractor shall liaise with the Employer, as well as the respective households connected to the sewerage system, for any actions associated with this function of the Employer.

After the existing households are connected to the piped sewerage system, the Contractor shall be responsible for pumping out and disposing of the sludge from the household septic tanks or cesspits. As part of the O&M Services of the Contract, the Contractor shall properly liaise with the respective household for this activity.

8.2.15 Other Requirements

Containment Plan for Sewage Spills during Construction

The Contractor shall prepare a containment plan to prevent, control and remedy sewage spills during construction. This plan shall in particular focus on the overall sequence of construction of the different elements of the works i.e. WWTP, gravity sewers, force mains, lifting stations and pumping stations, and the connection of the houses. Once this sequence with time schedule is determined the containment plan for sewage spills during construction can be developed.

The procedure for connecting the houses to the piped sewer network shall prevent sewage spills. The procedure for the maintenance of temporary flows in the sewer network once houses are connected shall also be described. This will require the operation of the pumping/lifting stations on those parts of the network which have houses connected to them. The focus of the plan shall be on containing sewage spills should they occur, minimising both their volume and the extent to which they spread. The equipment – with operators - to collect any spilt sewage shall be available at short notice, where spillages occur. Any spilt sewage collected shall be taken to a disposal site approved by the Engineer.

Where necessary, drains shall be temporarily blocked to prevent the spread of sewage. Also, where feasible, spilt sewage shall be temporarily impounded to prevent its further spread. The plan shall allow for the rapid mobilisation of the Contractor's staff to deal with any spillages.

The plan for sewage containment during construction shall be subject to the approval of the Engineer.

Containment Plan for Sewage Spills during O&M Period

The Contractor shall prepare a Containment Plan to prevent, control and remedy sewage spills also during the O&M Period. The Containment Plan for the O&M Period shall be subject to the approval of the Engineer.

The proper operation of the sewerage network as it has been designed should prevent spillage of sewage. In particular, the maintenance of power supply during power blackouts, through the operation of the standby generators, should avoid the shutdown of the pumping and lifting stations and the La Digue WWTP, all of which could lead to a spillage of sewage.

The focus of the plan shall be on containing sewage spills should they occur, minimising both their volume and the extent to which they spread. The equipment – with operators - to collect any spilt sewage shall be available at short notice, where spillages occur. Any spilt sewage collected shall be taken to the WWTP for treatment.

Where necessary, drains shall be temporarily blocked to prevent the spread of sewage. Also, where feasible, spilt sewage shall be temporarily impounded to prevent its further spread. The plan shall allow for the rapid mobilisation of the Contractor's staff who are responsible for the O&M of the sewer network to deal with any spillages.

Maintenance Plans for Sewer Network during O&M Period

The Contractor shall provide an Operational Management Plan (OMP) for the sewer network. This OMP shall include a detailed Maintenance Plan for the sewer network – including pump stations – constructed under the Contract.

This detailed Maintenance Plan for the sewer network shall also form part of the O&M Manuals to be provided prior to Completion, also subject to the Engineer's approval, and shall also meet the requirements of the Environment Department and Environmental Health Department of Seychelles.

Right of Engineer to Suspend Work

The Engineer shall have the right to suspend work in the event of significant infringements of any of the Environmental Requirements of the Contract, until the situation is rectified. In this event, the Contractor shall not be entitled to claim for delays or any incurred expenses.

8.3 Feedback Acceptance, Grievance Redress Mechanism

The Project will include a Grievance Redress Mechanism (GRM) that is designed to facilitate feedback from any Project participant or stakeholder regarding project operations, management, use of resources and impacts of activities, intentionally or otherwise, and resolution of the same by project management, Government and/or the EIB. In the event that any Project stakeholder feels that the principles or processes of the project have not been adhered to or followed, or that resources have been misused or any person or persons have abused the process for personal gain, or that the Project is seen as harming households or community groups, then those stakeholders have the right to raise their concerns and to seek satisfactory acknowledgement and resolution of their grievances. This right is essential to ensure transparency and accountability. Stakeholders will be informed of the Project GRM through community meetings, Project documentation and through the local media. The Project Grievance Resolution Mechanism uses a three stage approach:

Stage 1: If the source of the concern is located within a community itself, then the first attempt to resolve the problem will be made through traditional methods and mechanisms at village level (relying District Representatives) to report and resolve the issue if possible. Otherwise, a public meeting may be called to help resolve the problem.

Stage 2: If local methods cannot solve the problem to the satisfaction of the concerned stakeholders, the stakeholders may then take the matter to the District Administration or PUC, who will endeavour to propose a satisfactory solution.

Stage 3: Should neither the District Administrator nor PUC be able to offer a satisfactory solution, the matter may then be referred to the District Grievance Committee. If there is currently no such committee, the District Administration/Council, with District Administration/Council endorsement will appoint such a committee. The Committee will consider whether the grievance is genuine and, if so, will suggest an appropriate course of action to resolve the matter. If, however, either the aggrieved party or the party at fault does not accept the suggested solution, the Grievance Committee may then direct that the matter be forwarded to the District Administration or an arbitration system for resolution.

If, for any reason, stakeholders feel that the local institutions cannot assist in the resolution of grievances because they include an individual or individuals who have themselves abused the process, then they may take their grievance to the PUC, either directly, or through any other third party such as an NGO, a faith-based group, or a women's network, etc.

The District Administration would be responsible for recording the grievance or complaint using **FORM 1**, below (or something similar), and for reporting to the PUC on grievances recorded through his/her progress report. If, due to its nature, the grievance requires immediate attention, the Community Helper would inform the PUC without waiting for quarterly report submission. The summary report of grievances/complaints from the CHs would be captured in the project's management information system (MIS) at the by the District Administrator/Council Chairperson. The MIS would track the date and type of comment or complaint (informational, regarding sub-project process, project staff behaviour, use of sub-project financial resources, etc.), how and when the comment or complaint was resolved. The District Administrator will consult each other on all complaints received on at least a quarterly basis to respond to any systematic issues or problems. The PUC (M&E Officer) would track and report on the overall project grievance resolution process to the EIB Bank for discussion and action as required during their implementation support missions.

FORM 1 : COMMUNITY FEEDBACK/COMPLAINTS RECORDS

Name of District Representative:

For the period from: . . . . . / . . . . /. . . . . to . . . . / . . . . / . . . . .

Date	Name	Nature of Complaints	Actions taken to follow up and Outcomes	Complaints addressed completely?

8.4 Implementation Responsibilities

Responsibilities of Project key stakeholders in implementing the ESMP are allocated in the table below.

Responsibilities of Project key stake holders in implementing the ESMP

Stake holder	Key Responsibility
PUC/PMU	Facilitate information disclosure process
PUC/PMU	• Provide inputs to activity Environmental Codes of Practices (ECOPs) as and when required • Incorporate relevant mitigation measures proposed in activity ECOPs into detail engineering design of the activity • Incorporate ECOPs and relevant Mitigation measures into bidding documents and construction contract • Oversee the implementation of mitigation by the communities/contractors • Provide guidance to communities/contractors to address arisen socio-environmental issues during construction phase of the work • Provide technical guidance to benefited community to promote safe and environmental sound maintenance of the works provided
District Administration	• Attend safeguard training organised by the Project • Facilitate project activities related to community consultation and information dissemination • Collect local information to provide inputs for socio-environmental eligibility and impacts monitoring • Facilitate community in monitoring of relevant activities during community meeting and follow up till finalisation • Facilitate community, particularly assist SIC, in monitoring socio-environmental impacts of activities and follow up till finalisation • Facilitate community participatory monitoring during the construction phase of relevant activities
Community SIC	With the assistance of District Administration and the Community and the guidance of SIC, members of the benefited communities will:: • Participate in environmental monitoring process, • Propose alternative options to ensure that activities are eligible and/or have minimal negative socio-environmental impacts • Actively participate in environmental monitoring during construction • Undertake mitigation measures during the construction phase of the works provided by the Project • Arrange and implement proper maintenance of the works to ensure potential impact during operation phase are mitigated

Stake holder	Key Responsibility
Contractors	• Implement the mitigation measures specified in construction contract • Monitor environmental conditions in areas disturbed by the contractor and report to the work supervisor/the Engineer. • When socio-environmental issues arise, report the issues to the Work Supervisor/the Engineer to obtain guidance on actions. Make records of such issues and follow up

8.5 Promoter's Responsibilities of the Finance Contract

In addition to the implementation responsibilities of Section 8.4 above, PUC as the Promoter of the Project is also responsible that the associated requirements of the Finance Contract between the Government of Seychelles and the European Investment Bank are adhered during Project implementation.

For these, the Promoter must comply with the following obligations:

(a) Implement and operate the Project in compliance with Environmental Law;
(b) Obtain and maintain requisite Environmental Approvals for the Project; and
(c) Comply with any such Environmental Approvals.

For the above obligations, "Environment" means the following, in so far as they affect human health and social well-being:

- Fauna and flora;
- Soil, water, air, climate and the landscape;
- Cultural heritage and the built environment;
- And includes, without limitation, occupational and community health and safety matters and working conditions.

For the above obligations, "Environmental Claim" means any claim, proceeding, formal notice or investigation by any person in respect of any Environmental Law.

For the above obligations, "Environmental Law" means:

- EU law, standards and principles as specified by the EIB;
- The Republic of Seychelles' national laws and regulations; and Applicable international treaties;
- Of which a principal objective is the preservation, protection or improvement of the Environment.

For these, EIB funds will not be used by the Promoter prior to completion of Environmental and Social Impact Assessment and stake-holders participation as required by the national legislation and satisfactory to the EIB.

8.6 Borrower's Responsibilities of the Finance Contract

In addition to the implementation responsibilities of Section 8.4 above, the Government of Seychelles as the Borrower of the Project is also responsible that the associated requirements of the Finance Contract between the Government of Seychelles and the European Investment Bank are adhered during Project implementation.

For these, the Borrower must procure that the Promoter promptly informs the EIB of:

- Any action or protest initiated or any objection raised by any third party or any genuine complaint received by the Borrower or any material Environmental Claim that is to its knowledge commenced, pending or threatened against it with regard to environmental or other matters affecting the Project; and
- Any fact or event known to the Borrower, which may substantially prejudice or affect the conditions of execution or operation of the Project;
- Any non-compliance by it with any applicable Environmental Law; and
- Any suspension, revocation or modification of any Environmental Approval, and set out the action to be taken with respect to such matters.

For the above, "Environment" and "Environmental Law" and "Environmental Claim" mean the same as the definitions of Section 8.5 above.

9 Stakeholder Engagement and Public Consultation

9.1 Overview

In reference to Chapter 10 of Volume I of EIB's Environmental and Social Handbook (version 9.0 of 02/12/2013): The specific objectives of stakeholder engagement and public consultation include the following:

- Establish and maintain a constructive dialogue between promoter, affected communities and other interested parties throughout the project life cycle;
- Ensure that all stakeholders are properly identified and engaged;
- Engage stakeholders in the disclosure process, engagement and consultations in an appropriate and effective manner throughout the project lifecycle, in line with the principles of public participation, non-discrimination and transparency;
- Ensure that the relevant stakeholders, including commonly marginalised groups on account of gender, poverty, educational profile and other elements of social vulnerability, are given equal opportunity and possibility to voice their opinions and concerns, and that these are accounted for in the project decision-making.

The above is consistent with Regulation 6(1) of the Environment Protection (Impact Assessment) Regulations, 1996, of Seychelles, in which the Authority undertakes a scoping exercise, where the Proponent first meets with the Authority to discuss the project and the list of stakeholders to be consulted during the scoping activity. This is followed by a process where stakeholders are consulted on the issues that need to be taken into account in the ESIA. The ESIA Report is then subjected to public inspection as required for Class I studies that need to be so in order to be in accordance with Regulation 8(1) of same regulations.

9.2 Scoping Meetings with Relevant Authorities

As part of the consultative process, the Ministry of Environment, Energy and Climate Change, which is the Relevant Authority of the EIA process in Seychelles, was consulted. This resulted in scoping meetings with internal stakeholders of that ministry, in which no serious concerns were raised towards the Project.

Other stakeholders such as the Planning Authority and the Ministry of Natural Resources and the District Authorities were also consulted. These stakeholders also did not raise any serious concerns towards the Project.

9.3 Consultation Meetings with the Public

As associated with this ESIA Report: The Promoter consulted communities and people that are likely, or may be adversely impacted from the Project. This process of consultation was undertaken in a meaningful manner that provided the affected parties with opportunities to identify and express their views on project risks, impacts and mitigation measures, and engaged in a collaborative process with the Project in responding to, and addressing considerations raised.

Among others: ESIA public consultation meetings were arranged on 3rd June 2016 and 25th June 2016. Notes from these meetings are provided in Annex 7.

9.4 Environmental Approval of the Project

In reference to the Finance Contract between the Government of Seychelles and the EIB: The Promoter has an obligation to obtain the requisite Environmental Approval for the Project.

For this purpose, the following steps of the process of preparing an EIA study for Class I projects in Seychelles were carried out:

(1) Scoping meeting with the Department of Environment,
(2) Undertake scoping study & prepare scoping report,
(3) Upon submission of scoping report the ministry provides the detailed Terms of Reference to carry out the ESIA Report,
(4) ESIA Report is undertaken on the basis of the Terms of Reference,
(5) ESIA Report is submitted to the promoter for review,
(6) ESIA Report is submitted for internal review,
(7) ESIA Report is submitted for public review,
(8) ESIA Report undergoes final appraisal for environmental approval.

As associated with this ESIA Report: Stakeholders were satisfactorily engaged on environmental and social issues that could potentially affect them through a public participation process comprising both information disclosure and public consultation. People and communities were also identified that are or could be affected by the Project, as well as other interested parties.

For Project implementation: Safeguards and mechanisms have been satisfactorily established that will maintain a constructive relationship with stakeholders on an ongoing basis through adequate engagement throughout implementation of the Project. These include the environmental and social requirements: that are incorporated into the tender and contract documents; and that shall be complied by the construction Contractor and supervised by the supervising Engineer.

As a result of the above: Environmental Approval was dispatched to the Promoter by the Relevant Authority on 2nd March 2017 which is provided in Annex 9.

10 Conclusions

This ESIA Report has been prepared to fully meet the requirements of the Environment Protection Act of the Government of Seychelles, among which are true statements and descriptions of:

- The location, size and scope of the project or activity and description of the original state of the environment prior to implementation of the project or activity;
- The principle, concept and the purpose of the project or the activity;
- Technical aspects relating to the project or the activity;
- The direct or indirect effects that the activity is likely to have on the population, flora and fauna, soil, air, water, landscape, and other physical assets including historical, artistic and archeological;
- Any actions or measures which may avoid, prevent, change, mitigate or remedy the likely effects of the activity or the project on the environment;
- The inevitable adverse effects that the project or the activity is likely to have on the environment if it is implemented in the manner proposed by the proponent;
- The irreversible and irretrievable impact on the commitments of resources which will be involved by the project or the activity;
- The actions or measures proposed for compensating physically or financially for any resulting loss or damage to the environment;
- A study of the feasible alternatives considered, including a summary of all the expected impacts;
- An environmental monitoring programme;
- Such other information as may be necessary to a proper review of the potential environmental impact of the project or the activity.

This ESIA Report has also been prepared to fully meet the requirements of the EIB, among which attention was given to the following:

- The physical characteristics of the whole project and, where relevant, its area of influence, during the construction and operational phases;
- The location of the major works, with particular regard to the environmental sensitivity of the geographical area likely to be affected and social aspects;
- The impacts on human rights, likely to be significantly affected by the proposed works;
- The communities likely to be impacted by the project, and of other relevant stakeholders;
- The likely significant effects of the proposed project on the environment, population and human health resulting from: the expected residues, emissions and the production of waste; the use of natural resources, in particular soil, land, water, and biodiversity; and any expropriation, land acquisition and easements and/or involuntary resettlement of people and likely restrictions on access to land, shelter and/or livelihood;
- The measures foreseen to avoid, prevent or reduce any significant adverse effects on the environment, human health and well-being.

All of the above has been taken into account in this ESIA Report.

Otherwise, the Project is not subject to Environmental Impact Assessment per Directive 2011/92/EU under EU Law, because the associated waste water treatment plant does not have a capacity exceeding 150,000 population equivalent as defined in Point 6 of Article 2 of Council Directive 91/271/EEC of 21 May 1991 concerning urban waste-water treatment.

Regardless, the Promoter has complied with its obligations under the Finance Contract between the Government of Seychelles and the EIB to obtain the requisite Environmental Approval for the Project from the Relevant Authority in Seychelles, as evident by the Environmental Approval that was dispatched to the Promoter by the Relevant Authority on 02.03.2017 and provided in Annex 9.

This ESIA Report concludes that the proposed Project poses no serious impact on the environment as well as on the livelihood of the people in the vicinity of the Project sites. The expected negative effects can be satisfactorily monitored and mitigated, and are mostly limited to the Project implementation phase only.

Annex 1: Terms of Reference

TERMS OF REFERENCE FOR THE PREPARATION OF AN

ENVIRONMENTAL IMPACT ASSESSMENT (EIA) STATEMENT UNDER THE ENVIRONMENT PROTECTION (IMPACT ASSESSMENT) REGULATIONS, 1996

REHABILITATION OF PROVIDENCE WWTP, SEWERAGE PUMPING STATIONS & RISING OF VICTORIA MAINS & CONSTRUCTION OF LA DIGUE WASTEWATER SYSTEM.

MINISTRY OF ENVIRONMENT ENERGYAND CLIMATE CHANGE
ENVIRONMENTAL ASSESSMENT AND PERMITS SECTION
WASTE, ENFORCEMENT & PERMITS DIVISION
BOTANICAL GARDENS
P. O. BOX 445
VICTORIA

Terms of Reference for the preparation of an Environmental Impact Assessment (EIA) Statement For sewerage treatment network project

APPLICANT:

PROPOSED DEVELOPMENT: SEWERAGE NETWORK PROJECT

LOCATION: MAHE & LA DIGUE

PREAMBLE

Pursuant to Schedule 1, Regulation 3(1) (b) of the Environment Protection (Impact Assessment) Regulations, 1996, Schedule 1, hotels, restaurants, tourism, residential are prescribed project under Section 15(1) of the Environment Protection Act, 1994 the preparation of an Environmental Impact Assessment (EIA) statement is required when an application is made to the Authority for Environmental Authorization.

DEGREE OF DETAIL

In preparing the EIA, it is the applicants' responsibility to address the impacts of the proposal to the degree necessary to enable the Authority to be informed of all relevant impacts of the proposal. The level and nature of investigations should reflect the type and scale of impacts.

***It should be noted that the preparation of Terms of Reference for an EIA does not indicate approval or support in any way, nor does it indicate approval in principle*.**

CONTENTS

The EIA produced to accompany the application is to address the issues set out below and should generally follow the format as suggested in this document.

1. Executive Summary

An executive summary of no more than five pages must be included. This should be written as a non-technical summary which provides an overview of the EIA report in simplified layman's terms. The aim of the Executive Summary is the listing of key Impacts, strategies to be employed to manage the impacts and performance indications for auditing purposes.

A section of the Executive summary should include a **Socio-Economic Impact Assessment;**

As a result of the findings of the ESIA and addressing issues raised in the stakeholder consultation in the preparation of the Scoping Report, all the measures to be taken by the developer to mitigate impacts that will have **direct bearings on the existing residents** should be summarized in this section. This should include detailed scheduling of works so as to have minimal disturbances to the livelihoods of the community.

2. Alternatives to the project

Describe any prudent and feasible alternatives to the proposed development investigated during the planning process, including alternative locations for such a development, with an overview of the consequences in each case. Discussion should include the reason for choice of the preferred option, and the likely situation and use of the site if the project does not proceed.

3. Terms of Reference

The Terms of Reference and accompanying letter of transmission provided by the Ministry of Environment, Energy and Climate Change must be included in the EIA documentation.

4. Scoping comments

A list of all the stakeholders consulted (scoped) for the project including copies of all their comments and concerns (scoping verification forms) should be attached in the EIA Report.

5. Policy, Legal and Administrative Framework

Outline the pertinent regulations standards and policies governing environmental quality, health and safety, protection of sensitive areas, protection of endangered or threatened species as well as infrastructure development and land use control at the national and local levels in relation to the proposed project.

6. Description of the Proposal

State the objectives of the proposal and why it is needed, the type of development proposed, including information on:

- Location of the site (including map) and a site plan (that is the nominated positions or areas for the development, and the location and identification of all facilities on the site;
- Details of existing sewage systems in the area.
- Detail storm water management to show all the networks and pathways for the whole development;
- Service requirements for electricity, potable water supply and drainage, including volume of water needed for the whole development and **assurance from service provider that this additional demand can be met;**
- Area of land required for the various types of development; describe land tenure; present tenure, land uses, right of ways, ownership and encumbrances of the proposed site.
- The impacts of the proposed on other projects of National importance (such as drainage management projects);
- Land acquisition information if need be to accommodate the proposal;
- Impacts on site of cultural/heritage significance;
- Describe town planning provisions affecting the land;
- Number of residential units, allotment size, and resultant population size if required for the project;
- Distances to boundaries.

Provide details of the development including:

- Construction timetable including the working hours;

- Quantities, nature and sources of materials required for fill, aggregate for construction, and transport routes and methods;
- Extent and methods of excavation, extent of earthmoving and methods, sites of spoil disposal and containment, machinery and equipment to be used;
- Machineries and equipment to be used;
- Project implementation plan which shall include a communication plan to be adopted during the construction phase; the plan is to also include how the work will be implemented and its impacts on other activities;
- Landing areas for unloading and loading of construction materials;
- Assess the impacts of transportation of all the construction materials to the site;
- Building design limitations and standards (e.g. height, elevations, materials, architectural criteria, buildings design on pillars or stilts, structural improvement to discourage entry of birds, climate change, aesthetic value and buffer/set back distances from water bodies);
- Details of the manner in which the proponent proposes to accommodate the workforce during construction;
- A detailed Construction Environmental Management Plan -CEMP for the project must be submitted once the contractor for the project has been identified. The plan must include established mitigative measures, systems and procedures to be employed during the construction phase of the development. The CEMP must indicate which component of the project will be implemented first and last with the associated time frame.
- Key milestones (including assigned responsibilities) will have to be indicated. A project implementation plan has to be submitted prior to the commencement of construction works.

State and discuss pollution management strategies and control measures to be used, including:

- Measures to be taken to prevent any spillage of oil and diesel onto the access road during the construction and operational phases; remedial measures to be taken should there be any spillage; and
- Control measures to be taken during construction to minimize dust, noise, and air as well as water pollution.

The following details relevant to the proposed site and surrounding area should also be described:

- Past and current usage of the site and its surrounding area;
- Approvals required for the project and expected program for approval applications.

7. Description of Environment and Assessment of Potential Impacts

Topography

- Describe of the proposed site in relation to the catchments system, watersheds and any waterways on or near the site; calculate the approximate areas and their estimated discharge; table showing the various channels draining these watersheds with their discharge capacities must be included; including gullies, depressions, valley, cliffs, and rocky reliefs.

- Describe the area surrounding the proposed site including information on: buffer distances; aesthetic and landscape values; structures or archaeological areas of cultural, historical, religious, heritage or social importance; and
- Provide details on the overall environmental protection measures incorporated in the design, siting, layout, landscaping, and rehabilitation and associated works to minimize impacts on the environment.

Hydrology

- Provide a description of existing surface drainage patterns, flows, likelihood of flooding and present water uses;
- All existing flow paths, water retention and buffer zones should be mapped and presented on a comprehensive site map;
- A detailed hydrological assessment of the parcel must be carried out;
- Details of the generated runoff and discharge potentials must also be provided;
- A master plan showing all existing watersheds influencing the area of interest and proposed drainage alignment, location of conduits, culverts etc. (drainage network)., as well as analysis on amount of water generated on site and from these watersheds and proposed techniques to effectively drain excess water;
- Describe impacts on water quality associated with storm water runoff and other critical conditions taking account the measures proposed to mitigate such impacts; Specific references should be given to the processes of siltation and the effects of these on the marine environment and the littoral zone;
- Assess the impacts that will be generated by erosion induced by storm water run-off and sediment wash down, existing water courses, and propose mitigative measures for those;
- Provide an erosion and sedimentation control plan as part of the management plan;
- Discuss anticipated flows of water to and from the project area under critical conditions, including the consequences of failure (under such conditions) of proposed pollution control works;
- Details of temporary drainage and sediment control measures during the construction phase must be provided;

Climate

- Describe the existing climatic conditions of the area including average rainfall per year, prevailing wind patterns, and susceptibility to disaster caused by natural events pressure levels.

Soils and Geology

- A description of the areas to be disturbed; and
- Likely influences of the geological features on water quality in the area, particularly if disturbed during construction.

Visual Impact

- Predict the visual impacts (particularly of the hillside from the coastal areas) that might be generated by the development and propose ways to minimize such impact;

Flora

The degree of disturbance to the landscape and stage of regeneration should be outlined along with the following:

- Major species and communities present in all habitat types within the area;
- The extent of disturbance to the natural vegetation as well as existing infrastructure;
- Any rare or endangered species, their habitats requirements and sensitivity to changes;
- A Vegetation Management and Rehabilitation Plan should be submitted to be endorsed by the Department of Environment and other relevant agencies prior to implementation of the plan. This should also include a landscaping plan incorporating a list of proposed indigenous plants to be used in the program.

Fauna

- **A description of fauna present in the area**, and at a regional scale, and a statement of the potential impacts of the proposal on the terrestrial and aquatic fauna; a description of other fauna present or likely to be present in the area;
- Any rare or endangered species, their habitat requirements and sensitivity to changes;
- Occurrence, distribution and requirements of migratory species;
- Highlight the measures to be taken in order to improve the habitat value of the site.

Transportation

Road network

- Any adverse effect of the development on the road network and the costs of measures to minimize those effects.
- Information is required on traffic generated by private and commercial movement during both the construction and operational phases of the development (including details of any staging);
- Should the movement of any very heavy and/or over-dimension loads be proposed, details about the intended routes to be used shall be given.
- Methodology that will be implied to carry the materials on site.
- Details relating to road access and parking facilities must in accord with the requirement of the Department of Transport and the Seychelles Land Transport Agency.

Health and Safety Issues

- State the procedures required for expatriate if they will be working on the project, like screening for any illnesses such as typhoid and other communicable illnesses that could trigger an epidemic;
- Define health and safety measures that should be put into place by contractors on site; and
- Develop a disaster and emergency contingency plan for the construction and operational stage for the development.

Air/Noise

- Noise - Define the areas of impact and measure and discuss ambient noise levels in all areas likely to be affected by the development. Indicate nearby land uses, dwellings which could be affected by the proposal. Where nearby residents are potentially affected by the proposal, list all noise sources and describe areas where noisy activity could be expected to occur as a result of the proposal. Provide details of proposed mitigation measures to be undertaken to minimize noise impacts on the surrounding environment;
- Air - Information on existing air quality should be provided for those air pollutants expected to be emitted by the proposed development, in particular, the impacts of dust nuisance, should be detailed. Provide details of proposed mitigation measures to be undertaken to minimize dust emissions during the construction phase and operation phase; and
- Burning - Define the site for the burning activities taking into account the proximity to residential areas, scale of burning required, materials to be burned, measures to ensure containment, emergency measures to be in place.

Socio-Economic

Discuss the following;

- A Land Use survey needs to be carried out in the area of influence to determine potential impacts on the different uses;
- Visual intrusion of the proposal upon the existing appearance and views of surrounding areas;
- The effects of the proposal on other property owners, including developments in the area; effects of the proposal on the population growth rate of the region; implications of the proposed development future development in the local area.

8. Environmental Management

In respect of impacts identified which need to be controlled, an environmental management program incorporating an **Environmental Management Plan,** whereby, Monitoring and Reporting is included. Where practicable the costs of monitoring programs should be estimated and responsibility for monitoring programs specified. References should be made to relevant legislation and standards.

An Environmental management plan should detail any:

- Habitat enhancement projects or rehabilitation measures;
- maintenance schedules;
- erosion and sediment management as well as flood management strategies;
- pollution control and waste management methods;

Monitoring programs should; ensure safeguards are being effectively applied; identify any unpredicted impacts requiring remedial measures; and measure any differences between predicted and actual impacts.

The reporting program should detail; steps to be taken to correct detrimental effects identified by monitoring; and procedures for reporting on monitoring programs and proposed recipients of reports.

The Environment Management Plan (EMP) should cover for the construction and operation phases of the resort. It should specifically detail all proposed environment monitoring to be undertaken in liaison with respective authorities.

The EMP must be included in the contractual clauses of the main contract and related sub- contract.

The EMP should make provision for the monitoring process to be conducted on a regular basis and should provide the necessary **auditing methods/template of forms** for this as part of the Environment Impact reporting of monitoring to be done.

It is stipulated that an Environment Officer (EO) should be appointed, with consent of the Department of Environment for the duration of the Planning and Construction period that will inspect and ensure compliance with the EMP on a daily basis. The EO must liaise on a regular basis with the responsible Authorities and provide a monthly monitoring report to the Authority.

Monthly environmental audits (entailing site inspection, review of monitoring records, reports, plans and other records) should be undertaken and submitted in monthly meetings with proponent/agent, developer, contractor and responsible authorities in the form of a monitoring report.

9. Conclusions and Recommendations

As a result of the findings of the EIA, present a balanced overview of the proposal's net impact and provide recommendations on the proposal. This should include the identification of any alterations to the proposal considered to further mitigate environmental impacts.

10. Consultation

In preparing the EIA, the applicant/consultant should consult affected and interest groups. The EIA should detail any public comment sought from and any consultation conducted with any affected groups (e.g. community, environmental, industry) in developing the proposal and preparing the EIA. **Issues as raised during the scoping phase for the EIA should be addressed in the report and satisfactorily dealt with.**

Early consultation is beneficial in helping to ensure that a development will cause a minimum of undesirable effects and in reducing delays in the latter stages of planning and design.

11. Copies of Report

Upon completion of the environmental impact assessment statement, a total of **three (3) hard copies and one (1) digital copy (preferably in Acrobat PDF format)** of the report are to be submitted to the Authority – Waste Enforcement and Permits Division, as part of any application.

Annex 2: Chance Find Procedures

In the event that artefacts, objects are exposed during construction phase, the contractor and relevant stakeholders will follow the procedures described below:

a. Stop the construction activities in the area of the chance find.

b. Delineate the discovered site or area.

c. Notify District Administration and secure the site to prevent any damage or loss of removable objects. In cases of removable antiquities or sensitive remains, a night guard or other relevant protection shall be present.

d. Notify the District Administration, who in turn would notify PUC (within 72 hours).

e. Contact the responsible local authorities who would be in charge of protecting and preserving the site before deciding on the proper procedures to be carried out. This would require a preliminary evaluation of the findings to be performed by the National Museum or National Archives. The significance and importance of the findings should be assessed according to the various criteria relevant to cultural heritage, including the aesthetic, historic, scientific or research, social and economic values.

f. Ensure that decisions on how to handle the finding be taken by the responsible authorities. This could include changes in the layout (such as when the finding is an irremovable remain of cultural or archaeological importance) conservation, preservation, restoration and salvage

g. Implementation for the authority decision concerning the management of the finding shall be communicated in writing; and

h. Construction work will resume only after authorization is given by the responsible local authorities concerning the safeguard of the heritage.

During project supervision, the Environment Officer shall monitor the above regulations relating to the treatment of any chance find encountered are observed.

Relevant findings will be recorded by the EIB in its regular supervision mission and through regular progress reports. If deemed appropriate, the Project's Implementation Completion Reports (ICRs) will also assess the overall effectiveness of the project's cultural property mitigation, management, and activities, as appropriate.

Annex 3: Land Commitment Letter Template

PUC Representative ----------

District Administration ----------

Dear Sir/Madam,

Re: LAND AVAILABILITY FOR THE PROJECT

This letter serves to confirm our commitment that land is available for the project. This land is given for the use of the _____.

The owners of the land in our community are Mr/Mrs. _____ who with a second family/family member confirm our commitment by putting their hand hereto;

This piece of land (_____) is confirmed to be free from dispute and the Project Committee and subsequent committees appointed by the District Authority to administrate the infrastructure are free to use the said land to provide/improve/expand the provision of the services directly provided by the infrastructure. The land owners fully agree that this commitment is irrevocable.

1. Resource owner (Name) 2. Resource owner representative

   _____ _____

2. Signature

   _____
   _____

3. Date

   _____ _____

4. Verified by Project Chairman and Secretary

   _____
   _____

   Chairman Secretary

Annex 4: List of Chemicals under Stockholm and Rotterdam Conventions

Stockholm Convention	Rotterdam Convention
Annex A	Pesticides
aldrin	2,4,5-T
chlordane	aldrin
dieldrin	captafol
endrin	chlordane
heptachlor	chlordimeform
hexachlorobenzene	chlorobenzilate
mirex	DDT
toxaphene	dieldrin
polychlorinated biphenyls (PCB)	dinoseb and dinoseb salts
	1,2-dibromoethane (EDB)
	fluroacetamide
	HCH (mixed isomers)
	heptachlor
	hexachlorobenzene
	lindane
	certain mercury compounds
	pentachlorophenol
	certain hazardous pesticide formulations of methamidophos
	methyl-parathion
	monocrotophos
	phosphamidon
	parathion
	Industrial chemicals
	asbestos (crocidolite)
	polybrominated biphenyls (PBBs)
	polychlorinated byphenyls (PCBs)
	polychlorinated terphenyls (PCTs)
	tris (2,3-dibromopropyl) phosphate recently added include pesticides
	binapacryl
	toxaphene
	ethylene dichloride
	ethylene oxide
	DNOC and its salts
	All formulations of monocrotophos and parathion
	Certain formulations of benomyl, carbofuran and thiram
	industrial chemicals
	asbestos (actinolite,anthophyllite, amosite, tremolite)
	Tetraethyl and tetramethyl lead

Annex 5: List of WHO Classification of Commercial Formulations of Pesticides Available in Seychelles

Pesticide formulations	Common Names	WHO classification of hazards	Main Use
Abamectin 0.15%EC	Abamectin	U	Insecticide
Bacillus thuringiensis	Bacillus thuringiensis	U	Insecticide
Bayticol Dip	Flumethrin	U	Insecticide for ticks
Carbaryl	Carbaryl	II	Insecticide
Carbofuran	Carbofuran	IB	Insecticide
Cartap	Cartap	II	Insecticide
Chlorpyrifos	Chlorpyrifos	II	Insecticide
Deltamethrin	Deltamethrin	II	Insecticide
Fenitrothion	Fenitrothion	II	Insecticide
Fipronil	Fipronil	II	Insecticide
ICON	Lambda-cyhalothrin	II	Insecticide/ mosquitoes
Karate	Lambda-cyhalothrin	II	Insecticide
Lambda 2.5%EC	Lambda-cyhalothrin	II	Insecticide
Malathion	Malathion	III	Insecticide
Mavrik	Tau-fluvalinate	II	Insecticide
Mustang	Imidacloprid	II	Insecticide for TB
Natrasoap	Potassium salts	UN	Insecticide/Miticide
Orthene/Otin	Acephate	III	Insecticide
Perkill 250 EC	Permethrin	II	Insecticide

Pyrethrum	Pyrethrin	II	Insecticide
Silafluofen	Silafluofen	II	Insecticide
Success	Spinosad	U	Insecticide
Target	Permethrin-pirimiphos-methyl	II	Insecticide
Tebufenozide	Tebufenozide	III	Insecticide
Termidor	Fipronil	II	Insecticide /termites
Yates Baysol	Methiocarb	1B	Molluscide
Yates Blitzem	Metaldehyde	II	Molluscide
Axiom	Mancozeb	U	Fungicide
Borrek	Chlorothalonil	U	Fungicide
Fos-Jet 60	Phosphite	U	Fungicide
Leaf curl	Copper oxychloride	III	Fungicide

Pesticide formulations	Common Names	WHO classification of hazards	Main Use
Tricyclazole	Tricyclazole	II	Fungicide
Amine 720	2,4.D	III	Herbicide
Butachlor	Butachlor	U	Herbicide
Glyphosate	Glyphosate	U	Herbicide
Gramoxone	Paraquat	II	Herbicide
Grasskill	Glyphosate	U	Herbicide
Boracol	Ethylene glycol +	II	Timber treatment
Eco-Bor	Disodium Octaborate Tetrahydrate	U	Timber treatment
Cockroach gel bait	Boric acid	U	Cockroach bait
Invicta	Abamectin	U	Cockroach bait
Contrac	Bromadiolone	1A	Rat bait
Rat tracking powder	Diphacinone	1A	Rat bait
Talon pillet	Brodifacoum	1A	Rat bait
Scarecrow bird repellent	Polybutene	U	Bird repellent
Quick Bayt	Imidacloprid	II	Fly bait
Mortein	Allethrin, Resmethrin	III	Household pests

8. 1A – extremely hazardous
9. 1B – highly hazardous
10. II – moderately hazardous
11. III – slightly hazardous
12. U – unclassified (not hazardous in normal use)

Annex 6: List of Land Parcels Affected by the Project

Type	LD Parcel	Type	LD Parcel	Type	LD Parcel	Type	LD Parcel
sPS/LS 01	LD491	Gravity Line	LD1272	Gravity Line	LD212	Gravity Line	LD1879
sPS/LS 02	LD749	Gravity Line	LD2069	Gravity Line	LD1215	Gravity Line	LD1216
sPS/LS 04	LD1766	Gravity Line	LD952	Gravity Line	LD789	Gravity Line	LD121
sPS/LS 03	LD1773	Gravity Line	LD840	Gravity Line	LD235	Gravity Line	LD1878
sPS/LS 07	LD1995	Gravity Line	LD1500	Gravity Line	LD1742	Gravity Line	LD1639
sPS/LS 12	no parcel number in database	Gravity Line	LD841	Gravity Line	LD1236	Gravity Line	LD748
sPS/LS 05	LD988 and LD 984	Gravity Line	LD1827	Gravity Line	LD891	Gravity Line	LD232
sPS/LS 06	LD597	Gravity Line	LD493	Gravity Line	LD1917	Gravity Line	LD1147
sPS/LS 10	LD913	Gravity Line	LD2086	Gravity Line	LD1051	Gravity Line	LD2217
sPS/LS 13	LD472	Gravity Line	LD236	Gravity Line	LD2179	Gravity Line	LD937
PS 01 to Final PS	LD1236	Gravity Line	LD942	Gravity Line	LD2067	Gravity Line	LD56
LSsPS/ 17	LD1215	Gravity Line	LD1766	Gravity Line	LD258	Gravity Line	LD716
PS 02 Final PS to WWTP	no parcel number in database	Gravity Line	LD638	Gravity Line	LD912	Gravity Line	LD2072
sPS/LS 08	no parcel number in database	Gravity Line	LD2106	Gravity Line	LD1083	Gravity Line	LD146
sPS/LS 18	LD1219	Gravity Line	LD458	Gravity Line	LD297	Gravity Line	LD918
sPS/LS 15	LD266	Gravity Line	LD1213	Gravity Line	LD2216	Gravity Line	LD1145
sPS/LS 11	LD1742	Gravity Line	LD575	Gravity Line	LD1219	Gravity Line	LD559
sPS/LS 09	LD252	Gravity Line	LD507	Gravity Line	LD122	Gravity Line	LD2006
sPS/LS 16	LD2216	Gravity Line	LD372	Gravity Line	LD2071	Gravity Line	LD61
sPS/LS 14	LD266	Gravity Line	LD1636	Gravity Line	LD314	Gravity Line	LD990
		Gravity Line	LD1995	Gravity Line	LD1275	Gravity Line	LD1859
Type	**LD_Parcel #**	Gravity Line	LD183	Gravity Line	LD938	Gravity Line	LD378
Pressure Line	LD445	Gravity Line	LD785	Gravity Line	LD986	Gravity Line	LD1986
Pressure Line	LD245	Gravity Line	LD1122	Gravity Line	LD176	Gravity Line	LD1496

Type	LD Parcel	Type	LD Parcel	Type	LD Parcel	Type	LD Parcel
Pressure Line	LD700	Gravity Line	LD1885	Gravity Line	LD1542	Gravity Line	LD927
Pressure Line	LD1766	Gravity Line	LD452	Gravity Line	LD1549	Gravity Line	LD356
Pressure Line	LD1025	Gravity Line	LD1224	Gravity Line	LD451	Gravity Line	LD325
Pressure Line	LD1995	Gravity Line	LD237	Gravity Line	LD1782	Gravity Line	LD312
Pressure Line	LD755	Gravity Line	LD755	Gravity Line	LD550	Gravity Line	LD2068
Pressure Line	LD1148	Gravity Line	LD1212	Gravity Line	LD660	Gravity Line	LD988
Pressure Line	LD1176	Gravity Line	LD1148	Gravity Line	LD1191	Gravity Line	LD1128
Pressure Line	LD1773	Gravity Line	LD1176	Gravity Line	LD450	Gravity Line	LD1187
Pressure Line	LD924	Gravity Line	LD2104	Gravity Line	LD2070	Gravity Line	LD411
Pressure Line	LD1973	Gravity Line	LD2130	Gravity Line	LD1294	Gravity Line	LD1274
Pressure Line	LD1505	Gravity Line	LD1093	Gravity Line	LD1214	Gravity Line	LD919
Pressure Line	LD266	Gravity Line	LD51	Gravity Line	LD60	Gravity Line	LD2117
Pressure Line	LD1027	Gravity Line	LD860	Gravity Line	LD1600	Gravity Line	LD597
Pressure Line	LD1215	Gravity Line	LD1085	Gravity Line	LD1628	Gravity Line	LD1826
Pressure Line	LD1742	Gravity Line	LD449	Gravity Line	LD457	Gravity Line	LD1982
Pressure Line	LD1236	Gravity Line	LD1884	Gravity Line	LD1988	Gravity Line	LD387
Pressure Line	LD2216	Gravity Line	LD1773	Gravity Line	LD1481	Gravity Line	LD1981
Pressure Line	LD1219	Gravity Line	LD924	Gravity Line	LD1130	Gravity Line	LD913
Pressure Line	LD2071	Gravity Line	LD795	Gravity Line	LD31	Gravity Line	LD1096
Pressure Line	LD491	Gravity Line	LD925	Gravity Line	LD984	Gravity Line	LD553
Pressure Line	LD384	Gravity Line	LD1190	Gravity Line	LD1105	Gravity Line	LD341
Pressure Line	LD660	Gravity Line	LD1054	Gravity Line	LD800	Gravity Line	LD1306
Pressure Line	LD1214	Gravity Line	LD1625	Gravity Line	LD953	Gravity Line	LD1296
Pressure Line	LD1323	Gravity Line	LD899	Gravity Line	LD1020	Gravity Line	LD1941
Pressure Line	LD984	Gravity Line	LD2066	Gravity Line	LD2190	Gravity Line	LD548
Pressure Line	LD1972	Gravity Line	LD266	Gravity Line	LD893	Gravity Line	LD48
Pressure Line	LD749	Gravity Line	LD505	Gravity Line	LD453	Gravity Line	LD88
Pressure Line	LD444	Gravity Line	LD1064	Gravity Line	LD506	Gravity Line	LD342
Pressure Line	LD252	Gravity Line	LD1017	Gravity Line	LD233	Gravity Line	LD39
Pressure Line	LD2143	Gravity Line	LD2131	Gravity Line	LD894	Gravity Line	LD1218

Type	LD Parcel	Type	LD Parcel	Type	LD Parcel	Type	LD Parcel
Pressure Line	LD2072	Gravity Line	LD916	Gravity Line	LD234	Gravity Line	LD167
Pressure Line	LD918	Gravity Line	LD1779	Gravity Line	LD2085	Gravity Line	LD1637
Pressure Line	LD1029	Gravity Line	LD1641	Gravity Line	LD49	Gravity Line	LD472
Pressure Line	LD988	Gravity Line	LD1501	Gravity Line	LD749	Gravity Line	LD155
Pressure Line	LD597	Gravity Line	LD168	Gravity Line	LD145	Gravity Line	LD306
Pressure Line	LD913	Gravity Line	LD797	Gravity Line	LD252	Gravity Line	LD729
Pressure Line	LD921	Gravity Line	LD963	Gravity Line	LD480		
Pressure Line	LD167	Gravity Line	LD796	Gravity Line	LD107		
Pressure Line	LD472	Gravity Line	LD608	Gravity Line	LD1016		

Annex 7: Notes of Public Meetings

Notes from Public Meeting held on Friday 3rd June 2016 from 3:30 pm to 4:40 pm

PREAMBLE: Please note that some of the issues raised are not relevant to the proposed project but rather concerns raised about the district by La Digue residents/business owners. Comments have been summarised into common topics and/or categories and listed in no particular order of importance.

Summary of public concerns over proposed Project:

- **Reliability of System:**
  - ❖ The resident wanted to be re-assured that the system would not fail and lead to emission issues as is currently the case on Mahé.
  - ❖ The resident that PUC lacked the manpower and expertise to ensure that the system is well maintained and operated throughout its lifetime
  - ❖ There was a query about back up mechanisms to ensure that the system does not fail
  - ❖ There were concerns that water bodies and the Anse Source d'Argent beach would be polluted and that could be at the detriment of the tourism industry on La Digue.

    RESPONSE: The emission issue was said to be due to the inefficient performance of the existing odour control units at the lifting stations. This issue is currently being addressed by installing new odour control units.

    A training programme is integrated along with the Project. This will ensure that local manpower is trained so that they can operate and maintain the system and do not have to rely on imported labour.

    The undersea cable from Praslin will be upgraded to ensure that reliability of power to La Digue is maintained. A back up system at each lifting station is not feasible but there will be one at the treatment plant.

- **Reducing the number of lifting stations?**
  - ❖ There was an opinion that the fewer the number of lifting stations, the less complicated the system would be. A proposal was also made to introduce smaller treatment plants along the sewer and not rely on only one larger one in case it failed.

    RESPONSE: The option of having fewer pump stations was considered during the Feasibility Study and one presented is the most feasible. The system is expected to be reliable provided that Operation and Maintenance is carried routinely.

- **Consideration of drainage system**
  - ❖ There were suggestions that due consideration is taken for complexity of a sewer system where there is a high density of residences as was experienced during the design of the drainage system currently being implemented on La Digue.
  - ❖ A query was made regarding how the drainage system would not be affected when the sewerage system is being constructed.

    RESPONSE: The sewerage system has been well thought of at areas where

the density of establishments is high. Regarding to the issue of connection points, there will be either of the following: a connection point at the perimeter of every property, near every building or near every potential location where a building may be erected.

The drainage system will have to be put on hold otherwise they will have to be demolished when the sewerage system is built. A major part of the sewer system will be deeper below the ground than the drainage system.

- **Compulsory Connection**
  - ❖ The resident wanted to be informed whether it would be compulsory for them to be connected to the system.
  - ❖ There were concerns that the cost incurred by each household or land owner could be prohibitive

    RESPONSE: There was the assurance that the utmost was being made to ensure that the connection point is made as closer to the residence or building as possible.

    The utmost would be done so that expenses made by the land owner is minimal.
- **Major disturbances**
  - ❖ The Consultant and PUC raised the issue of massive disruption during the construction phase especially due to the fact that the roads would have to be closed.
  - ❖ The number of machinery and space require for manoeuvring will be considerable and cooperation with the community and the businesses will be vital.

    RESPONSE: No response was made. This suggested that this issue was not being underestimated or the scale of disturbances was not being well understood.
- **Timing of the meeting**

  The initially agreed venue and time for the meeting had been shifted and was thought to be the cause for the low turnout during the meeting.

  RESPONSE: A suggestion was made to either have the meeting on Friday at 4:00 p.m. or on Saturday at 2:00 p.m. as is the case for public meeting on Mahé. The issue will be discussed between PUC and the District Administration and the meeting will be re-scheduled.
- **General Comments**
  - ❖ The projection of the presentation was not convenient for the meeting
  - ❖ There was a lack of a PA system and there may have been instances whereby the presentation was either not being heard by the audience or it was not picked up properly by the recording device
  - ❖ An SBC TV crew was present and this may increase more awareness on the project.
  - ❖ The room was not well ventilated to allow the audience to be comfortable.

Notes of Second Public Meeting on La Digue

Date: Saturday 25th June 2016

Time: 10.30 hours, note that the start was delayed by 30 minuted by a previous meeting running overtime

Venue: Government Administration Office La Digue

This was the second public consultation meeting held on La Digue, this meeting was held on a Saturday to give the opportunity for more people to attend.

The meeting took place in the presence of the La Digue Administrator and the La Digue Secretary.

In general the meeting was poorly attended with approximately the same number of people as the previous meeting.

A powerpoint presentation was made by the Consultant Project Manager explaining the proposed sewerage system for La Digue. This was the same presentation made at the previous public consultation held on La Digue on 3rd June with the addition of some additional slides showing construction of deep sewers.

The Consultant emphasized the following points:

- The potential serious public health situation which could arise if nothing was done;
- That the funding is available and the Project can and should proceed, the schedule was explained;
- La Digue was expensive to sewer because of the topography resulting in the need for pumping / lifting stations;
- Sewer and manholes would be located in the road reserve and only small amounts of private property would be required;
- The benefits of using treated wastewater to replace pumped ground water at L'Union Estate, wastewater to be treated to international standards suitable for use in agriculture;
- The fact the L'Union Estate or its immediate vicinity was the only feasible site for the WWTP;
- PUC would manage the sewerage systems and would have full time staff on La Digue specifically to run the sewerage system; and
- Serious disruption would take place and there would have to be temporary road closures during construction works.

Several questions asked and points were raised by the community, these were as follows:

- A question was asked how much private property would be needed it was explained that small areas of land for two small lifting stations would be required the purchase of private property;
- A question was asked who would operate the scheme, it was explained again that PUC would operate and maintain the sewerage system. It was anticipated that approx. 15 people would be employed full time on the sewerage system in La Digue;

- Doubts were expressed about the ability of PUC to manage to operate the scheme given that there were 20 pumping stations. Confidence was expressed in the ability of PUC to operate and maintain the sewerage system;
- Concern was expressed about the adequacy of the electricity supply to La Digue, it was explained that the pumps and flows were relatively small and that also there would be a standby electrical generator at the WWTP. Overall supply of electricity should be adequate.

No other points were raised and meeting was closed at 11.30 hours.

Annex 8: References and Citations

Government of Seychelles (2011) Fourth National Report to the United Nations Convention on Biological Diversity. Environment Department, P.O. Box 445, Botanical Gardens, Mont Fleuri, Victoria, Republic of Seychelles.

Commentary on the Development of the Republic of Seychelles Access to Genetic Resources and

Benefit Sharing Bill (2005); IPGRI ; Robert J. Lewis-Lettington and Didier Dogley

Department of Environment / Biodiversity website

Economic Assessment of Seychelles Biodiversity; Lucy Emerton 1997

European Investment Bank, *Environmental and Social Handbook, Version 9.0 of 02/12/2013*

Genetic Resources Bill – Draft 2010; Ministry of Environment

Global Forest Resources Assessment Country report Seychelles for FAO; Ester B (2005)

Inclusive Private Sector Development and Competitiveness Programme (IPSCDCP) Country: Seychelles Appraisal Report OSGE Department November 2013

Mainstreaming Biodiversity into Production Sectors Activities: Project Document

Mainstreaming Prevention and Control Measures for Invasive Alien Species into Trade, Transport and Travel across the Production Landscape; (Mainstreaming Bio-security Project) Document

National Report on Alien Invasive Species to the Convention on Biological Diversity (Neville, J., 2000)

National Strategy for Plant Conservation PCA-BG (2005)

News Update 14; 2008-03-24 “Heritage Gardens Spans the Generations” Nature Seychelles

Review of EMPS 2000-2010; Thematic Report- Biodiversity, Forestry and Agriculture (Matatiken, D., 2009)

Seychelles First National Report to the Convention on Biological Diversity

Seychelles Fourth National Report to the Convention on Biological Diversity, 2011

Seychelles National Biodiversity Strategy & Action Plan-Republic of Seychelles 1997

Seychelles National Climate Change Strategy, November 2009

Seychelles National Implementation Plan-POPS

Seychelles National Wetland Policy 10/8/2003

Seychelles Third National Report to the Convention on Biological Diversity, 2010

Annex 9: Environmental Approval of the Project

MINISTRY OF ENVIRONMENT, ENERGY AND CLIMATE CHANGE
ENVIRONMENT DEPARTMENT
Botanical Gardens, Mont Fleuri
P.O. Box 445 Victoria, Mahe, Republic of Seychelles
Tel. No. (248) 670500 Telefax No. (248) 610648

Please address all correspondence to the Principal Secretary

Your Ref:
Our Ref.: MEECC/WEP/EAPS/ CLASS 1/NOA/CONSTRUCTION OF LA DIGUE WASTE WATER SYSTEM
Enquiries to: A. Sorry
Extension No: 576
Date: 02nd March 2017

Mr. Ian Charlette
EIA Consultant
P.O.Box 631,
Victoria, Mahe

Dear Sir,

RE: NOTICE OF ACCEPTANCE OF ENVIRONMENTAL IMPACT ASSESSMENT (EIA) REPORT FOR PROPOSED CONSTRUCTION OF THE LA DIGUE WASTE WATER SYSTEM

Reference is made to the EIA report regarding the above project proposal that was submitted to the Authority for our consideration for the issuance of Environmental Authorization.

Following public inspection, internal review and further instructions the Authority hereby accepts the Environmental & Social Impact Assessment report subject to the following conditions which should be strictly adhered to prior and during the implementation of the project.

Environmental Authorization is being issued with the following conditions:

1. Upon approval of the project at the planning stage, the Environment Department shall be provided with the name of the Environment Officer for the project; this should be formally communicated to the Environment Department through the Principal Secretary.
2. There should be minimal clearing of vegetation so as not to affect stability of the sites and reduce the chances of erosion as well as the visual impact the development might bring about; this also applies to the coastal vegetation. Proponent should liaise with the Forestry, Conservation sections and the Climate Change Division within the Ministry of Environment, Energy & Climate Change prior to any clearance and obtain the necessary permission for the felling of Protected trees.

ENVIRONMENT DEPARTMENT
EAP SECTION
02 MAR 2017
DISPATCH

3. Onus is on the proponent to ensure that all rock boulders are secure. Rock blasting will not be allowed on site. Should there be a need to remove any rocks, it should only be done by use of wedge/jack hammer so as to minimize land destabilization.
4. Onus is on the developer to minimize nuisance by reasons of noise, smell, dirt, dust and fumes to any adjoining properties.
5. Proponent should ensure that measures are taken to prevent erosion on site and sedimentation of the nearby marine environment. Sediment/silt trap should be established prior to construction or mechanical intervention on the site.
6. Discussion and agreement between private landowners/utilities companies should be conducted to have the necessary way leave for the projects where applicable.
7. There should be minimal damage to existing water courses (drains, sea, marsh and rivers) during and after construction.
8. Details of the containment plan for emergencies should be clearly defined with locations of discharge points of raw sewage during emergency.
9. There should be close liaison between the National Drainage Task Force and the Public Utilities Corporation to synergise efforts so as not to cause damage to existing infrastructures since there are plans to implement the drainage networks projects on La Digue.
10. Installation methods should be discussed to ensure that all infrastructures are reinstated.
11. Roadside drains, culverts and cross drain should be provided and well maintained at all times.
12. Should there be a need to undertake any earthworks, for the erection of fences or construction of gates, the PUC/contractor must liaise with Planning Authority for advice.
13. All plastics, rubber, glassware, synthetic or any other inorganic waste, construction debris, demolition waste should not be dumped into sea and wet land but should be sorted out at source prior to disposal at appropriate site.
14. An area is to be designated on the site for the collection of all spoil materials. These stockpiles should be properly located so as not to block any accesses and water courses. The location is to obtain prior approval from the Environment Department.
15. Proponent should submit a Project implementation plan,which will provide the methodology options with their different time lines and detail explanations of the chosen method to be adopted in order through which the sequential targets for the implementation of each component of the project is expected to be implemented. The details of the chosen method should also provide analysis of the advantages and disadvantages of each phase and the expected measure in mitigating the impact vis-à-vis the existing infrastructures such as road, houses and other buildings within each specific location. This project implementation plan should be submitted to the Ministry of Environment, Energy & Climate Change for monitoring purposes.
16. A detailed maintenance plan for the sewer lines should be provided for the operational phase of the project. This should be reviewed in close consultation with the Environment Department and Environmental Health Department.
17. All monitoring exercises are to be undertaken in close liaison with the Environment Assessment and Permits Section of the Ministry of Environment, Energy & Climate Change.
18. The exact positions for the proposed pumping stations for the project shall be determined upon the planning stage of the project through a detailed planning application.
19. Prior to commencing any works for the project, the proponent will ensure that a meeting is held with the Ministry of Environment, Energy & Climate Change during which all stakeholders involved in the implementation of the project has to

be present. This will generally involve the environmental officer for the project, the project architect, the civil work contractors, a representative of the proponent and officers from the Environment Department. The appointed environmental officer for the project will ensure this coordination and advise the Environment Department of the availability of all the mentioned stakeholders above, at the earliest, to limit any further delay in the implementation of the project for the meeting. This is necessary to ensure that all stakeholders of the project are fully aware of the recommendations, provisions and mitigating measures as outlined in the EIA Report submitted for the project to minimize adverse negative impacts on the environment.

20. At this juncture the Ministry of Environment, Energy & Climate Change would like to inform the proponent that heavy fines will be imposed on them for non-compliance to directives from our ministry for works undertaken contrary to agreements between our two parties and works carried out without the necessary approvals from this Authority. As such it is in the interest of the proponent to ensure that all the necessary approvals are sought well in advance for any works undertaking and that they wish to implement as part of the project.

Please be reminded that other more specific conditions will be imposed upon the submission of the detailed plans for the project.

Should you have any queries regarding the conditions set our above please do not hesitate to contact the undersigned for clarification.

MMuzungaile

Marie May Muzungaile (Mrs.)
FOR: DIRECTOR GENERAL (WEP)

c.c- Chief Executive Officer Ministry of Habitat Infrastructure and Land Transport.