Strategic Environmental Assessment

Volume 1 – SEA Report

Proposed Constance Village Smart City at Flacq

by Constance Smart City Company Ltd

Sustainable Resource Management Ltd

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November 2025

The Permanent Secretary
Ministry of Environment, Solid Waste Management and Climate Change
Department of Environment
2nd Floor, Ken Lee Tower
Cnr Line Barracks & St Georges Streets
Port Louis

5th November 2025

Re: Proposed Constance Village Smart City at Flacq by Constance Smart City Company Ltd

We are hereby submitting 15 hardcopies and 20 softcopies of the Strategic Environmental Assessment (SEA) Report for the above project on behalf of the promoter.

The SEA report is presented in 3 volumes as follows:

1. Volume 1 – The main SEA Report,
2. Volume 2 – Annexes 1 to 16,
3. Volume 3 – Annexes 17 to 29.

All future correspondences in connection with this project should be sent to Mr. Patrick Boullé. The contact details are provided below:

Mr Patrick Boullé
Tel: 460 8600
Email: p.boulle@clgmu.com

Thanking you beforehand for your cooperation, we remain at your entire disposal to provide further information on the proposed project.

Yours truly,

.....

Mr Patrick Boullé
(Head of Property)
Constance Smart City Company Ltd

.....

Dr Revin Panray Beeharry
(Environment Consultant)
Sustainable Resource Management Ltd

Table of Contents

List of Annexes

List of Tables

List of Figures

List of Abbreviations

Abbreviation	Meaning
AMSL	Above Mean Sea Level
CEB	Central Electricity Board
CLG	Constance La Gaieté Company Ltd
CWA	Central Water Authority
DIA	Drainage Impact Assessment
EDB	Economic Development Board
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EA	Environment Act
GHG	Greenhouse Gas
HWM	High-Water Mark
IUCN	International Union for Conservation of Nature
LCP	Land Conversion Permit
LDA	Land Drainage Authority
MEP	Mechanical, Electrical and Plumbing
MOE	Ministry of Environment Solid Waste Management and Climate Change
MOA	Ministry of Agro Industry, Food Security, Blue Economy & Fisheries
NDU	National Development Unit
NGO	Non-Governmental Organisation
PV	Photovoltaic
RDA	Road Development Authority
SEA	Strategic Environmental Assessment
SCS	Smart City Scheme
SRM	Sustainable Resource Management Ltd
TIA	Traffic Impact Assessment
TMRSU	Traffic Management and Road Safety Unit
ToR	Terms of Reference
UNFCCC	United Nations Framework Convention on Climate Change

Executive Summary

Constance La Gaiete Co Ltd is planning a mixed-use development under the Smart City Scheme at Constance, Flacq. A Letter of Comfort was issued by the Economic Development Board (EDB) to Constance La Gaiete Company Ltd on 06th June 2024. Further to same, an application for a Letter of Intent was submitted to the EDB on 15th November 2024. A presentation of the project was also delivered to the representatives of the concerned ministries and authorities under the chairmanship of the EDB on 16th January 2025. As requested by the EDB, a new company has been incorporated by Constance La Gaiete Company Ltd for the development of the smart city under the name “Constance Smart City Company Ltd”. The Letter of Intent was issued by the EDB on 29th August 2025 with condition (b) of the said letter requesting that, for the purpose of the issuance of a Smart City Certificate, Constance Smart City Company Ltd is required to obtain a Strategic Environmental Assessment License from the Ministry of Environment, Solid Waste Management and Climate Change.

Extending over 357 Arpents of land, Constance Smart City Company Ltd will develop a smart village as a natural extension of Flacq. The new central urban area in the East commits to creating environmentally respectful, dynamic, and socially inclusive places that meet today's local demands, while evolving with the socio-economic needs of society and natural and climatic constraints. The smart city will offer a unique quality of life both in the design of its spaces and in the proximity of surrounding facilities. Engaging with the current landscape, the design leverages the existing advantages of the site: scenic roads lined with century-old trees, the poetic and hilly topography of the land, the staging of water, the enhancement of the Françoise and Rivière Du Poste rivers, ponds and lakes, neighbouring villages, and existing heritage. It is a unique place on the island where past, present, and future converge, just minutes from Flacq and 15 minutes from the island's most beautiful beaches.

The master plan has been developed by experienced international planners, envisioning a vibrant community where nature and urban living coexist seamlessly. Nearly 30% of the village’s area will be dedicated to green spaces, carefully designed to preserve and enhance the existing natural surroundings. Several interactive nature spaces have been planned, such as nature parks, natural corridors, urban gardens and diverse green spaces, as well as urban areas like plazas, squares, and parks where people can share, play, jog, or simply enjoy the neighbourhood.

In line with Sections 47(2) and 14(3) of the Environment Act 2024, a Strategic Environmental Assessment (SEA) has been prepared by Sustainable Resource Management Ltd (SRM Ltd) to ensure that environmental and sustainability considerations are integrated at the strategic

planning stage. The SEA process identified and evaluated potential environmental, social, and economic effects, recommended mitigation and enhancement measures, examined reasonable alternatives, and ensured compliance with national legislation and international best practice. The SEA report content is in line with Section 48 of the Environment Act 2024 and the conditions detailed in the letter from the Ministry of Environment, Solid Waste Management and Climate Change dated 08th September 2025.

The SEA followed a systematic approach based on the European Commission SEA Directive (2001/42/EC) and UNEP SEA Manual (2009). It involved the review of the policy, legal, and institutional framework, baseline assessment of biophysical and socio-economic conditions, impact identification and significance evaluation using an environmental impact score matrix, assessment of cumulative and residual impacts and consultation with key stakeholders and the public.

The predicted impacts of the proposed Constance Smart City development encompass several environmental and operational aspects. In terms of **land and biodiversity**, the project will involve localised vegetation clearance due to site preparation and construction activities; however, these impacts will be mitigated through the maintenance of buffer zones with the existing greenery to be preserved, and extensive replanting with native and endemic species as well as other suitable plants, and the establishment of biodiversity corridors to enhance ecological connectivity. Regarding **water resources**, appropriate river setbacks will be respected in compliance with the Rivers and Canals Act, and an integrated stormwater management strategy incorporating bioswales, talwegs, and retention basins will be implemented to prevent surface runoff, erosion, and flooding. Potential impacts on **air quality, noise, and vibration** will be temporary and limited to the construction phase, mitigated by dust suppression measures, regular maintenance of machinery, and restrictions on working hours to reduce disturbance to nearby receptors. As regards **wastewater and solid waste**, all treatment and disposal systems will comply with the requirements of the Wastewater Management Authority (WMA) and the Solid Waste Management Division (SWMD), including the implementation of on-site treatment, reuse of treated effluent for irrigation, and segregation of waste at source to promote recycling and reduce landfill demand. Under the **energy and climate** component, the project integrates renewable energy technologies such as solar photovoltaic systems, rainwater harvesting, and energy-efficient building designs aimed at reducing carbon emissions and improving resource efficiency. With respect to **traffic and accessibility**, the Traffic Impact Assessment (TIA) has confirmed that the proposed access improvements and internal circulation layout will maintain acceptable Levels of Service (LOS) across the road network, ensuring safe and efficient mobility within and around the smart city. The project plan takes into account the need for short transits for inhabitants to access key

services and also facilitates movement of inhabitants on foot, by cycling or using public transport. Residual impacts after mitigation are assessed as minor to negligible, with no significant long-term adverse effects anticipated.

The cumulative effects of concurrent developments in Flacq were also examined. With implementation of the Environmental Monitoring Plan (EMP) and inter-agency coordination, cumulative impacts on hydrology, traffic, and landscape character remain within acceptable thresholds. Climate vulnerability assessment indicates potential exposure to cyclones and intense rainfall, addressed through climate-resilient design, adequate drainage, and green infrastructure.

The smart city will generate substantial socio-economic benefits through job creation, enhanced mobility, and improved public amenities. It supports social inclusion, accessibility for persons with disabilities, and the creation of vibrant public spaces. No displacement of vulnerable households is anticipated. This development will contribute to the region's economic growth, offer facilities for a healthy lifestyle, prioritize well-being at all ages, and provide places and activities to invigorate the social and cultural fabric. It will offer an environment where it is pleasant to live, work, and have fun. Public and stakeholder consultations were conducted with relevant authorities and local communities, ensuring that environmental and social considerations are reflected in the project design.

The SEA concludes that the proposed smart city is environmentally feasible, socially acceptable, and economically viable, provided that mitigation and monitoring measures are effectively implemented. The project is consistent with Mauritius' Vision 2030, the Climate Change Act 2020, and the UN Sustainable Development Goals (SDGs). It will serve as a model for sustainable and climate-resilient urban development in the eastern region of Mauritius.

Outcome of Scoping and Screening by Authorities

As per the Environment Act 2024, real estate developments and smart cities require a Strategic Environmental Assessment (SEA) license from the Ministry of Environment, Solid Waste Management & Climate Change (MoE). In accordance with this requirement, a **project outline** was prepared by Sustainable Resource Management Ltd and was submitted to the MoE on 17th April 2025. On 2nd June 2025, a meeting was held at the office of the MoE where the promoter explained the proposed smart city project and the SEA consultant emphasized the various environmental concerns in the presence of relevant authorities and ministries. The outcome of the scoping and screening by authorities was then provided to the promoter and the consultants on the of 8th September 2025 by letter provided in **Annex 1**. **Table 1** below details our compliance with the outcome of this scoping and screening exercise.

Table 1: Compliance with the Outcome of Scoping and Screening by Authorities

No.	Compliance Item	Authority	Requirements	Compliance [Yes/No]	Proof/Remarks
1	Submission of SEA report	Director of Environment Ministry of Environment, Solid Waste Management and Climate Change	To submit 15 hardcopies and 12 soft copies.	Yes	15 hardcopies and 12 soft copies of the SEA report have been submitted to the MoE.
2	SEA Report		In accordance with Section 47(2) and 14(3) of the EA 2024.	Yes	The SEA report has been prepared in accordance with Sections 47(2) and 14(3) of the Environment Act.
3	Processing fees		Payment of MUR 100,000 by Promoter to Government of Mauritius.	Yes	The processing fee will be paid upon acceptance of the SEA application by MoE.
4	Registration of Consultant		Registration of the Consultant with the Construction Industry Authority (CIA).	Yes	Sustainable Resource Management Ltd is registered as SEA Consultant with the Construction Industry Authority as per the certificate in **Annex 2**.
5	SEA Report		Table of Contents of the SEA Report is in line with Section 48 of EA 2024.	Yes	The table of contents of the SEA report is in line with Section 48 of the EA 2024.

Table 1: Compliance with the Outcome of Scoping and Screening by Authorities (Cont'd)

No.	Compliance Item	Authority	Requirements	Compliance [Yes/No]	Proof/Remarks
6	Observations of GIS Mapping (a)	Director of Environment Ministry of Environment, Solid Waste Management and Climate Change	About one quarter (1/4) of the subject site prone to riverine flooding in a return period of 25 years. Site is not prone to landslide.	Yes	The Land Drainage Report in **Annex 3** has taken into consideration the flooding aspect of the site. Several consultations were made with the Land Drainage Authority, and a No Objection Letter was obtained on 16th May 2025 (refer to **Annex 4**). CLG replied to the LDA conditions on 28th May 2025 as per **Annex 5**. The Vulnerability Assessment (**Chapter 11**) has considered all possible climate change induced hazards and proposed measures that have to be implemented to mitigate the effect of these hazards.
8	Surrounding Environment	Ministry of Health and Wellness	Location of the site and its distance from existing polluting activities is shown in the Context Plan showing polluting activities within 5 km radius.	Yes	All polluting activities surrounding the project site within a 5km radius are attached in **Annex 6**. Mitigation measures for the proposed project are provided in **Chapter 13**.

Table 1: Compliance with the Outcome of Scoping and Screening by Authorities (Cont'd)

No.	Compliance Item	Authority	Requirements	Compliance [Yes/No]	Proof/Remarks
9	Noise	Ministry of Health and Wellness	Location of noise-emanating features and their distance from residential buildings to be provided.	Yes	Mitigation measures related to noise and vibration during the different phases of the smart city project are provided in **Chapter 13**
10	Wastewater		Setback of 30 m will be respected between wastewater disposal within lots and adjoining watercourses.	Yes	Location of any wastewater lifting station and its distance from nearest building will be provided in layouts at the permitting stage of each individual project within the smart city. Each project will be compliant with ongoing legislation.
11	Solid Waste	Solid Waste Management Division (SWMD) under aegis of the Ministry of Environment, Solid Waste Management and Climate Change	(i) Source segregation of wastes will be done.	Yes	Details on solid waste management for the smart city is provided in **Chapter 6**
			(ii) A Civic Amenity Centre will be implemented within the Smart City.	Yes	Details on solid waste management for the smart city is detailed in **Chapter 6**
			(iii) Green and biodegradable wastes will be composted.	Yes	Details on solid waste management for the smart city is detailed in **Chapter 6**

Table 1: Compliance with the Outcome of Scoping and Screening by Authorities (Cont'd)

No.	Compliance Item	Authority	Requirements	Compliance [Yes/No]	Proof/Remarks
12	Wastewater	Wastewater Management Authority under aegis of the Ministry of Energy and Public Utilities	(i) Detailed reports and drawings of the project and wastewater management schemes.	Yes	The wastewater management system is provided in **Chapter 6**. Detailed reports and drawings of wastewater management for each individual project within the smart city will be provided in layouts at the permitting stage of each individual project.
			(ii) Onsite wastewater disposal systems should not be located in flood prone areas, on slopes greater than 10%, in waterlogged areas and on land of poor permeability.	Yes	Noted, this will be taken into consideration on a project-to-project basis.
			(iii) Geotechnical report should include determination of the maximum ground water level at the site and percolation tests	Yes	The hydrogeology of the site is described in **Chapter 4**. The hydrogeological report and the geotechnical report are attached in **Annex 7** and **Annex 8** respectively.
			(iv)The design report for wastewater disposal system should be prepared and signed by a registered Civil Engineer	Yes	The design report for wastewater disposal for each project within the smart city will be submitted on a project/plot basis.

Table 1: Compliance with the Outcome of Scoping and Screening by Authorities (Cont'd)

No.	Compliance Item	Authority	Requirements	Compliance [Yes/No]	Proof/Remarks
12	Wastewater	Wastewater Management Authority under aegis of the Ministry of Energy and Public Utilities	(v) The design report for wastewater disposal system should include the geotechnical investigation report, location plan, site plan and full set of architectural drawings	Yes	Noted. The comprehensive design report for wastewater disposal will be submitted on a project/plot basis.
			(vi) The design report for the WTP should be prepared and signed by a specialist consultant and include wastewater flows from all proposed units to the wastewater treatment plant, a site plan showing location and plan dimensions of the proposed wastewater treatment plant/irrigation tank with appropriate setbacks	Yes	Noted. The design report for wastewater disposal will be submitted on a project/plot basis.
			(vii) Substantiation of the efficiency of the proposed wastewater treatment plant along with results of analysis	Yes	Noted and will be provided on a project-to-project basis.

Table 1: Compliance with the Outcome of Scoping and Screening by Authorities (Cont'd)

No.	Compliance Item	Authority	Requirements	Compliance [Yes/No]	Proof/Remarks
12	Wastewater	Wastewater Management Authority under aegis of the Ministry of Energy and Public Utilities	(viii) Extent and location of green space to be irrigated using treated effluent should be mentioned in the report and shown on site plans.	Yes	Noted and will be provided on a project-to-project basis.
			(ix) Plants that will be used in the irrigable areas should be mentioned.	Yes	Noted and will be provided on a project-to-project basis.
			(x) The allowable irrigation rate and the standard/guideline should be mentioned	Yes	Noted and will be provided on a project-to-project basis.
			(xi) Minimum distance of 1.2 m from formation level of soil absorption system to ground water level and minimum distance of 1 m between leaching field and structures. Irrigable areas and soil absorption systems should be located at least 30 m from any watercourse	Yes	Noted and will be complied with on a project-to-project basis.
			(xii) Contingency plan for the wastewater treatment plant	Yes	Contingency plan for the WTP will be provided on a project-to-project basis.
			(xiii) Responsible party for the operation and maintenance of the wastewater treatment plant	Yes	This information will be provided on a project-to-project basis.

Table 1: Compliance with the Outcome of Scoping and Screening by Authorities (Cont'd)

No.	Compliance Item	Authority	Requirements	Compliance [Yes/No]	Proof/Remarks
12	Wastewater	Wastewater Management Authority under aegis of the Ministry of Energy and Public Utilities	(xiv) PFD and cross-sectional layouts of the various units and the description of the processes involved in each unit	Yes	Layouts will be provided on a project-to-project basis.
			(xv) Capacity of the irrigation tank	Yes	Capacity of irrigation tank will be provided on a project-to-project basis.
			(xvi) Layout of the sewer network showing how wastewater is conveyed from source to the WTP	Yes	Layouts will be provided on a project-to-project basis.
			(xvii) Only landscaped areas on free draining soil strata to be considered as irrigable areas	Yes	Noted and will be complied with on a project-to-project basis.
			(xviii) Masterplan should include all plots of the Smart City and their annotation, name and location of each project for which SEA, EIA, PER, Morcellement Letter of Intent or BLUP has been issued, together with the reference and irrigable areas and their extent for each aforementioned project.	Yes	The masterplan and details of each project within the smart city is provided in **Annex 9**.

Table 1: Compliance with the Outcome of Scoping and Screening by Authorities (Cont'd)

No.	Compliance Item	Authority	Requirements	Compliance [Yes/No]	Proof/Remarks
13	Planning Guidelines	Ministry of Housing and Lands	(i) Development should be in line with PPG requirements	Yes	PPG requirements have been taken into consideration when designing the smart city.
			(ii) The poultry farm to be relocated at more than 200 m from the site and any sensitive users	Yes	The poultry farm will be relocated 200 m away from the site and sensitive areas as per PER license bearing reference ENV-ESDD-PER-2024-26 obtained on 23rd October 2025.
			(iii) A Smart City Certificate to be obtained from the EDB	Yes	The Letter of Comfort and the Letter of Intent for the smart city has have been obtained as per **Annex 10** and **Annex 11** respectively. The SEA clearance is a condition of the Letter of Intent required for the Smart City Certificate.
			(iv) LCP from the Ministry of Agro-Industry and Food Security	Yes	Applications will be done on a project-to-project basis. The current ongoing LCP applications are: • MAIFS-LCP-2025-82: Mall de l'Est • MAIFS-LCP-2025-372: Residential • MAIFS-LCP-2025-509: Poultry farm • MAIFS-LCP-2025-564: Residential
			(v) Consultations shall be obtained from all relevant authorities	Yes	Consultations were done with various authorities as per **Chapter 18.**

Table 1: Compliance with the Outcome of Scoping and Screening by Authorities (Cont'd)

No.	Compliance Item	Authority	Requirements	Compliance [Yes/No]	Proof/Remarks
14	Traffic	Traffic Management and Road Safety Unit	The views and recommendations of letter referenced TMRSU/111/248/2 dated 06 June 2025 should be respected.	Yes	The correspondence between the promoter and the TMRSU following obtention of the views are provided in **Annex 12**.
15	Accessibility	Disability Empowerment Unit under the aegis of The Ministry of Social Integration, Social Security and National Solidarity	(i) All infrastructure should be designed with accessibility in mind for persons with disabilities	Yes	Noted and will be compliant for individual projects.
			(ii) Disability-inclusive strategies should be embedded in the overall project design and must comply with the provisions of the Building Control Regulations including wheelchair-accessible ramps, braille signage and tactile pathways, elevators with braille buttons and audio floor indicators, assistive listening systems in public areas, reserved parking bays for persons with disabilities, visual and auditory alarms and gender- sensitive and inclusive signage	Yes	Noted and will be compliant for individual projects.

Table 1: Compliance with the Outcome of Scoping and Screening by Authorities (Cont'd)

No.	Compliance Item	Authority	Requirements	Compliance [Yes/No]	Proof/Remarks
15	Accessibility	Disability Empowerment Unit	(iii) The development should be aligned with the principles of universal design and the Equal Opportunities Act 2008, ensuring accessibility for all citizens	Yes	Noted and will be compliant for individual projects.
16	Land Use	Land Use Division under the aegis of the Ministry of Agro-Industry, Food Security, Blue Economy and Fisheries	LCP required for the extents which are currently under agricultural production	Yes	Applications will be done on a project-to-project basis. The current ongoing LCP applications are: • MAIFS-LCP-2025-82: Mall de l'Est • MAIFS-LCP-2025-372: Residential • MAIFS-LCP-2025-509: Poultry farm • MAIFS-LCP-2025-564: Residential The LCP applications done are as per **Annex 13.**
17	Biodiversity	National Parks and Conservation Service (NPCS) under the aegis of the Ministry of Agro-Industry, Food Security, Blue Economy and Fisheries	(i) To identify any area of potential environmental importance (if any) on or around the project sites. Potential environmental impacts have also been analysed.	Yes	The context plan showing all surrounding developments within 1km from the site is attached in **Annex 14**. All potential environmental impacts and proposed mitigation measures are provided in **Chapter 13**.

Table 1: Compliance with the Outcome of Scoping and Screening by Authorities (Cont'd)

No.	Compliance Item	Authority	Requirements	Compliance [Yes/No]	Proof/Remarks
17	Biodiversity	National Parks and Conservation Service (NPCS) under the aegis of the Ministry of Agro-Industry, Food Security, Blue Economy and Fisheries	(ii) Ecological survey should comprise of terrestrial and freshwater biodiversity and mitigation measures should be provided along with strategies to conserve and protect the latter	Yes	**Chapter 7** describes the findings of the ecological survey conducted on site. **Annex 15** contains the Biodiversity Impact Assessment report.
			(iii) List of ecological indicators	Yes	**Chapter 7** describes the findings of the ecological survey conducted on site. **Annex 15** contains the Biodiversity Impact Assessment report.
			(iv) SEA should incorporate mitigation measures such as an orchard along the river reserve dedicated to bats	Yes	Mitigation measures regarding biodiversity are addressed in **Chapter 13.**
			(v) Water quality test should be carried out on the rivers and use as a basic key indicator that would be monitored during the lifetime of the project	Yes	Analysis of the river water will be carried out during the different phases of the project.

Table 1: Compliance with the Outcome of Scoping and Screening by Authorities (Cont'd)

No.	Compliance Item	Authority	Requirements	Compliance [Yes/No]	Proof/Remarks
18	Biodiversity	Forestry Services under the aegis of the Ministry of Agro-Industry, Food Security, Blue Economy and Fisheries	(i) Clearance from the LDA should be obtained to determine the existence/original pathway of any drainage path on the project area.	Yes	No Objection Letter was obtained from LDA as per **Annex 4** and the reply of the promoter to the LDA is attached in **Annex 5**.
			(ii) A 16 m setback on each bank of Riviere du Poste de Flacq and Riviere Francoise must be strictly adhered to	Yes	Relevant setbacks catered for as part of masterplan (refer to **Annex 9**).
			(iii) A 2 m setback on each side of the natural drainage paths must be strictly complied with	Yes	Same has been catered for in the land drainage report of the smart city (see **Annex 3**)
			(iv) No development should be undertaken on reserves	Yes	Noted and has been catered for in the masterplan
			(v) Native/endemic vegetation found within the project area are to be conserved or translocated	Yes	All vegetative/ endemic plant will be preserved or relocated.
			(vi) It is recommended that trees/shrubs are planted to mitigate soil erosion/land degradation	Yes	Mitigation measures to reduce soil erosion are provided in **Chapter 13.**

Table 1: Compliance with the Outcome of Scoping and Screening by Authorities (Cont'd)

No.	Compliance Item	Authority	Requirements	Compliance [Yes/No]	Proof/Remarks
19	Irrigation	Irrigation Authority	(i) Periodic monitoring of groundwater and drainage trends during and post-construction phases	Yes	Periodic monitoring of groundwater and drainage trends will be done during and post-construction phases.
			(ii) Environmental and engineering clearance plans of the Smart City to show compliance with any existing Irrigation Infrastructure	Yes	Not applicable as there is no irrigation infrastructure on site.
20	Marine Resources	Blue Economy and Fisheries	To include the following in the SEA report: (i) Policy, Legal and Administrative Framework	Yes Yes	Refer to **Chapter 2** of the SEA report.
			(ii) Utility Requirements	Yes	Refer to **Chapter 6.**
			(iii) Terrestrial Ecology Survey	Yes	Refer to **Chapter 7**.
			(iv) Geotechnical Survey	Yes	Refer to **Chapter 4**
			(v) Land Drainage Impact Assessment	Yes	Refer to **Annex 3.**
			(vi) Traffic Impact Assessment	Yes	Refer to **Annex 16**.
			(vii) Heritage Impact Assessment	Yes	Refer to **Chapter 4** and **Annex 17.**
			(viii) Visual Impact Assessment	Yes	Refer to **Chapter 9** and **Annex 18**.
			(ix) Social Impact Assessment	Yes	Refer to **Chapter 14**.

Table 1: Compliance with the Outcome of Scoping and Screening by Authorities (Cont'd)

No.	Compliance Item	Authority	Requirements	Compliance [Yes/No]	Proof/Remarks
20	Marine Resources	Blue Economy and Fisheries	(ix) Vulnerability Assessment	Yes	Refer to **Chapter 11.**
			(x) Sustainability Aspect	Yes	Refer to **Chapter 16**
			(xi) Enhancement Opportunities	Yes	Refer to **Chapter 16**
21	Water Resources	Water Resources Commission under the aegis of the Ministry of Energy and Public Utilities	(i) The two rivers which borders the site should be preserved and appropriate setbacks need to be provided	Yes	The rivers will be preserved.
			(ii) The two natural watercourses which crosses the site should be preserved and setback distances need to be respected	Yes	The natural watercourses will be preserved, and necessary setbacks will be kept (refer to **Annex 3**).
			(iii) A buffer zone shall be provided, and no developments shall be carried out within 200 m of the proposed new Constance Dam embankment boundary	Yes	Noted.

Table 1: Compliance with the Outcome of Scoping and Screening by Authorities (Cont'd)

No.	Compliance Item	Authority	Requirements	Compliance [Yes/No]	Proof/Remarks
21	Water Resources	Water Resources Commission under the aegis of the Ministry of Energy and Public Utilities	(iv) Any new proposed borehole(s) shall not lie within the defined area of the new Constance Dam and any new application for borehole will be subject to the Ground Water Act	Partly compliant	**New Borehole 1** lies next to two other existing operational boreholes by CWA (BH729 and BH1449) supplying water to SAJ Hospital and the eastern district as per letter received on 18th July 2025 (see **Annex 19**). However, these 3 boreholes lie within the embankment of the new proposed Constance Dam. Constance Smart City Company Ltd is committed to work with the concerned authorities to find an acceptable solution at the time of realization of the Constance Dam project.
21	Water Resources	Water Resources Commission under the aegis of the Ministry of Energy and Public Utilities	(v) Exploitation of the sources of potable water shall not be prejudicial to the new Constance Dam	Partially compliant	**New Borehole 1** lies next to two other existing operational boreholes by CWA (BH729 and BH1449) supplying water to SAJ Hospital and the eastern district as per letter received on 18th July 2025 (see **Annex 19**). However, these 3 boreholes lie within the embankment of the new proposed Constance Dam. Constance Smart City Company Ltd is committed to work with the concerned authorities to find an acceptable solution at the time of realization of the Constance Dam project.

Table 1: Compliance with the Outcome of Scoping and Screening by Authorities (Cont'd)

No.	Compliance Item	Authority	Requirements	Compliance [Yes/No]	Proof/Remarks
21	Water Resources	Water Resources Commission	(vi) Views and recommendations from letters from the WRC referenced MEPU/WRU/I/523 V5 and MEPU/WRU/I/523 V7 will be considered and complied with	Yes	The project will be compliant to the views and recommendations of the WRC.
22		Central Water Authority under the aegis of the Ministry of Energy and Public Utilities	(i) Application to the CWA for drilling of the new borehole and setting up of infrastructure for exploitation	Yes	Permission has already been obtained from the CWA, and the approval letter is provided in **Annex 19**.
			(ii) No wastewater of any kind should be disposed in any watercourse, canal or on ground that can cause contamination of river water	Yes	No wastewater will be disposed in watercourses. Wastewater management is given in **Chapter 6**. Impacts and mitigation measures are provided in **13.2.10, 13.3.7** and **13.4.4**.
			(iii) It is advised to install smart meters in all residential or commercial plots	Yes	Smart metering system will be implemented (refer to **Chapter 11 and Chapter 13**).
			(iv) Treated wastewater, if ever to be used for irrigation of vegetables, should be dechlorinated and free from microbiological organisms	Yes	Refer to **Chapter 6.**

Table 1: Compliance with the Outcome of Scoping and Screening by Authorities (Cont'd)

No.	Compliance Item	Authority	Requirements	Compliance [Yes/No]	Proof/Remarks
22	Water Resources	Central Water Authority	(v) To prevent contamination of the quality of water resources in the vicinity of the project site	Yes	Refer to **Section 13.2.7** in **Chapter 13.**
23	Infrastructure Works	Ministry of National Infrastructure-Geotechnical Unit	Ensure that the development of the project, design and construction practice will not give rise to any risk of ground instability that may affect actual and future developments.	Yes	Investigation will be done to look at any ground stability issues, if any, on a project basis. The site tends to be generally flat.

1.0 Introduction

1.1 Background

Smart cities are now an integral part of everyday life in Mauritius. A smart city aims to improve the efficiency and quality of life for its citizens and businesses through enhanced urban infrastructure, climate resilience, services, and governance, aiming to make cities more sustainable, resilient, and liveable. Smart cities are underpinned by the idea of providing “Live, Work & Play” opportunities in the vicinity. Their long-term development must include components that enable the combination and optimum enjoyment of these three life pillars within a single environment. Smart cities therefore offer a fulfilling living environment comprising of offices, common green areas and sports facilities as well as dedicated areas for commercial, residential, educational or healthcare purposes.

The Smart City Scheme in Mauritius was introduced in 2015 as a property development initiative aimed at creating integrated, sustainable, and efficient urban spaces. The Smart City Scheme was designed by the Economic Development Board (EDB) with the support of the Government of Mauritius under the **Government of Mauritius' Vision 2030**. The aim is to develop well-thought-out and qualitative urban environments, that harness innovation and urban planning, to work for all users and residents, thus reducing the amount of travel and traffic congestion across the island. Smart cities promote innovation to support our country’s competitiveness. They open up Mauritius to the world through targeted economic activities, that encourage the inflow of foreign capital and affirm Mauritius as a leading financial centre and investment platform for economic growth [1]. To date, 16 smart city projects, as provided in **Table 2**, have been issued with a Smart City Scheme (SCS) Certificate by the EDB.

Table 2: List of Smart City Projects Approved by the EDB

Project Name	Project Location
Cap Tamarin Smart City	Tamarin
Medine Smart City (Uniciti)	Flic en Flac
Moka Smart City	Moka
Hermes Properties (Tribeca Central)	Trianon
Beau Plan Smart City	Beau Plan

Table 2: List of Smart City Projects Approved by the EDB (cont'd)

Project Name	Project Location
Mont Choisy Smart City	Mont Choisy, Grand Baie
Azuri Smart City	Haute Rive
Ferney Agri Hub	Ferney
Yesihai Investment	Pailles
Jinfei Smart City	Riche Terre
Montebello Smart City	Montebello
St Felix Smart City	St Felix
Royal Saint Louis	Pailles
Savannah Smart City	Gros Bois
Cote D'Or Data Technology Park	Cote D'Or
Anahita Beau Champ	Beau Champ

1.2 The Promoter

The promoter of the smart city project will be Constance Smart City Company Ltd as per Certificate of incorporation in **Annex 20**. The extract of files for Constance Smart City Company Ltd is provided in **Annex 21.**

Constance Smart City Company Ltd is a wholly owned subsidiary of Constance La Gaiete Company Ltd. Constance La Gaiete Company Ltd operates under the Constance Group which is a Mauritian group with an international reach. The main business activity of Constance La Gaiete Company Ltd is agro and real estate development. A Letter of Comfort as per **Annex 10** was issued by the Economic Development Board (EDB) to Constance La Gaiete Company Ltd on 6th June 2024. The Letter of Intent was obtained on 29th August 2025 (see **Annex 11**).

All correspondence in relation to this project should be addressed to the representative of Constance Smart City Company Ltd, Mr Patrick Boullé as per details below:

Mr Patrick Boullé

Tel: 460 8600

Email: p.boulle@clgmu.com

1.3 The SEA Consultant

Sustainable Resource Management (SRM) Ltd was established in the year 2000 and has since been a key player in providing consultancy services in energy and the environment. To date, the company has completed more than 200 consultancy assignments ranging from Environment and Social Impact Assessment to Economic Assessment of key project related to power plants, integrated resort schemes, real estate development, solid waste processing plants and other key infrastructure projects. The founder and CEO, Dr Revin Panray Beeharry has over 30 years' experience in providing advisory services. SRM Ltd is registered in the field of strategic environmental assessment with the Construction Industry Authority (formerly CIDB) as per the CIA Certificate in **Annex 2**. The Strategic Environmental Assessment (SEA) consultant can be contacted as per below details:

Dr. Revin Panray Beeharry

Contact Number: 674 2587

Email: admin@srm-consulting.com

1.4 The Project Team

Since 2023, the promoter has appointed both local and foreign consultants to ensure a resilient and future proof development. The consultants working on the smart city project are as per **Figure 1**.

Figure 1:The Project Team

1.5 Key Smart City Components

The key components of a smart city vary depending on the specific context and goals of the city, however, some of the key components that will be included as part of the Constance Smart City are as follows:

- The masterplan is based on the principle of Agri-Urbanism with nearly 30% of the land area dedicated to green spaces. An Agri Park will be established within certain sections of these buffer zones. This initiative will not only enhance the environmental and recreational value of the area but will also serve as a productive landscape, promoting sustainable land use while maintaining the floodplain's core function. The park will provide landscaped spaces for retention basins for the holding of surface run-off. Informative signages on local flora and fauna and 'Nature learning initiatives' will be incorporated as part of the park design.
- Accessibility and Mobility: The accessibility and mobility have been designed for proximity - that is, a 400m radius achievable in a 5-min convenient walk with

centralized amenities. The proximity of residential areas to schools, commerce, workplaces, and leisure activities is the most efficient way of reducing the need to travel by car. The road network has been designed taking into consideration speed and traffic reduction measures.

- Implementation of Sustainable Urban Drainage Systems: The internal layout of the proposed development has been carefully planned to preserve the natural topography and respect the site's hydrological dynamics. The stormwater management strategy includes vegetated swales that direct surface runoff towards strategically located detention basins. These basins have been engineered to ensure that post-development outflow into the rivers remains below pre-development levels, thus avoiding any increase in downstream surface runoff. These principles have over 30 years of feedback in urban development projects and respond not only to potential flooding but also to improving residents' quality of life (swales are planted natural spaces, true ecological corridors). In addition, they help to cool the urban environment and improve aquifer recharge capacity be-cause of the slowdown and storage spaces with permeable soils.
- Energy-efficient buildings and infrastructure: The smart city will promote the use of energy-efficient buildings and infrastructure, to reduce energy consumption and greenhouse gas emissions.
- Sustainability and environmental management: Sustainable development and environmental management will be a priority as part of the Constance Village Smart City. **Constance is committed to delivering a future-proof and environmentally responsible development**. The Masterplanning principles combined with the inclusion of green infrastructure such as the Agri-Park, demonstrate a long-term vision for resilience, sustainability, and community well-being.

1.6 Aims and Objectives of the Project

The main aim of the project is to develop an urban sustainable village for the future generations of the East.

The project objectives are:

- To develop a resilient and future-proof smart urban project.
- To build an inclusive ecosystem where people of all walks of life, age groups, and those with different aspirations can feel at home and where businesses can thrive.
- To leverage its strategic location as the gateway to the luxury coast and as a peripheral hub of the key rural centre in the East.

- To provide quality living for all, catering to the needs of the young and old, families, and singles.
- To promote a healthy and active lifestyle choice, surrounded by nature.

1.7 The SEA Report

This Strategic Environmental Assessment (SEA) report is submitted to the Ministry of Environment, Solid Waste Management and Climate Change as a supporting document for obtaining the SEA license for the current project. This report is prefaced by a Non-Technical Summary which emphasizes the major findings of the study.

The report has been compiled as follows:

Chapter 1 contains the Introduction,

Chapter 2 focusses on the Policy, Legal and Administrative Framework,

Chapter 3 contains the Site Description,

Chapter 4 contains the Baseline Conditions,

Chapter 5 contains the Project Description,

Chapter 6 contains the Utility Requirements,

Chapter 7 focusses on the Ecological Survey,

Chapter 8 describes the Stormwater Management of the project,

Chapter 9 contains the Visual Impact Assessment,

Chapter 10 contains the details on Accessibility and Mobility,

Chapter 11 is the Climate Change and Vulnerability Assessment,

Chapter 12 contains the Method of Assessment,

Chapter 13 emphasizes the Potential Environmental Impacts, Recommended Mitigation Measures and Residual Impacts,

Chapter 14 describes the Socio-cultural and the Socio-economic Impacts of the project,

Chapter 15 contains the Environmental Monitoring and Maintenance Plan,

Chapter 16 contains the Sustainability Aspects and Enhancement Opportunities,

Chapter 17 contains the Project Alternatives,

Chapter 18 contains the findings of the Public Participation and Stakeholder Consultation,

Chapter 19 focusses on the Decommission of the project,

Chapter 20 contains the Conclusion.

2.0 Policy, Legal and Administrative Framework

2.1 Local Laws and Regulations

The environmental legislative acts and regulations which are relevant to the proposed project are outlined below.

2.1.1 Environment Act 2024

The Environment Act (EA) 2024 provides for a modern legislative framework that ensures better protection, management, and conservation of the environment. The Act defines the following relevant terms: accredited laboratory, to provide environmental data and conduct analyses of environmental samples; Central Water Authority; circular economy; climate change; clinical waste; Commissioner for Environment; deposit, emission and leakage of waste; effluent; Environmental Impact Assessment (EIA); environmental effect; extended producer responsibility; hazardous waste; Integrated Coastal Zone Management Committee; multilateral environmental agreements; national environmental standards; discharge of oil into the environment; pesticide residues; pollutant substances; rock quarrying and its impact on the environment [2].

Part IV of the EA 2024 sets out the requirements for strategic environmental assessments. No proponent may carry out a new undertaking specified in Part A of the Sixth Schedule without an approval of a Preliminary Environmental Report (PER), or a new undertaking specified in Part B of the Sixth Schedule without an Environmental Impact Assessment (EIA) license or a new undertaking specified in Part C of the Sixth Schedule without a Strategic Environmental Assessment (SEA) license.

Environmental Regulations

The Environmental Regulations and Guidelines set out under the Environment Protection Act and directly relevant to the project are:

- Environment Protection (Standards for Air) Regulations 1998
- Environment Protection (Standards for effluent discharge) Regulations 2003
- Environment Protection (Standards for effluent for use in irrigation) Regulations 2003
- Environment Protection (Environmental Standards for Noise) Regulation 1997 amended in 2022
- Environment Protection (Standards for Noise) Regulations 2004 and Environment Protection (Environmental Standards for Noise) (Amendment) Regulations 2003
- Hazardous Waste Regulations 2002

2.1.2 Planning and Development Act 2004

This Act provides for: (a) in relation to land development – (i) the promotion and co-ordination of the orderly and economic use and development of land; (ii) the proper management,

development and conservation of natural and man-made resources for the purposes of promoting the social and economic welfare of the community and a better environment; (iii) use of land for public purposes; and (iv) ecologically sustainable development; (b) the appropriate sharing of responsibility for planning and development between the different levels of government. It also: establishes appropriate institutions, structures and processes to achieve effective planning and development; facilitates inter-agency co-operation in planning and development; encourages appropriate private sector participation in planning and development; safeguards the immediate and long-term public interest in the processes and effects of planning and development.

The Act consists of 82 sections divided into 12 Parts: Preliminary (I); Administration (II); Planning (III); Control of development (IV); Continuation of existing uses (V); Special powers (VI); Development by Government (VII); Certification of development (VIII); Enforcement (IX); Planning Appeals Tribunal (X); Compensation (XI); Miscellaneous (XII). Part VA (Land Productivity Enhancement Scheme) is repealed by Act No. 27 of 2013.
The Minister shall, in principle, be responsible for the administration of this Act. There is a National Planning and Development Commission established under section 6. The Commission shall advise the Minister on all matters relating to land use planning and development and make such recommendations as it deems necessary. The Minister shall cause to be prepared, and adopt, maintain and keep under regular review, a National Development Strategy. There shall be three types of development plans: (a) local plans; (b) action area plans; and (c) subject plans (sect. 14). Subject to this section, a permit authority may agree a planning agreement with any person proposing to develop any land, concerning the development of such land, for the purposes of this Act (sect. 35) [3].

2.1.3 National Development Strategy 2003

The Ministry of Housing and Land Use Planning, through the National Development Strategy, seeks to improve the environment by adopting the following measures [4] to:

- Safeguard valued elements of the natural and built environments,
- Use natural resources in a sensitive and sustainable manner,
- Promote land and property development and management practices which will benefit the environment and all Mauritians,
- Ensure that development makes a positive contribution to the environment.

2.1.4 Planning Policy Guidance 2004

The Planning and Development Act 2004 also makes provision for the introduction of Planning Policy Guidance (PPG) which shall prevail to the extent of any inconsistency, over a

development plan. PPG therefore has the status of state (national) planning policy and is a material consideration in assessing applications for development permits [5].

2.1.5 Smart City Scheme

The aim of a smart city project is to create working, living, and leisure space that will be environment-friendly; aim at generating its own resources in terms of energy and water; provide for state-of-the-art connectivity; provide smart modern transportation; and reduce traffic congestion [6]. The objectives of the Smart City Scheme are:

- The creation of smart cities across Mauritius which shall be mixed-use developments comprising office, business, residential, and entertainment components all integrated in a coherent Master Plan focusing on innovation, sustainability, efficiency and quality of life.
- The creation of an environment-friendly working, living, and leisure space aiming at generating its own resources in terms of energy and other utilities and providing for state-of-the-art connectivity, smart modern transportation, and the reduction of traffic congestion.
- The promotion and co-ordination of the orderly and economic use and development of land.
- Ecologically sustainable development.
- The promotion of targeted economic activities resulting in an increase in foreign direct investment and export to rapidly growing economies, while at the same time strengthening the industrial and service base and promoting an economic diversification path.

2.1.6 Native Terrestrial and National Parks Act 2015

The Native Terrestrial Biodiversity and National Parks Act, 2015, as amended, makes renewed provision for – (a) generally the protection of wild fauna and flora; (b) giving effect to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and any other biodiversity-related Convention to which Mauritius is, or may, become a party; and (c) the identification, control and management of reserved lands and private reserves, and for related matters [7].

2.1.7 Local Government Act 2011

The Local Government Act 2011 (LGA 2011), as subsequently amended, provides at Sub-Part F – Permits and Licenses for the grant of building and planning permission for proposed development works. Under section 117 (1), no development works shall be undertaken unless a Building and Land Use Permit (BLUP) has been issued in respect of those works. As development works means installation works involving, inter alia, permanent structures, the

Project falls within the definition of development works, and, therefore, a BLUP must be obtained prior to its implementation. Under section 117(2), the promoter is required to make an application to the local authority in which the development site is located, in the current case, the District Council of Pamplemousses. Under section 117(6), in processing applications for a BLUP, the Permits and Business Monitoring Committee of the Council (the PBMC) must have regard to the provisions of the Building Control Act, the Environment Protection Act, the Mauritius Fire and Rescue Service Act, the Planning and Development Act and the Town and Country Planning Act and the Planning and Development Act and any guidelines issued under those Acts. Under section 117(7), the PBMC only approves an application where it is satisfied that the application is in accordance with the Acts and the guidelines referred to in subsection (6). Under section (10)(a), where an application is approved, the Council issues the BLUP on such conditions as the Council may determine [8].

2.1.8 Wastewater Management Authority Act 2000

This act gives the Authority powers to carry out, monitor, supervise, maintain, manage and control wastewater works and promote the treatment of water and wastewater systems. The Wastewater Management Authority Act places restrictions on wastewater effluent disposal. In accordance with Section VII of the act, no person shall, without lawful authority, cause effluents to overflow along any gutter, canal or surface, cause rainwater, surface water or sub-soil water to enter any house sewer, construct or install any treatment plant or other assembly meant for the collection, conveyance, treatment or disposal of effluents, without the prior approval of the Authority [9].

2.1.9 Forests and Reserves Act 1983

This Act provides the basis for the protection of the forests and river borders of Mauritius. It also sets the allowable development from the edges of a water course, irrespective of the type of ownership enjoyed by properties lying along such watercourse [10]. The Forest and Reserves Act 1983, Act 41 of 1983 – 1 May 1984 requires that there should be no construction within a river reserve, unless with the declaration of the Supreme Court. A river reserve, as defined in the Act, is: Where there is an escarpment, the land extending from the edge of a watercourse to the top of the escarpment; Where there is no escarpment, the land extending from the edge of a watercourse to a distance measure on the horizontal plane as follows:

- in the case of a river, of 16 m
- in the case of a rivulet, of 8 m
- in the case of a feeder, of 3 m

2.1.10 Climate Change Act 2020

The Climate Change Act was passed by the Parliament of Mauritius to provide a legal framework for the country's efforts to mitigate and adapt to climate change. The Act recognizes the urgent need to reduce greenhouse gas emissions and build resilience to the impacts of climate change and sets out a range of measures to achieve these objectives [11].

2.1.11 Rivers and Canals Act 1863

This Act deals with the control, pollution, wastes and environmental effect for rivers and waterways in Mauritius and defines all rivers and streams as public property. The Rivers and Canals Act 35/1863 prohibits any construction or setting up and operation of any activity with potential of defiling river within 100 feet (±30m) of any river or stream, unless a certificate is obtained from the Permanent Secretary or the Sanitary Authority that the water of the river or stream is not liable to be defiled by the proposed construction and/or activity [12].

2.1.12 Central Electricity Board Act 1939

The Central Electricity Board (CEB) is responsible for power generation and distribution, including the setting up of power purchase agreements including generation from renewable sources [13].

2.1.13 Road Traffic Act 1989

The construction of and upgrading of public roads require the clearance of the Road Development Authority (RDA) and the Traffic Management and Road Safety Unit (TMRSU) of the Ministry of Public Infrastructure, Land Transport & Shipping [14].

2.1.14 Central Water Authority Act 1971

The Central Water Authority is responsible for the control, development and conservation of water resources. The Authority shall be the sole undertaker for the supply of water for domestic, commercial and industrial purposes throughout Mauritius. The Authority is also responsible for ensuring that water supply conforms with such standards as are laid down by law [15].

2.1.15 Land Drainage Authority Act 2017

The Land Drainage Act 2017 establishes the Land Drainage Authority as a corporate body and provides guidance with respect to its functions, powers and administration. The authority is responsible for the development, construction and maintenance of the drainage infrastructure of the country. The Authority shall, among other things, prepare and implement land drainage schemes, carry out research on watershed management, and advise the Minister on the formulation and management of land drainage policies and strategies. The Authority shall be administered by a Board, to be known as the Land Drainage Board. Part V Section 22 of the Act emphasizes offences which prohibit any person from damaging the

drainage infrastructure or changing the course of any drainage infrastructure without approval of the Authority [16].

2.1.16 National Heritage Fund Act 2003

The National Heritage Fund Act 2003 is the principal legislation for safeguarding Mauritius's cultural heritage. It establishes the National Heritage Fund (NHF) as a statutory body under the Ministry of Arts and Cultural Heritage, with responsibility for identifying, preserving, protecting and promoting both the tangible and intangible heritage of the country. The Act empowers the NHF to survey and maintain a national register of heritage resources, undertake research and documentation, and advise Government on policies for conservation. It provides a legal mechanism for sites, monuments, shipwrecks, artifacts and other properties of outstanding historical, cultural, aesthetic or scientific value to be formally declared as National Heritage by the Minister, on the recommendation of the NHF. Once declared, such properties—whether publicly or privately owned—are subject to strict controls on alteration, demolition, export or sale, and any damage or unauthorized activity is an offence punishable by fines and imprisonment. The NHF is also mandated to raise public awareness through education, exhibitions and community involvement, and it may acquire or lease property to ensure adequate protection. Funding for these activities comes from a dedicated National Heritage Fund, which receives government allocations, grants and donations. Through these provisions the Act gives Mauritius the legal framework to conserve and manage its rich historical and cultural assets and to meet its international obligations, including those under the UNESCO World Heritage Convention [17].

2.2 International Conventions whereby Mauritius is a Signatory

Mauritius is signatory of the following international agreements among others:

- The Convention on Wetlands of International Importance (Ramsar Convention), 1975.
- Convention on the Protection, Management and Development of the marine and coastal environment of the Eastern African Region and related protocols (Nairobi Convention 1985).
- Montreal Protocol on Substances that Deplete the Ozone Layer, 1992.
- United Nations Framework Convention on Climate Change (UNFCC), 1992.
- United Nations Conventions of Biological Diversity (CBD), 1992.
- World Heritage Convention (UNESCO), 1995.
- Kyoto Protocol, 2001.
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), 2001.
- Convention on the Conservation of Migratory Species of Wild Animals, 2004.
- Paris Agreement, 2016.

2.3 IFC Guidelines

International Finance Corporation's (IFC's) Performance Standards, which are part of the IFC's Sustainability Framework, are globally recognized as benchmarks for environmental and social risk management. The Sustainability Framework demonstrates IFC's strategic commitment to sustainable development. IFC's Sustainability Framework promotes sound environmental and social practices, encourages transparency and accountability, and contributes to positive development impacts. The Sustainability Framework was originally adopted in 2006 and updated in 2012. The 2012 edition of the IFC's Sustainability Framework is meant to apply to all investments and advisory clients of the World Bank Group whose projects undergo IFC's initial credit review process since January 2012. On the other hand, the Environmental, Health and Safety (EHS) guidelines published by the International Financial Corporation of the World Bank Group are technical reference documents with general and industry-specific prescriptions for Good International Industry Practice (GIIP). The EHS guidelines contain the specific performance levels and measures that are normally acceptable to the World Bank Group, and that are generally considered to be achievable in new facilities at reasonable costs by existing technologies [18].

2.4 Equator Principles

The Equator Principles (EPs) are a risk management framework, adopted by financial institutions, for determining, assessing and managing environmental and social risks in projects. It is primarily intended to provide a minimum standard for due diligence and monitoring to support responsible risk decision-making. The Equator Principles apply globally to all industry sectors and to five financial products, namely: Project Finance Advisory Services, Project Finance, Project-Related Corporate Loans, Bridge Loans and Project-Related Refinance and Project-Related Acquisition Finance. Currently, there are 114 Equator Principles Financial Institutions (EPFIs) in 37 countries that have officially adopted the EPs. EPFIs commit to implementing the EP in their internal environmental and social policies, procedures and standards for financing projects. The Mauritius Commercial Bank Ltd has adopted the Equator Principles since May 2012 [19].

2.5 Relevant SEA Guidelines

2.5.1 The SEA Directive by the European Commission

The Strategic Environmental Assessment (SEA) Directive's objectives (Directive 2001/42/EC) are to provide a high level of protection to the environment and contribute to integrating environmental considerations into the preparation, adoption, and implementation of plans and programmes to promote sustainable development. To achieve this, an environmental assessment must be carried out according to the Directive's provisions for plans and programmes identified as likely to have significant effects on the environment. The SEA

Directive applies to a wide range of public plans and programmes, including land use, transport, energy, waste, and agriculture. Applying the Directive should lead to more sustainable and resource-efficient development through systematic appraisal of different options during planning [20].

2.5.2 UNEP SEA Manual (2009)

It is a step-by-step guide for beginners and governments building SEA systems from scratch. The UNEP SEA Manual helps countries, especially those with limited SEA experience, establish and implement SEA processes. It promotes sustainability assessment, stakeholder participation, and ecosystem-based thinking, and applies to a broad range of plans, policies, and programmes. It also puts strong emphasis on capacity-building and institutional integration [21].

2.5.3 World Bank SEA Guidance Note

The World Bank SEA Guidance Note guides the SEA implementation in World Bank-supported projects, particularly in low and middle-income countries. It is flexible and can be adapted to different contexts, emphasising the integration of environmental and social considerations into policymaking and encouraging early engagement and political economy analysis [22].

2.5.4 Guidelines for Using SEA by the IAIA

The Strategic Environmental Assessment (SEA) guidelines created by the International Association for Impact Assessment (IAIA) are an excellent decision-making tool to support African countries in developing policies, plans, and programmes to support projects across the continent. The SEA guidelines provide essential tools for effective sustainability planning and stakeholder engagement. This guidance gives invaluable insight into the impacts of different energy technologies on the environment and society, including the benefits of carrying out SEA in order to reduce or minimize impacts, and tools to integrate SEA into decision-making. SEA focuses on a higher level—on policies, plans, and programmes. It zooms out and looks at the bigger picture (like a province, region, or whole country), with a strong focus on alternative options and cumulative effects. SEA provides an early warning system, so governments can identify and address potential issues before they become problems. The scale of the benefits is larger, and the opportunity to reduce risk early is also high, helping to avoid later costly or permanent mistakes caused by poorly designed policies [23].

2.5.5 National Guidelines for SEA in Kenya

The National Environment Management Authority (NEMA) coordinates and supervises environmental matters and is the principal instrument of government in the implementation of all environmental policies. A key objective of NEMA is to identify projects, programmes, plans, and policies that require environmental assessment and remedial measures. The

Environmental Impact Assessment (EIA) process inadequately deals with cumulative, synergistic, secondary, and/or long-term impacts which can be addressed when policies, plans, and programmes (PPP) are subjected to a Strategic Environmental Assessment (SEA) process. SEA can analytically and systematically integrate environmental issues into PPP formulation through a rigorous stakeholder engagement process, among others. The guideline outlines the SEA concept, principles, basic steps, and expected outputs and outcomes of a SEA process. It is expected that the National Guidelines for Strategic Environmental Assessment contribute to a more in-depth understanding and inform enhanced practice of SEA in Kenya [24].

2.5.6 SEA – Guidelines for Regional Assemblies and Planning Authorities

This guideline is intended to assist regional and planning authorities, and any development agency responsible for preparing a planning scheme in respect of a Strategic Development Zone (SDZ), in implementing the requirements of Directive 2001/42/EC of 27 June 2001 on the assessment of the effects of certain plans and programmes on the environment - commonly known as the “SEA Directive”. The objective of this guideline is to provide for a high level of protection of the environment and to contribute to the integration of environmental considerations into the preparation and adoption of plans and programmes, with a view to promoting sustainable development, by ensuring that, an environmental assessment is carried out of certain plans and programmes which are likely to have significant effects on the environment [25].

2.5.7 SEA – Guidelines for Pacific Island Countries and Territories

The Pacific Regional Environment Programme (PREP) Strategic Plan 2017 – 2026 has identified Strategic Environmental Assessment (SEA) as a tool for strengthening national sustainable development planning. SEA provides a systematic process by which environmental and climate change considerations are required to be fully integrated into the preparations of development plans, proposed sector policies and strategies, and development programmes prior to their final adoption. This guidance on the application of SEA serves as a tool to support environmental planning, policy, and informed decision making. It provides background on the use and benefits of SEA as well as providing tips and guiding steps on the process, including case studies, toolkits and checklists for conducting an SEA. These guidelines are intended to assist with better understanding of what Strategic Environmental Assessment is, the benefits that can be achieved through its targeted use, and how and when to apply it to ensure that environmental and social matters are integrated into policies, plans, programmes and projects. The guidelines can also be used by government sectors in terms of developing and implementing new policies and programmes for the government. These guidelines can also provide useful assistance to non-governmental organisations,

communities and all those seeking to broaden their capacities, with a view to better-informed public participation in strategic planning [26].

2.5.8 Good Practice Guidance for Development Cooperation by the OECD

This Guidance volume explains the benefits of using SEA in development cooperation and sets out key steps for its application based on recent experiences. Twelve different entry points are identified for the practical application of SEA in development cooperation. For each entry point, the text provides a guidance note: a checklist of questions and hands-on case studies. Evaluation and capacity development for SEA processes are also addressed. It points out ways to support the application of SEA in the formulation and assessment of development policies, plans, and programmes. In view of the highly diverse circumstances across different countries, it seeks to provide a commonly agreed and shared model that allows for flexibility in developing appropriate applications of SEA to the diversity of needs. It is presented in the context of a rapidly emerging framework of international and national legislation on SEA in both developed and developing countries [27].

3.0 Site Description

3.1 Location of the Site

The proposed site for the Constance village smart city is found at Constance, Flacq in the Eastern part of Mauritius as shown in **Figure 2** below. Site and location plans are provided in **Annex 22**. The site falls within the purview of the District of Flacq. The promoters require a SEA license from the Ministry of Environment, Solid Waste Management and Climate Change to proceed with the project.

Figure 2: Geographical Location of the Site

3.2 Site Accessibility

The site is found on both sides of B23 Road (Brisée Verdière – Saint Julien – Constance Road) and partly along A2 Road (Port Louis - Central Flacq Road) as shown in **Figure 3**. When coming from the East and the South, the site can be accessed through A7 Road (Moka - Camp de Masque - Flacq Road) and by turning into B23 Road. The site can also be accessed by the A2 Road when coming from the North. When coming from the West and the Central Plateau, the site can be reached using B23 Road.

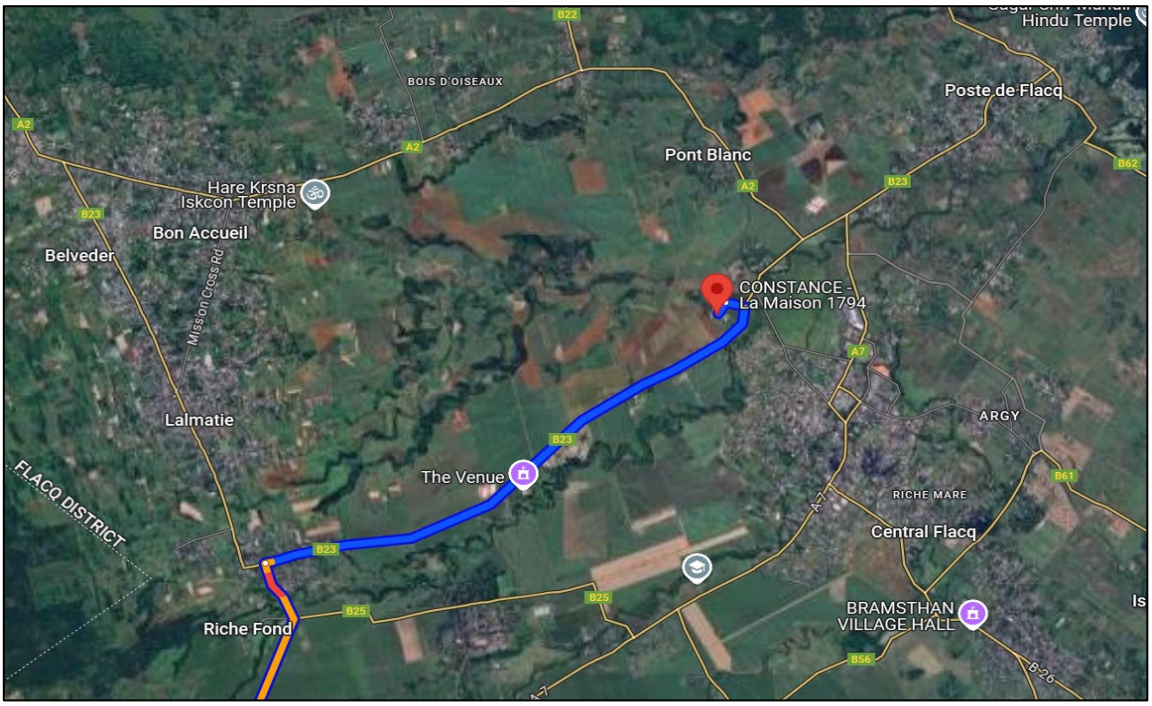


Figure 3: Roadmap Showing Access to the Site

3.3 Site Ownership

The site identified for the proposed smart city project consists of eight plots of land, all belonging to Constance La Gaiete Company Ltd, as per the Title Deeds in **Annex 23**. The land selected for the smart city has a total extent of 1,505,561 m^2. Constance La Gaiete Company Ltd has issued a letter of authorization to Constance Smart City Company Ltd for the development of the smart city (see **Annex 24**). The notary certificate is attached in **Annex 25**.

3.4 Current Usage of the Site

Several activities are currently being undertaken on the different plots of land (see **Figures 4 to 9**).

The various activities undertaken on site are as follows:

- **Agricultural Activities**
    - Agricultural operations (Garage, Ex factory and agricultural offices)

- Sugar cane

Figure 4: Sugar Cane Cultivation

- Agricultural diversification (Food crop)
- Poultry activities

Figure 5: Poultry Farm

- **Business Park**
  - Constance Hotels Head Office

Figure 6: Constance Hotels Head Office

- Beau Bois Espace Affaires

Figure 7: Beau Bois Espace Affaires Office

- **Commercial, Sports and Leisure**
  - Le Comptoir Café

Figure 8: Le Comptoir Café

  - Le Club Constance
  - Quad Activities

- **Education**
  - La Ruche Animée Pre-primary School
  - Dukesbridge Pre-Primary School

Figure 9: Dukesbridge Pre-primary School

- **Medical**
  - OCS Santé
- **Industrial**
  - Cementis Distribution Centre

3.5 Key Features of the Site

The site is the natural extension of Flacq and has various features that are attractive for the development of a smart city. The key features are as follows:

- The site is found in a strategic location which is some minutes away from Flacq and 15 minutes away from the island's most beautiful beaches.
- The site has good road connections to ensure safe and easy access to and from the site.
- The site is remote enough to give residents privacy, but close enough to downtown Flacq so that residents can get access to commercial and recreational businesses,
- The site is also close to the Flacq public hospital in case of any emergencies.

3.6 Characteristics of the Surroundings

The context plan in **Annex 14** shows the major developments within the 1km radius from the boundaries of the proposed site at Constance, Flacq. The surrounding developments in the region are as follows:

- Sir Aneerood Jugnauth Hospital is found 34 m to the southwest of the site.
- Coeur de Ville Flacq is located at a distance of 633 m from the proposed site.
- To the north of the site, there is a poultry farm, situated at a distance of 257 m.
- The proposed site is bounded by sugarcane plantation by the west.
- Dr Bruno Cheong Medical Centre is found 506 m to the east of the site.
- The fire station and Flacq District Council are found at a distance of 861 m and 429 m respectively from the site.

3.7 Zoning of the Site

The site lies within the District Council of Flacq. The site and development within its surroundings are shown in the context plan (see **Annex 14**). The promoter requires a Strategic Environmental Assessment (SEA) license from the Ministry of Environment, Solid Waste Management and Climate Change to proceed with the development of the Constance Village Smart City.

4.0 Baseline Conditions

4.1 Geology and Land Suitability

The “Land Resources and Agricultural Suitability Map of Mauritius, FAO, MSIRI” (see **Figure 10**) was used to assess the agricultural suitability of the site where the smart city will be located. Part of the site for the smart city Constance is found in the land unit mapping symbol 1.4 (Plots 1 & 2) and Plots 3, 4, 5, 6, 7, 8 fall under land unit mapping symbol of 3.1. The landform of Plots 1 and 2 is almost flat to gently undulating with slopes less than 8% but some grading to 13%. It has Latosolic Reddish Prairie soils and very shallow to shallow reddish brown silty clay loam with frequent to very frequent rock fragments. Plots of land having land mapping symbol unit of 3.1 are almost flat to gently undulating, with slopes mostly less than 8%. The soils are Low Humic Latosols and Humic Latosols [28]. A geotechnical investigation has been carried out on site, and the geotechnical investigation is provided in **Annex 8**.

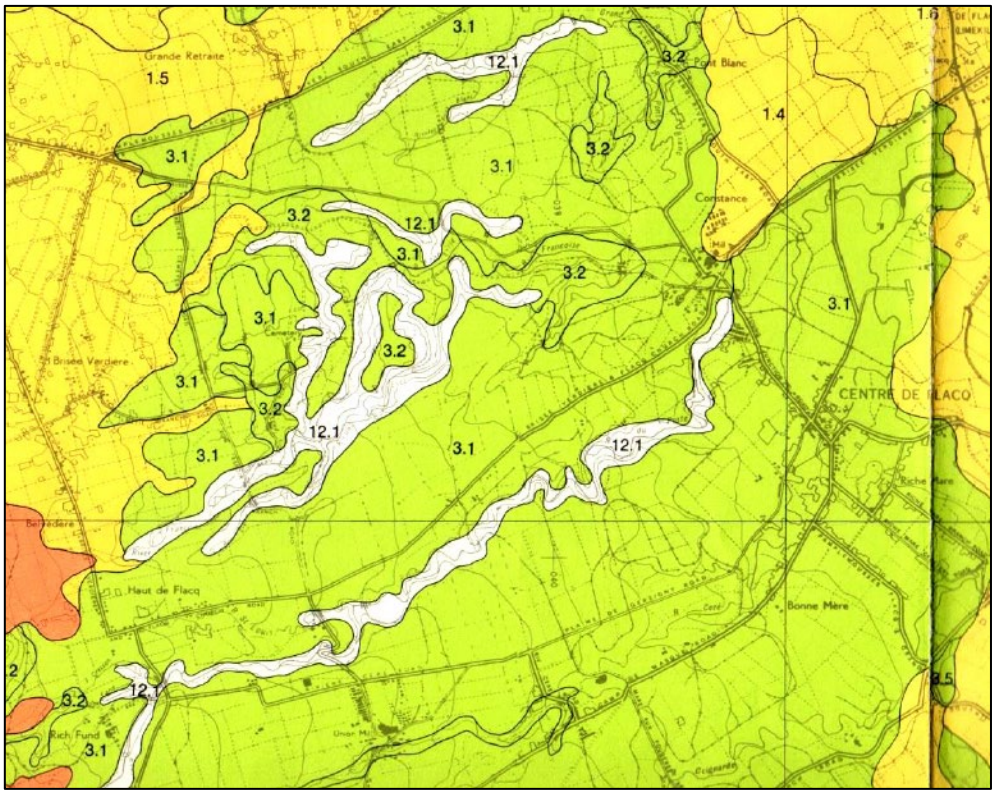


Figure 10: Agricultural Suitability Map

4.2 Hydrogeology

As per the hydrogeological map of Mauritius (see **Figure 11**), the site for the proposed smart city is found in Aquifer IV which is the Nouvelle Decouverte/Plaine des Roches/Trou D’eau Douce aquifer. According to Giorgi et al. (1999), Aquifer IV comprises of:

- The eastern part of the intracalderic reservoir centred on Valetta-Montagne La Terre.
- The median reservoirs of Camp Thorel-Pont Bon Dieu and Melrose-Belle Mare.

- The coastal reservoirs of Plaine des Roches and Trou d'Eau Douce.

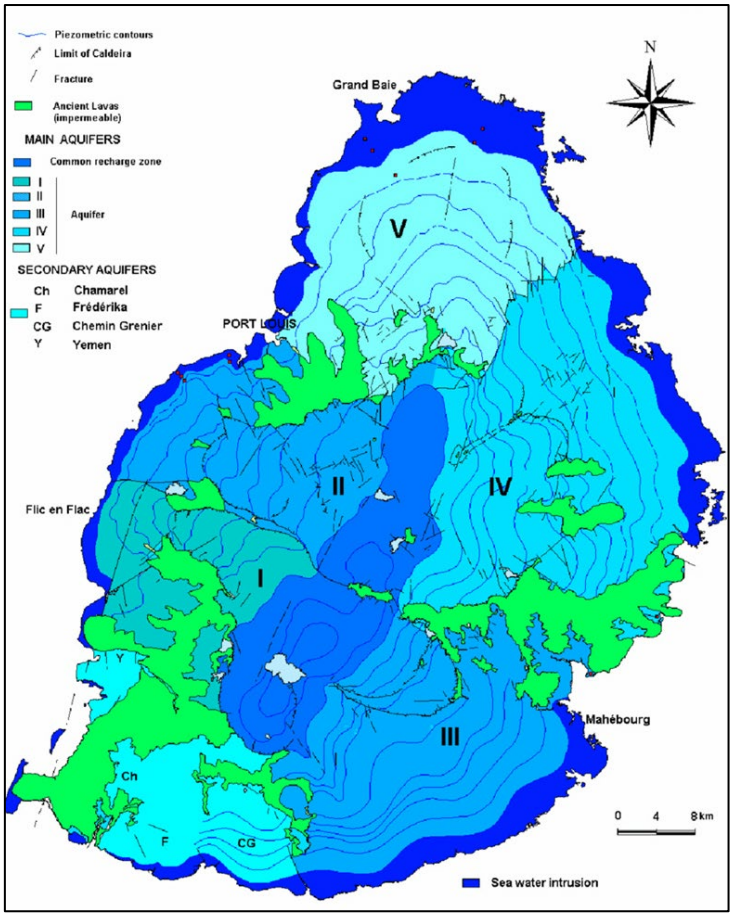


Figure 11: Aquifers of Mauritius

The median reservoir of Camp Thorel-Pont Bon Dieu is limited to the north by the fault N20 that affects the border of the caldera and to the south by the ridge of ancient basalt (Motte à Thérèse). South of this boundary is located the median reservoir of Melrose-Bel Etang that splits into three corridors in relation with the presence of Mt Fayence and Mt Blanche ridges.

The Eastern plain does not have many surface water courses. The northern boundary of Aquifer IV corresponds to the path of Riviere du Rempart. Towards the South, the network of Grande Riviere Sud-Est and its tributaries are also mainly associated with spatial distribution of outcropping Intermediate Lava Series. The central part of the aquifer also presents some surface water courses. Springing water at Bel Etang is the start of Riviere Coignard that meets Riviere Céré at Hermitage and Riviere du Poste-de-Flacq further downstream. The latter, as most of its tributaries, originates from the springs of Riche Fond. Those located downstream at Constance Beau Bois form Riviere Françoise that reaches the sea at Choisy. A hydrogeological investigation was carried out to study the hydrology and hydrogeology of the site. The hydrogeological report is provided in **Annex 7**.

4.3 Climatology

Located in the southwestern Indian Ocean, east of Madagascar, Mauritius enjoys a mild tropical maritime climate, characterized by two distinct seasons: a warm and humid summer season that spans from November to April, and a relatively cooler and drier winter season that lasts from June to September. The months of October and May are considered transition periods between the two seasons [29].

4.3.1 Temperature

The average temperature in Mauritius remains relatively constant throughout the year, with a difference of only 4.3 °C between the warmest and coolest seasons. The summer months are warm and humid, with an average temperature of 24.7 °C. January and February are the hottest months, with the average maximum temperature reaching 29.2 °C. In contrast, the relatively cool and dry winter season sees an average temperature of 20.4 °C. July and August are the coolest months, with average night minimum temperatures dropping to 16.4 °C.

According to official data collected in the East of Mauritius for the period between 1971 and 2000, the average monthly minimum temperature in the project area varies throughout the year between 17.0 and 22.3°C, with a global average of 19.5°C. As for the average monthly maximum temperature, it varies between 23.7 and 28.8°C, with a global average of 26.4°C. The minimum and maximum monthly temperature averages for the period 1971-2000 in the East of Mauritius is illustrated in **Figure 12.**

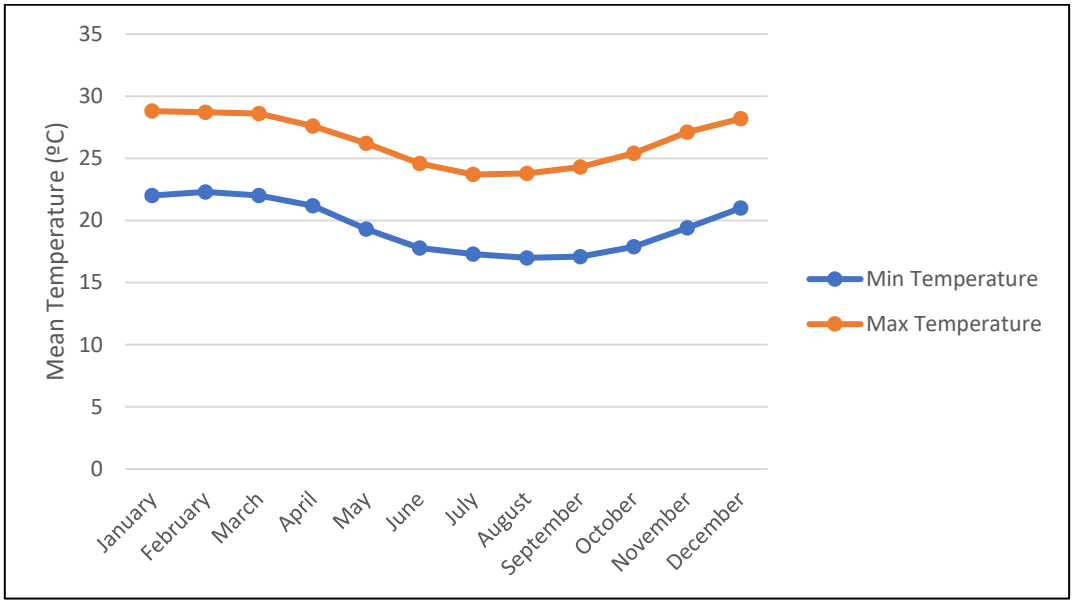


Figure 12: Monthly Temperatures for the Period 1971-2000 in the East of Mauritius

In recent years, Mauritius has been affected by rising temperatures due to climate change. Temperature analyses show a clear warming trend, with an average increase of 0.15°C per

decade and a rise of 0.74-1.2°C compared to the long-term mean from 1961-1990. In urban areas, the witnessed temperature rise is even greater [30].

4.3.2 Rainfall

Mauritius receives a significant amount of rainfall throughout the year, with distinct wet and dry seasons. The long-term mean annual rainfall (1971-2000) over the island is 2010 mm. The wettest months are February and March, while the driest month is October. However, most of the rainfall occurs during the summer months (November to April), with the mean summer rainfall (1971-2000) being 1344 mm (67% of the annual amount) and mean winter rainfall (1971-2000) being 666 mm [31]. The island exhibits significant spatial variability in mean annual rainfall, influenced by factors such as topography and orientation, leading to varying precipitation patterns across different areas. The estimated total annual precipitation volume on the island ranges between 3,000 and 4,500 million cubic metres [32]. **Figure 13** illustrates the spatial distribution of precipitation in winter and summer.

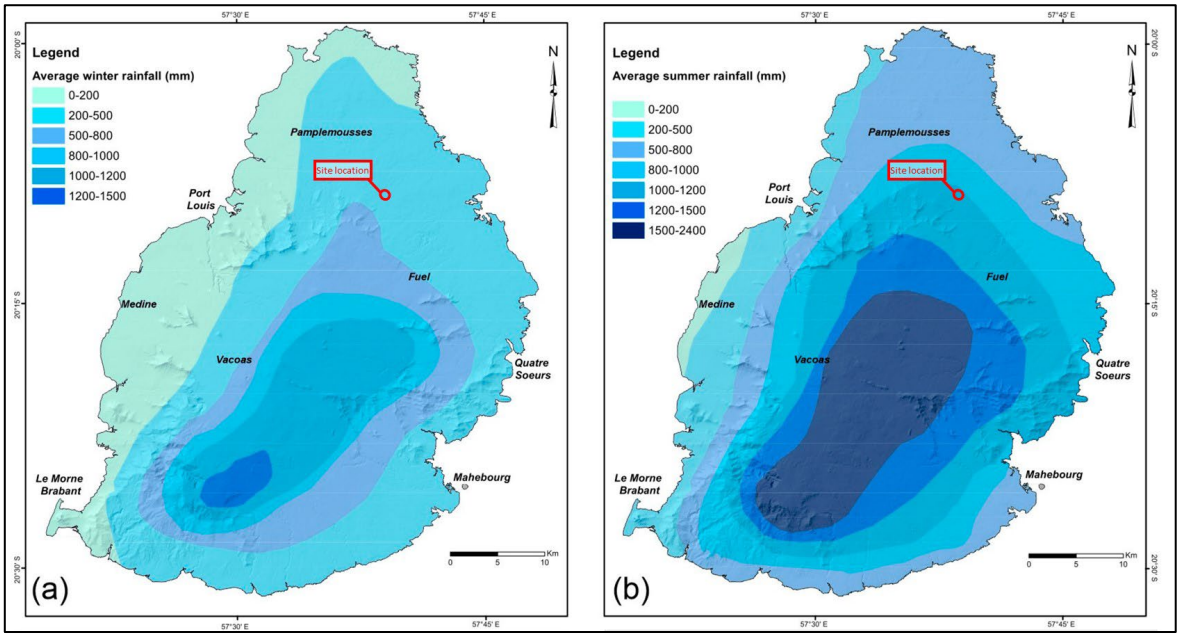


Figure 13: Spatial Distribution of Precipitation in Winter (a) and Summer (b) in Mauritius

Figure 14 illustrates the mean monthly precipitation in the east of Mauritius where the project is situated, according to official data for the period between 1971 and 2000. The minimum monthly precipitation depth in the project area occurs on average in October with 62.2 mm, and the maximum stands at 334. mm, occurring in February. The total yearly precipitation volume averages 1962 mm.

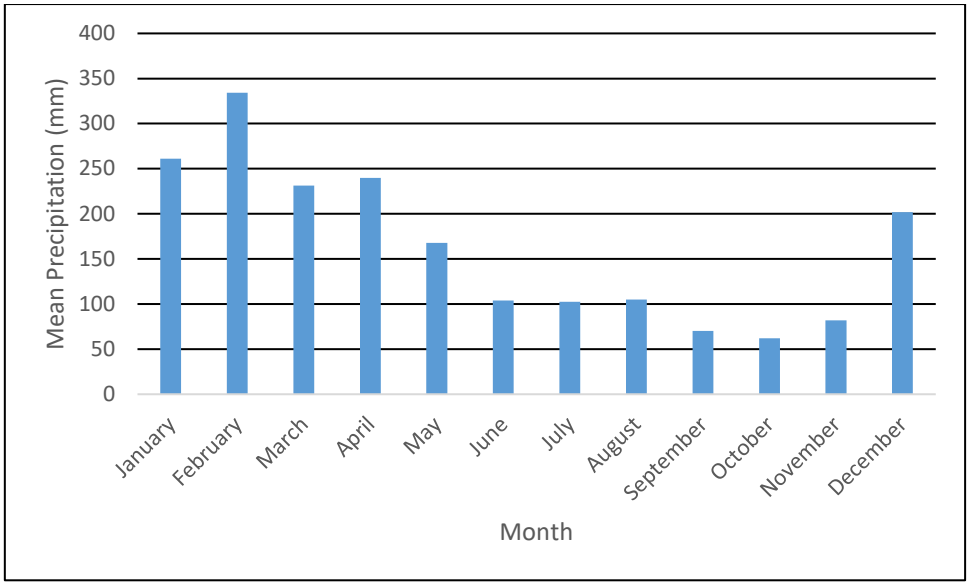


Figure 14: Mean Monthly Precipitation for the Period 1971-2000 in the East of Mauritius

Mauritius experiences occasional cyclones that can bring significant amounts of rainfall within a short period of time. Climate change is also expected to affect the intensity and frequency of rainfall events in the long term, leading to more extreme weather events such as floods and droughts. This could have significant implications for the island's agriculture, water resources, and infrastructure.

4.3.3 Wind

The subtropical marine climate of Mauritius is influenced by the southeast trade winds throughout the year. The winds are the result of the clockwise rotation of high-pressure systems in the south and low-pressure systems in the north of the island. The strength and direction of the winds vary depending on the location, time of day, and season.

The wind patterns in Mauritius are characterized by moderate to strong winds along the coastal regions, with the Central Plateau experiencing less wind due to its higher elevation. The topography of the island influences wind speed and direction, with the east coast being exposed to stronger winds due to the lack of mountains. Wind also has a notable impact on the island's weather and precipitation, bringing moisture from the Indian Ocean and resulting in higher rainfall levels on the windward side of the island. The southeast trade winds help regulate the temperature and humidity levels, contributing to a comfortable climate year-round [30].

4.4 Topography

The topography of the site varies from 115m to 35m Above Mean Sea Level (AMSL) with the general terrain of the site sloping towards the North-Eastern direction.

4.5 Heritage

Two sites located in Mauritius are inscribed on the UNESCO World Heritage List; (1) Aapravasi Ghat and (2) Le Morne Cultural Landscape. The Government of Mauritius recognizes the significance of these sites and has committed to their preservation. It has established legal frameworks and regulations to safeguard the authenticity and integrity of these sites, ensuring their long-term protection and conservation. In addition to these sites, Mauritius has identified a range of significant cultural heritage sites within its territory [17]. These sites encompass diverse aspects of the country's rich cultural and historical heritage. They include archaeological sites, historic buildings, religious structures and cultural landscapes. The cultural heritage map in **Annex 17** shows the cultural heritage sites found in the District of Flacq. Verandah of Manager's Residence (Constance), (see **Figure 15**), also classified as a heritage site [17], is found on the site for the proposed smart city. The Verandah of Manager's Residence is preserved being part of the "La Maison 1794" building and is currently being used as the Constance Head Office. It will continue to be preserved and will form part of the smart city.

Figure 15: La Maison 1794

4.6 Existing Utilities

The District of Flacq has a reasonably robust network of large diameter water mains and is supplied with surface water from Piton du Milieu Reservoir [33]. Numerous boreholes also exist and are a key component of water supply in the district; around 60% of potable water supply is from groundwater sources.

The existing CEB 66/132kV main transmission cable located close to the west of the district feeds the Amaury Substation where the 22kV overhead cables subsequently feed

transformers in the east coast of Mauritius. It should be possible to meet any likely demands for electricity, although major power requirements along the coastal fringe may require the installation of new feeder cables.

There are no centralised wastewater collection network treatment facilities in the region. Houses are equipped with individual septic tanks. The closest pumping station is at Flacq, which receives approximately 400 m^3/day of wastewater redirected to leaching fields after secondary treatment and chlorination [34].

Solid waste from the District of Flacq is sent to La Laura Transfer Station which is found approximately 7 km from the site and receives approximately 3,276 tons of solid waste per month. From La Laura Transfer Station, the collected waste is compacted and sent to the landfill of Mare Chicose [35].

5.0 Project Description

5.1 The Smart City

The proposed site is of a total extent of 1,505,561 m^2. Constance Village will be a low-density development where, of the 1,505,561 m^2, only 61% (914,359m^2) of land will be serviced into macro-plots. The smart city will provide a mix of offerings which are residential units, land parcelling, retail-commercial activities, education, offices, healthcare, retirement, and industrial activities as shown in **Figure 16**.

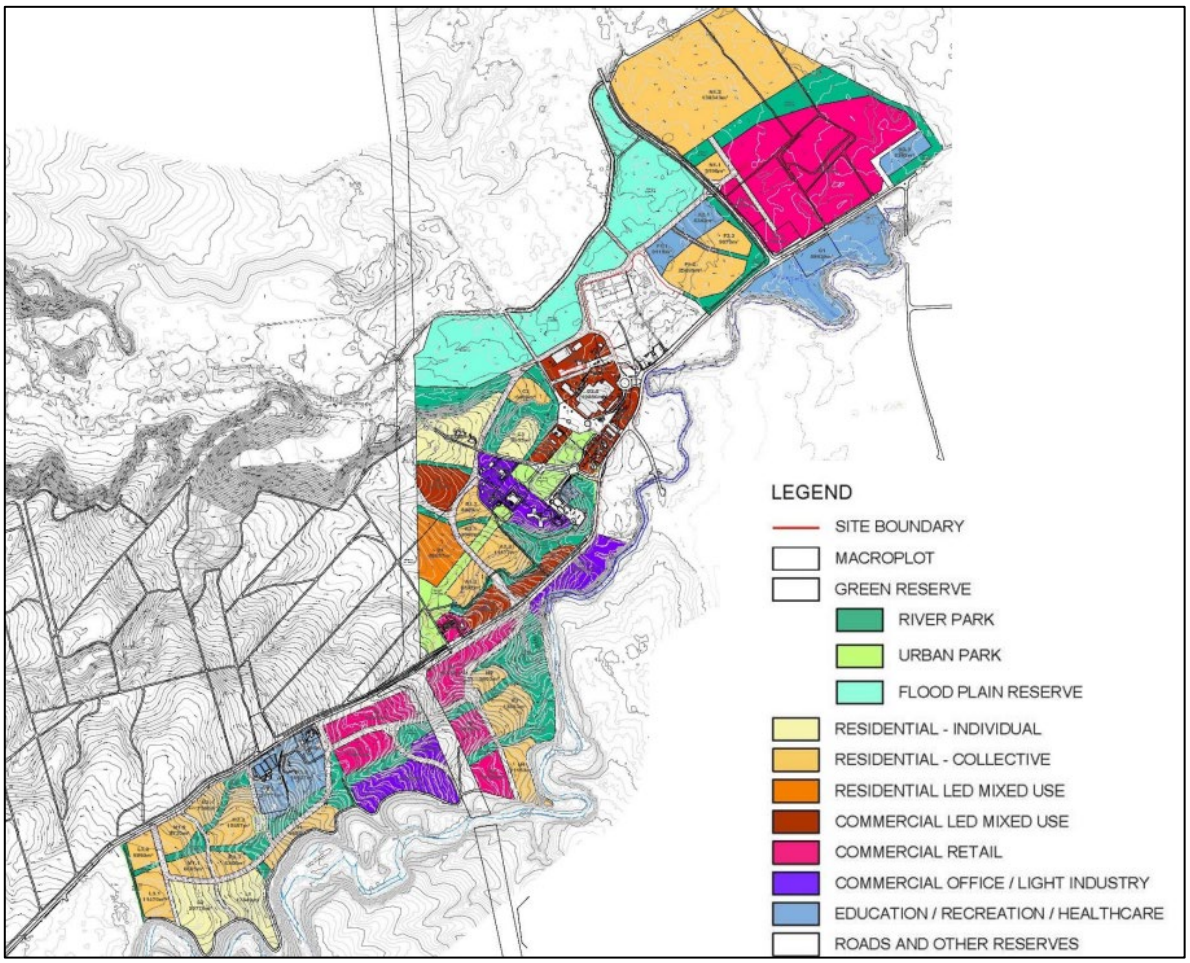


Figure 16: Land Utilisation Schedule

The land use and development parameters are illustrated in **Table 3** below. The land use parameters are in conformity with the smart city guidelines, where:

- Mixed-use development will consist of both residential and non-residential components.
- Residential land area does not exceed 50% of total land area.
- Area of serviced plots (approx 70% of land parcelling) does not exceed 12.5% of total land area and does not exceed 25% of residential land area.

- The masterplan promotes low-rise developments with a maximum allowable height of G+3.

Table 3: Land Use and Development Parameters

Project Type	Land Extent (A)	Land Extent (%)	GBA (m^2)	No. of Units
Apartments	49.4	14	136,787	1,520
Townhouses	15.9	4	30,175	189
Land Parcelling	29.5	8	21,039	105
Residential	**94.8**	**27**	**188,001**	**1,814**
Offices	21.4	6	36,717	-
Retail	58.7	16	74,791	-
Healthcare-Retirement	2.0	1	6,200	-
Education	10.0	3	11,794	-
Leisure	20.2	6	9,221	-
Industrial	9.5	3	9,106	-
Non-Residential	**121.8**	**34**	**147,829**	**-**
Green Reserve	99.3	28	-	-
Roads & Reserves	40.7	11	-	-
Common Areas	**140.1**	**39**	**-**	**-**
TOTAL	**356.7**	**100**	**335,830**	**1,814**

5.2 The Masterplan

The masterplan of the smart city, as provided in **Annex 9,** envisions a vibrant community where nature and urban living coexist seamlessly. The commercial, educational, and healthcare facilities will be positioned at the intersection of major roads or at the extremity of the development. Generous green spaces will cover approximately one third of the site. The key considerations when designing the masterplan were to:

- Protect vulnerable areas within the development and its surroundings against flooding.

- Efficiently manage vehicular traffic generated by the development without burdening existing infrastructure.
- Connect people through safe and healthy public realm.
- Create vibrant communities through active urban centres.
- Provide the best mix of usage necessary within the development.
- Set up design & concept guidelines for the property development.
- Entail a proper governance structure for the ongoing maintenance.

The masterplan design report is attached as **Annex 26**.

5.3 Character Areas

The proposed site for the smart city is a blend of contrasts, combining industrial character marked by agricultural and industrial activities, and a tapestry of diverse landscapes and unique characters. One of the key endeavours of the smart city project was to transcribe the different elements of the site into the future developments by ensuring a quality end-product – A Village, rather than a series of villages. Based on these attributes, four distinct and interconnected neighbourhoods will be developed within the Constance Village Smart City as shown in **Figure 17**.

Figure 17: The 4 Character Areas of the Smart City

5.3.1 Jardin de Constance

Marked by majestic old trees, this neighbourhood is characterised by tree-lined avenues, an expansive central garden and a number of old buildings, that bring back memories of colonial times. It is the ‘old’ Constance where one can feel the connection with the past and history of the place.

Spanning the central part of the smart city, this neighbourhood stretches from the Sugar Mill to the future M4, as shown in **Figure 18**. To the North, residential areas feature beautiful villas with expansive gardens that will be tucked under the shade of trees. New buildings will blend harmoniously with the existing parts by respecting key elements of traditional design. The neighbourhood will be accessed via Park Drive, a spine road connecting B23 to A2. Park Drive will feature generously planted swales and large pedestrian and cycle paths. At its centre, a large linear park will connect all destinations from the Sugar Mill in the East to the M4 in the West.

Some features of Jardin de Constance are:

1. A community park – featuring kiosks or shading structures providing shelter, cafes, and small boutiques.
2. Constance Walk - a place for the community to come together.
3. Constance Offices – a small cluster of offices in refurbished buildings, connected to the main office, and directly accessible from the plaza of the heritage buildings.
4. Constance Gardens.
5. A villa cluster.
6. Le Comptoir.
7. A shared space.

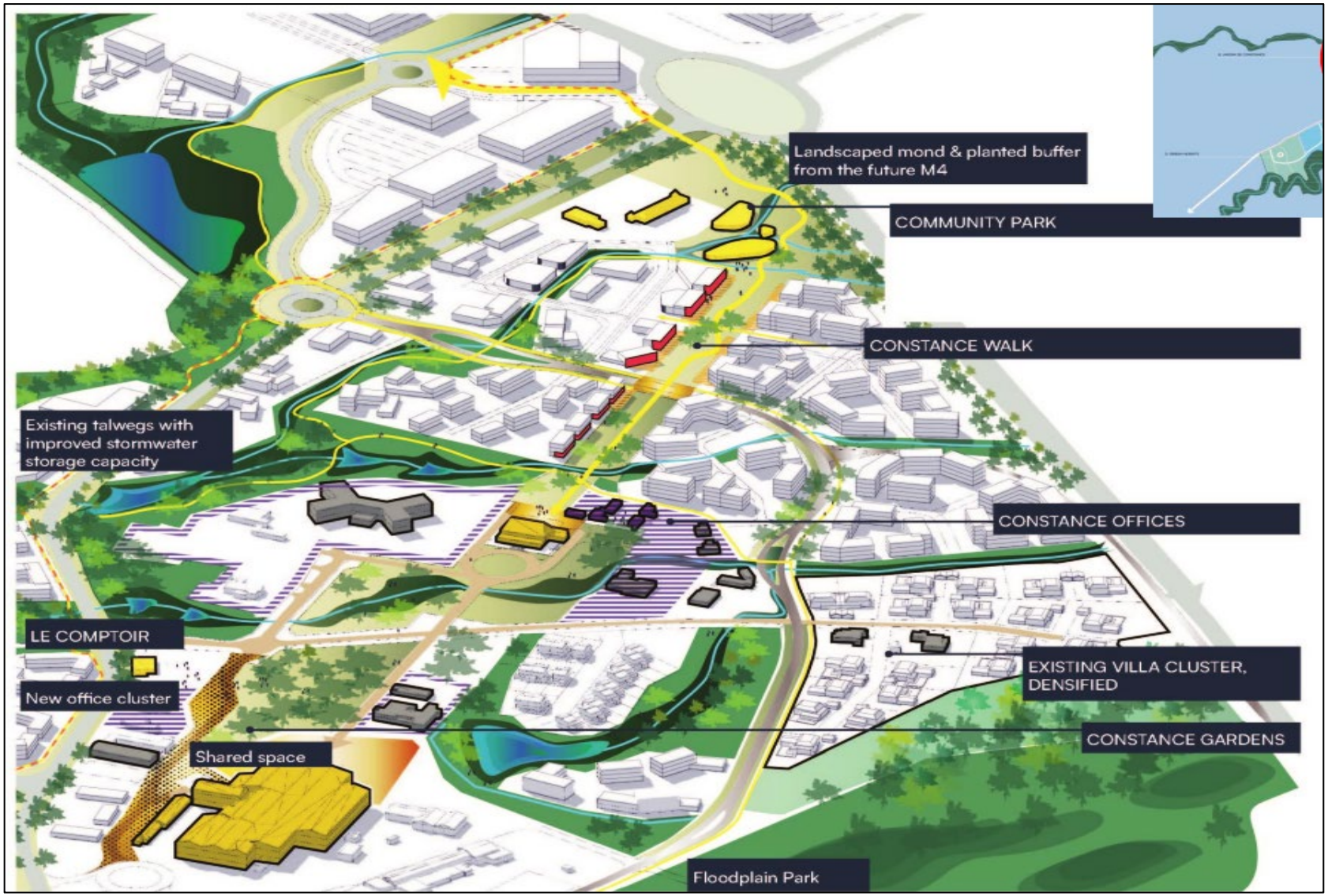


Figure 18: Jardin de Constance

5.3.2 Constance Village

Constance Village will be positioned behind the factory hub along B23, and framed by lush green belts. Constance Village will be the dynamic heart of the development, steeped in its industrial heritage. It will evolve into a bustling productive centre, surrounded by residential areas and a commercial hub as shown in **Figure 19**. The Constance Village will consist of a shopping mall, a clinic, apartments, schools, medical centres, a community centre, a sports complex, an activity zone, a factory hub, and a plaza. Le Verger, an existing residential community, will also form part of Constance Village.

The medical centre and school, catering to the larger Flacq region have been located at the entrance of the North site with direct access from A2. The flood plains along Riviere Françoise have been used to locate sports amenities associated with the school, as well as the residential communities around.

The community centre and the sports complex will be located at the entrance of the smaller hamlet along Riviere Centre de Flacq. This neighbourhood community centre anchors the cluster of predominantly residential sectors, peppered with activities along the internal loop road.

Situated between two residential clusters along the Riviere Centre de Flacq, a small activity zone has been planned, that includes offices and workshop spaces.

The factory hub and plaza will allow for ongoing existing light industrial activities behind the old factory building, without interfering with the newer uses planned around the area.

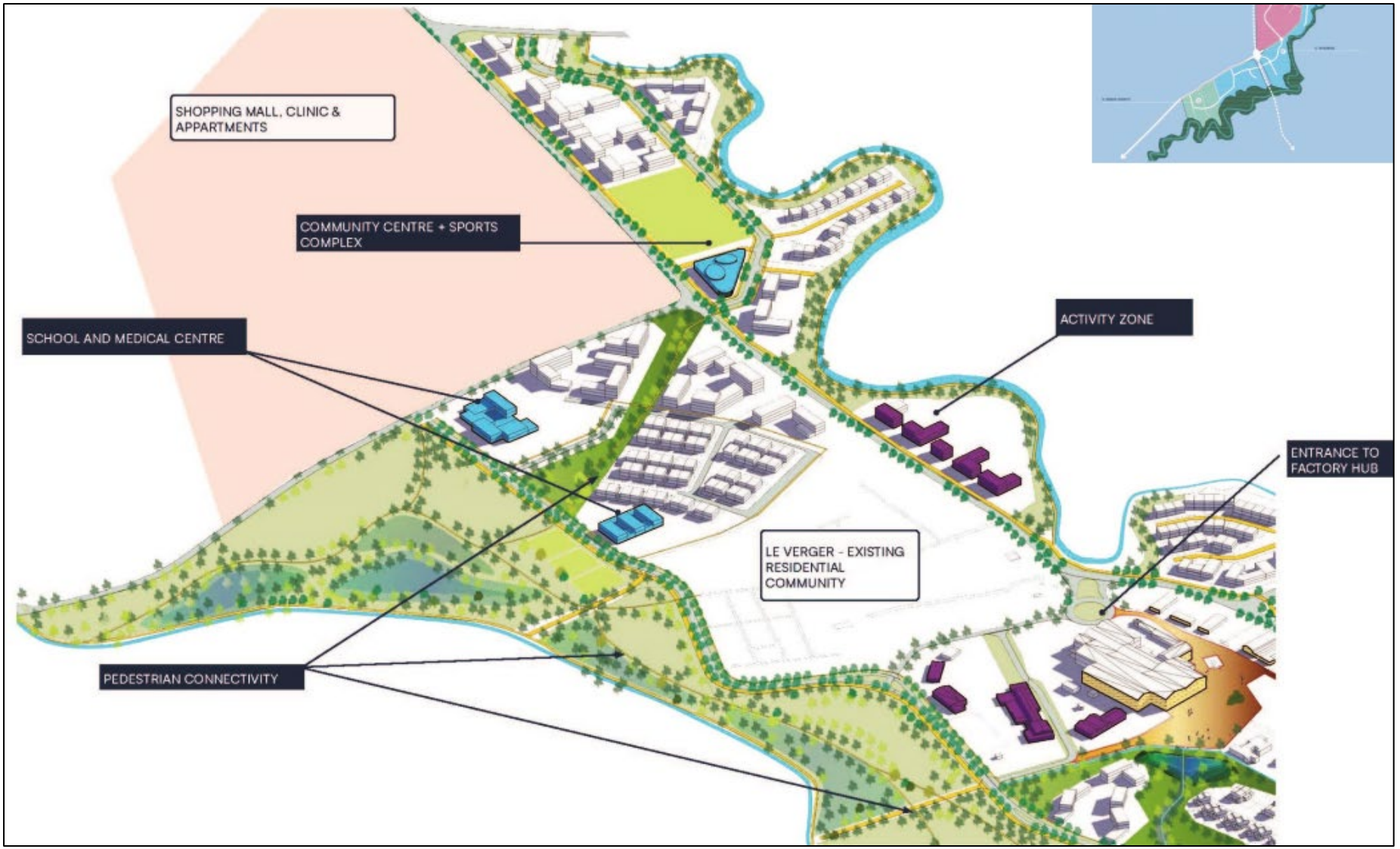


Figure 19: Constance Village

5.3.3 Riverside Neighbourhood

Bound by Rivière Du Poste to the south and the B23 to the north, this part of the development transitions between different neighbourhoods, from residential-led developments to the east overlooking the river to retail and light industry activities spanning both sides of the future M4 (see **Figure 20**). The focus is on leveraging visibility and river proximity while navigating challenges such as noise and complex access to create a thriving, accessible zone. The Riverside neighbourhood will comprise of:

- Large retail and warehouses.
- R&D Quarter - Innovative industries and research hubs organized around a landscaped park, offering convenient access and proximity to Flacq as well as the coast and luxury hotels of the east.
- Shopping village - A traditional commercial facade on the roadside with small retail units and F&B kiosks overlooking the park and the river.
- Commercial plot - A smaller plot in between the river and B23 which will accommodate offices, retail or light industry.
- Residential - Deeper plots which will integrate residential developments, offering river views and micro-neighbourhoods organised around communal central areas.

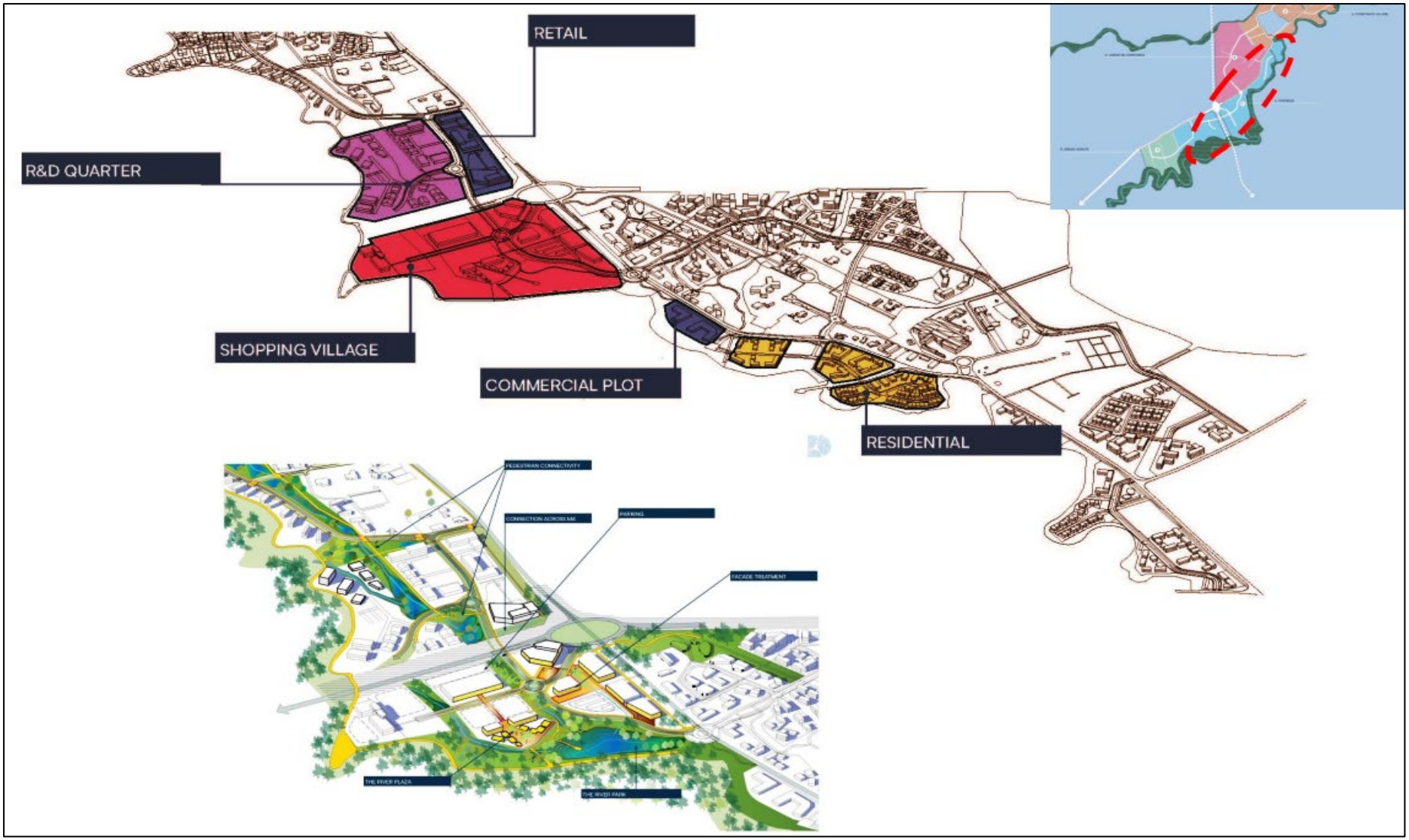


Figure 20: Riverside Neighbourhood

5.3.4 Constance Eco Quartier

The vision for Constance Eco Quartier spurs from a desire to create a place that would, above all, cater for the residents' wellbeing. A place that is safe for all, connected to nature, creating opportunities for social interaction. This modern, eco-friendly neighbourhood (see **Figure 21**) features sleek, sustainable architecture and lush greenery, fostering a safe, socially engaging environment for those committed to environmental harmony and contemporary living. The design of the Eco Quartier neighbourhood has taken into consideration the following aspects:

1. Safety:

- There is a dedicated pedestrian route crossing the development, with limited road crossings.
- All internal roads are designed as shared streets, where driving speed is further limited through design.
- All pedestrian road crossings are raised to footpath level and marked with a different material, adding visibility and acting as an additional speed reduction measure.

2. Noise and Pollution:

- Speed limits are enforced throughout the development not only to increase safety, but also to reduce noise and pollution.
- Cars are moved away from houses by limiting car parking to designated entry points and grouping parking in pocket parks at the entrance of residential streets.

3. Access to Nature:

- Natural-looking spaces have a positive impact on residents' wellbeing. The design includes ample green areas and naturalistic landscapes to enhance mental and physical health.

4. Sustainability:

- Buildings have been designed in line with bioclimatic principles for optimised natural ventilation and lighting. Local materials will be used wherever possible.

5. Healthy Connected Communities:

- The neighbourhood design favours soft mobility.
- Formal and informal gathering spaces are dotted around the project.
- Parking is set back to create opportunities for face-to-face encounters, fostering a sense of community.
- The design ensures visual connections for safety, making public spaces feel secure and inviting.

Figure 21: Constance Eco Quartier

The Eco Quartier neighbourhood will consist of:

- The Village Square

The village square has been designed as an extension of a larger community park; a densely vegetated open space that serves as a central feature of the linear park passing through the development. The park transitions into the square through a series of stepped terraces, forming a sort of amphitheatre, where one can sit comfortably and watch life unfolding below.

Three residential buildings frame the square, each incorporating active uses on the ground floor to ensure that the area remains vibrant. These spaces may include programmes that open into the square, such as restaurants, cafés, and community clubs. Other potential uses include small shops, a library, a nursery, or any public-receiving programme. Offices are also permitted, provided their facades maintain a high degree of transparency.

- Cascade Park

The Cascade Park, nestled into one of the steeper slopes, includes three large basins designed to double as spaces for sports, leisure activities, and community gatherings during dry periods enhancing its versatility and utility for residents.

- Shared Streets

Shared streets have been designed primarily to optimize the use of space and promote safety. They also contribute to a more qualitative public realm.

These design elements help keep driving speeds low. Designing one space for all users allows for the optimization of road width, leaving more room for planting, and minimizing land sealing. This, in turn, reduces local runoff and helps mitigate the urban heat island effect, offering a greener, healthier, and more resilient environment to the residents of the neighbourhood.

- Integrated Parkings

Public parking is a major issue in new developments worldwide, often requiring large amounts of space for a relatively small portion of the population. In the eco-neighbourhood, particular attention has been given to integrating parking spaces into the urban environment. All parking areas will be permeable, and no continuous groups of more than five spaces will be allowed. The proposed concept not only introduces a quality detail, such as rows of stone pavers, but also serves as a speed reduction measure and can be easily converted into pocket squares if the need for parking diminishes.

5.4 Project Components

The smart city project will provide a mix of offerings which are residential units, land parcelling, retail-commercial activities, education, offices, healthcare, retirement, and industrial. Descriptions of each key offering are as follows:

1. **Residential**

One key objective of the Constance Village smart city is to offer affordable and diverse housing options, enabling Mauritians from the East and beyond to realize their dream of living in a place of character, with a modern feel, blending nature and city, and the history of the site. The residential part of the smart city will consist of a variety of projects, mainly land parcelling, apartments, townhouses, and retirement homes. The first residential projects will be developed around La Maison 1794 and around the future regional mall. The different residential typologies have catered for the growing demand for quality housing in the region of Flacq. Multi-generational collective housing clusters have been planned densely, around shared open spaces close to the urban nodes, taking advantage of the proximity to essential urban services and amenities.

2. **Retail – Commercial**

One of the first flagship projects within Constance Village Smart City will be the Mall de l'Est (see **Figure 22**). The mall will be located at the intersection of A2 and B23 roads. The Mall de l'Est will provide enhanced retail experience with better amenities and optimum tenant mix, compared to existing malls in the region. The Mall has been designed to be people-centric and take into account the aspirations of families in the Flacq district. The mall is expected to be operational in October 2027.

Figure 22: Plan of Constance Mall

3. Office, Sports and Leisure Amenities

The current facilities of Constance are Constance Head Office, Constance Hotels Head office, le Comptoir and Le Club. The smart city will offer the opportunity to enhance the existing facilities through redevelopment of buildings, by introducing office blocks This development will revitalize historical buildings around Le Comptoir. The office space will enable small businesses in the Flacq region to settle within the smart city and expected to be operational in 2026-2027.

4. Education

La Ruche Animée and Dukesbridge, two pre-primary schools are the current operators of Constance. Discussions are ongoing with these operators to expand their operations within the smart city, and also with new operators to settle within the Constance Smart City to enhance the education offering of the proposed smart city.

5. Healthcare

The current health operator within Constance is OCS Sante Health Hub and discussions are ongoing with operators to enhance the medical offering within the smart city. The proposed clinic will be strategically located close to the future mall.

6. Factory Area Rejuvenation

One of the key projects of the Constance Smart City will be the redevelopment of the area on which the old sugar factory is located. Mixed-use projects will be implemented to preserve the heritage of the site and promote arts, culture and creativity, and potentially a ‘Work -Play’ hub; a blend of retail stores, offices, light industries, wellness centres, and Community facilities and spaces offering unique experiences to the visitors. As part of the Factory rejuvenation project, a study has been underway for several months to reimagine the factory's future, with a strong focus on building on its rich heritage. The process includes a culturally sensitive approach, incorporating historical research, community engagement, and data collection. Key actions underway involve consulting archives, gathering oral testimonies, and analysing the factory’s historical role. Additionally, the study involves analysing local demographics and needs, while identifying opportunities for collaboration with local businesses and cultural initiatives. The goal is to create a space that connects with its environment, blending heritage with innovation, to serve the community and visitors alike. A series of ‘Ateliers' (workshops) as shown in **Figure 23** were conducted with former factory employees, their families, local residents, and other key stakeholders from the East region. The objective was not only to gather personal stories and insights, but also to ensure the factory’s future reflects and honours its historical significance, while addressing the needs and aspirations of the community. The factory rejuvenation has been targeted for 2027 to 2030.

Figure 23: Workshops

7. Industrial

Cementis Constance Distribution Centre and Constance La Gaiete Garage are the industrial activities currently being undertaken within Constance. These operators will be part of the industrial segment of the smart city. Other operators have also expressed interest in light industrial activities and warehousing projects, within the smart city.

8. Green Parks and Promenades

Constance Village Smart City has the potential to be one of the greenest smart cities in Mauritius. Agri-Urbanism is at the core of the Constance Village masterplan. Green parks and promenades will be the crucial part (28%) of the smart city. The green spaces and promenades will play a primary role in preserving existing vegetation, fostering local ecosystems, and maximizing biodiversity. Many of these areas will be developed into accessible parks, providing opportunities for the community to interact with nature. Urban spaces like plazas, squares, and parks will serve as hubs within the village, designed primarily for people to gather, play, jog, and simply enjoy their neighbourhood.

5.5 Phasing of the Project

The smart city project will be developed in different phases. **Table 4** below shows the phasing strategy of the smart city project.

Table 4: Phasing Strategy of the Smart City

Phase	Timeline	Main Projects
1	2025 – 2030	- Business Park and Sports Amenities - Mall de l'Est - Clinic - Schools - Residential Units (Apartments, Townhouses, Villas) - Land Parcelling - Retirement Home - Ex Sugar Factory Area Rejuvenation - Towncentre - Common Infrastructure Deployment
2	2030 – 2045	- Residential Units (Apartments, Townhouses, Villas) - Office & Commercial Projects - Leisure - Industrial - Common Infrastructure Deployment
Overall	Phasing will be subject to market demand, emerging trends and development opportunities.	

6.0 Utility Requirements

The following utilities requirements are expected for the site:

- Water consumption
- Electricity
- Street lighting
- Telecommunication network
- Wastewater management
- Solid waste management
- Stormwater
- Fire Safety

A comprehensive MEP report is provided in **Annex 27,** detailing all the assumptions and calculations for each utility requirements.

6.1 Water Consumption

The aim for the smart city water supply is to provide a clean, safe and uninterrupted water service across the entire development. Water supply, treatment, distribution, and metering strategies for the proposed Constance Smart City were developed using various references and standards, and following discussions with the Central Water Authority.

The total projected daily water demand for the smart city upon full implementation in 2045 is 2,109 m^3/day. **Figure 24** shows the position of the exploratory borehole found near BH729 and BH1449.

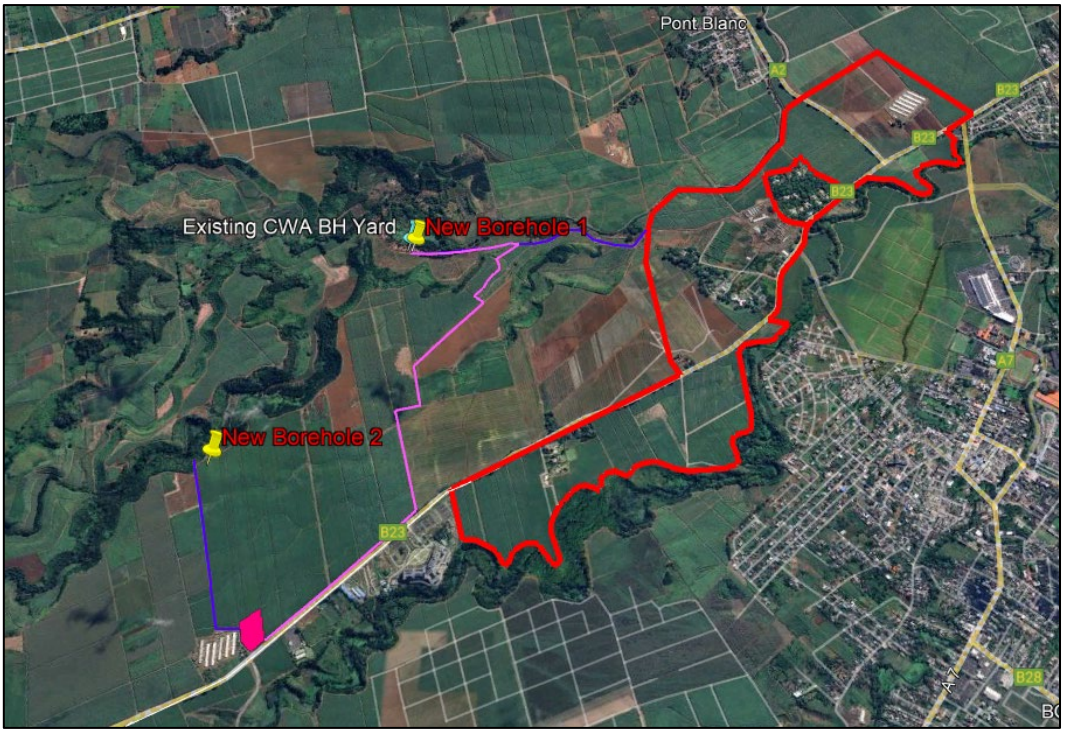


Figure 24: Position of New Boreholes

A letter was sent to the Central Water Authority (CWA), requesting permission for drilling of a new borehole, to ensure water supply for the smart city. A letter of approval was obtained for the drilling of the new borehole (see **Annex 19**). Subsequently, a report on the drilling and pumping test at the exploratory borehole was prepared and a site visit conducted, together with the CWA. The report on the drilling and pumping test is provided in **Annex 28**. The investigation on the exploratory borehole has demonstrated that it can operate at an extraction rate of 45 m^3/hr (1,000 m^3/day). It has been observed that this rate can be maintained while the nearby boreholes BH729 and BH1449 continue to operate under normal conditions. The achieved yield of 1,000 m^3/day will be sufficient to cater for the water requirements of Phase 1 of the smart city project.

For subsequent phases of the smart city, investment shall be made for a new borehole (New Borehole 2), pumping station, water tanks and water distribution infrastructure to the remaining plots of the smart city.

Water treatment will be done prior to the supply of water throughout the smart city. Water from the boreholes will undergo filtration and disinfection to ensure that it meets all health and safety standards for clean drinking water, thereby safeguarding the well-being of all residents. The treatment process will adhere to stringent potable water standards for clean drinking water and adhere to the local CWA standards.

The entire smart city project will require two tanks, each with a capacity of 2,500 m³, to cater for a 2-day storage need. The water storage tanks will be strategically positioned at a high altitude, to be able to supply water to the whole smart city, at a minimum pressure of 2.2 bars by gravity. The smart city will also have centralized water storage with distribution by gravity and a smart metering system.

6.2 Electricity

The smart city development aims to establish a sustainable, efficient, and resilient energy system that ensures a reliable grid and uninterrupted supply of electricity. This advanced infrastructure shall integrate real-time data and IoT technologies to optimize energy use and support the integration of a diverse range of renewable energy sources, including solar and wind.

The total electrical demand upon full implementation of the smart city in 2045 has been forecasted to be 73,320 kWh (6.11 MVA). The cumulative electrical demand forecast is shown in **Figure 25** below.

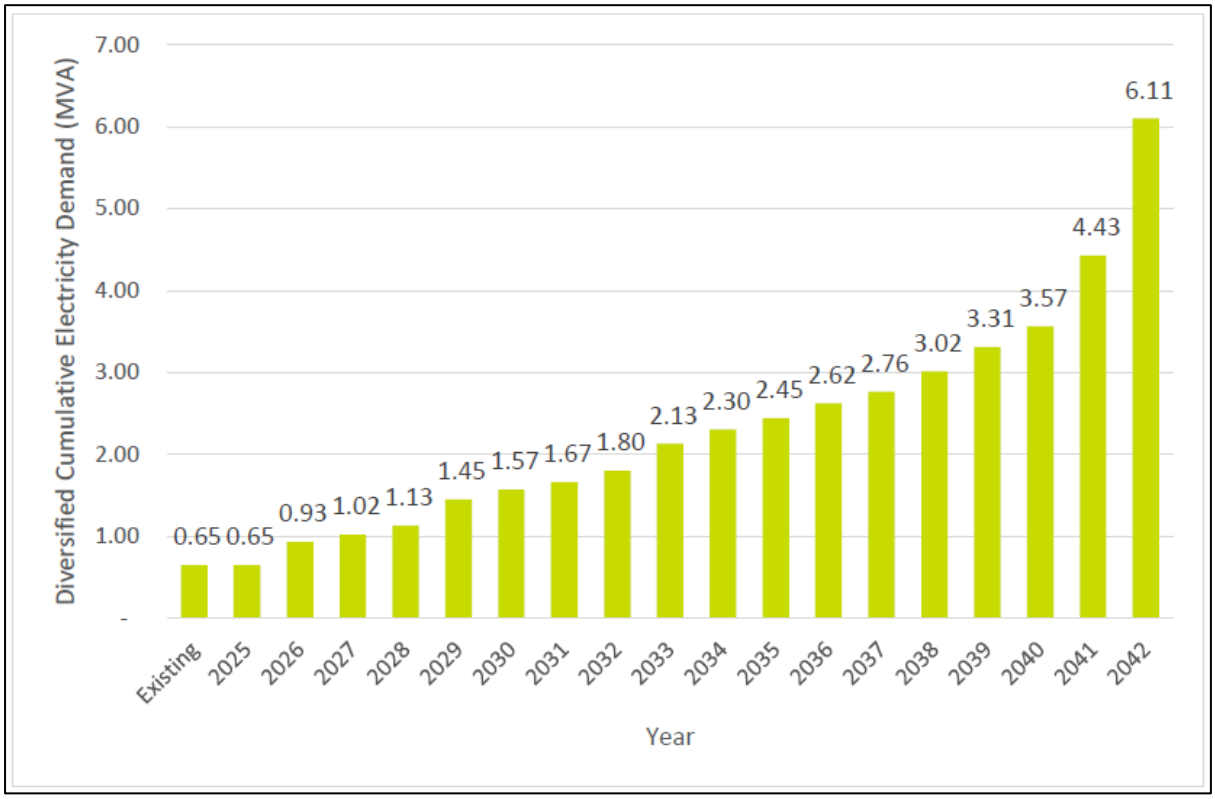


Figure 25: Cumulative Diversified Electrical Demand Forecast

In the context of the CEB power supply for the smart city project, the plan involves locally tapping off from the existing aerial high-voltage (HV) feeder from Amaury, at the intersection of roads A2 and B23. For the CEB power supply to the smart city, there are two proposed options:

- Installation of a new fully underground 22 kV high-tension (HT) feeder originating from the FUEL CEB GIS station, passing through the ALTEO sugar factory premises and Constance land, extending to the start of the smart city just after the New Flacq Teaching Hospital.
- A new fully underground 22 kV HT feeder starting from the FUEL CEB GIS station, passing through the ALTEO sugarcane fields and following the reserve of the future M4 up to the slip lane off into the smart city.

The two options are illustrated in **Figure 26** below.

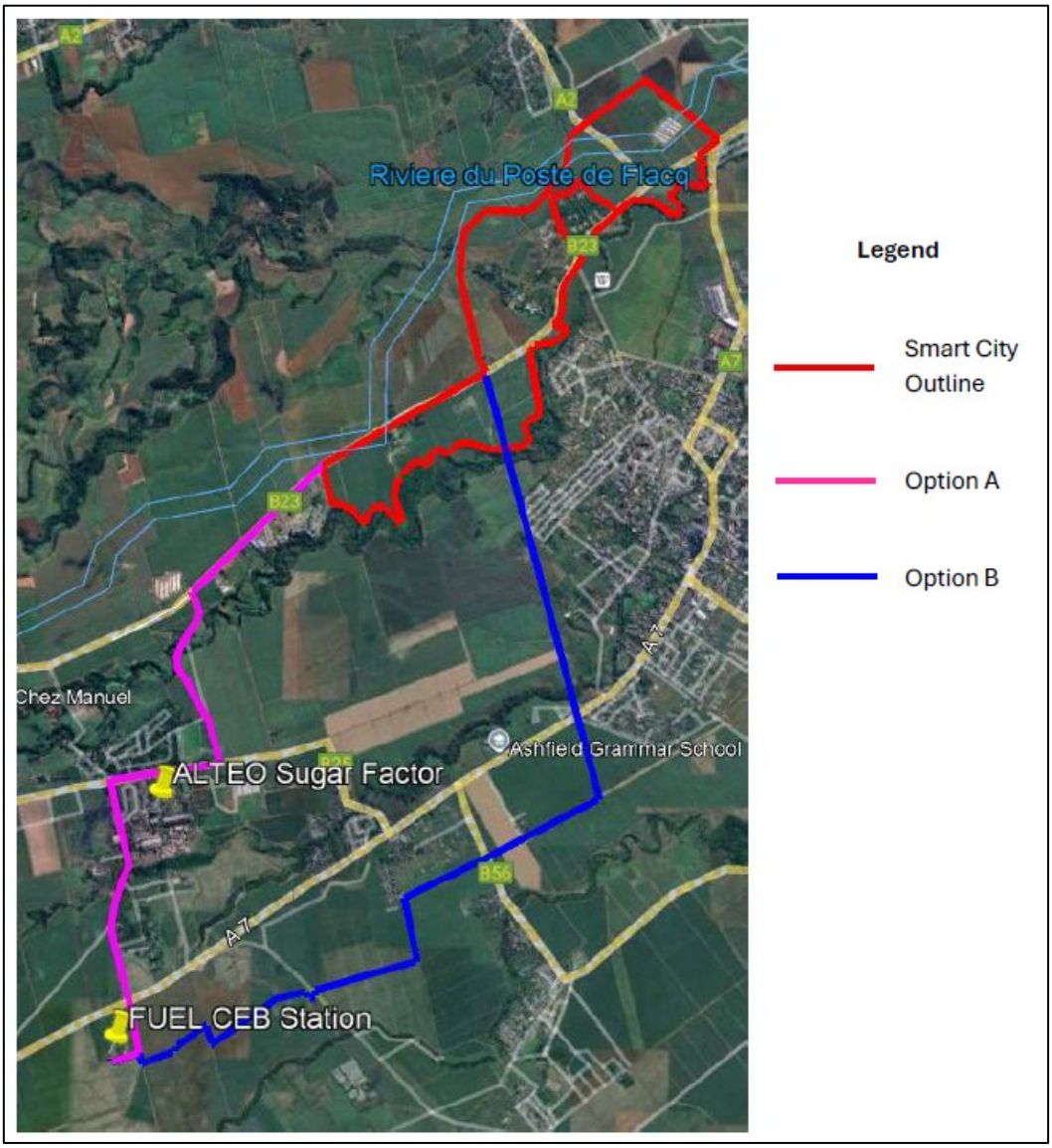


Figure 26: Options for Offsite Electrical Supply to Smart City from CEB Grid

Electrical energy consumption of users inside the smart city shall be metered, as far as possible, through individual CEB meters. CEB metering shall, in most cases, be on the LV (Low Voltage) side of CEB electrical infrastructure. However, for some exceptionally large

property developments in the smart city, such as for shopping malls, where the electrical demand will most probably exceed 500kVA, as per CEB regulations, the CEB metering shall be done on the HV (High Voltage) side.

6.3 Street Lighting

The Constance Smart City will create a well-lit, safe urban environment that prioritizes convenience, security, and sustainability. Advanced lighting technologies will be implemented to enhance visibility and ensure the safety of all residents and visitors, facilitating safe and efficient navigation throughout the smart city. The lighting systems shall integrate smart controls, to optimize light levels based on real-time conditions, further improving energy efficiency and reducing light pollution.

The street lighting system as shown in **Figure 27** is proposed to be equipped with motion sensors and adaptable lighting levels. This approach integrates motion sensors to detect the presence of pedestrians, cyclists, and vehicles, dynamically adjusting the brightness of streetlights based on real-time activity. When no movement is detected, the system dims the lights to conserve energy, reducing unnecessary power consumption. Upon detecting motion, the lights brighten to ensure adequate visibility and safety for all road users. This smart lighting system not only enhances energy efficiency, but also minimizes light pollution, contributing to a more sustainable and environmentally friendly urban environment.

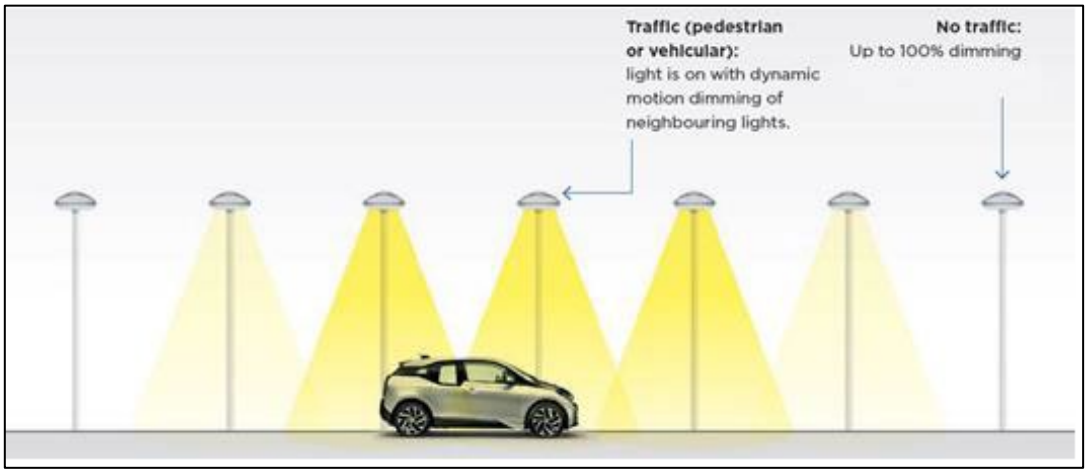


Figure 27: Street Lighting Strategy

Additionally, the system shall be programmed to adjust lighting levels based on the time of day, weather conditions, and specific urban requirements, further optimizing its functionality and effectiveness. For residential areas, it will be ensured that the streets are well-lit, without causing excessive glare or light pollution that could disturb residents.

It is proposed to use solar LED lighting poles for street lighting inside the smart city. Solar LED lighting poles are a state-of-the-art solution for sustainable and efficient outdoor lighting. These

poles harness solar energy through integrated photovoltaic panels, converting sunlight into electricity to power high-efficiency LED lights. This technology significantly reduces reliance on grid electricity, thereby lowering carbon emissions and promoting environmental sustainability.

Conventional wired LED lighting poles will be used along B23 and A2 to harmonize the existing road lighting appearance with the new proposed smart city street and neighbourhood lighting. This part of the street lighting has been proposed as wired because of the many existing high trees, which might reduce the efficacy of PV streetlights.

6.4 Telecommunication

The vision for the smart city's Information & Communication Technologies (ICT) system is to create a connected, intelligent, and efficient digital infrastructure that enhances the quality of life for all residents by integrating advanced technologies, real-time data analytics, and seamless communication networks. A fibre optic backbone will ensure comprehensive broadband access, linking residences, buildings, and smart infrastructure like street lighting and smart metering. Additionally, 5G technology will provide faster speeds, lower latency, and more reliable connections, enhancing digital experiences for residents, businesses, and municipal services. The 5G network will support advanced smart city technologies, ensuring that the infrastructure is future proof. All the buildings within the smart city will be provided with a fibre optic internet connection which would combine both data and voice

Design meetings were organized with both Emtel and Mauritius Telecom, for the provision of high performance 5G network coverage for the whole smart city. Both Emtel and MT are willing to consider the installation of palm tree type aerial antennas of height around 35 m and with ground footprint requirements of 20x20m as may be the requirements upon further detail survey and analysis by the operator. The 5G network will also enable the future proofing of the Smart City by enabling the implementation of advanced Smart City technologies such as IoT, Edge Computing, etc.

6.5 Wastewater

The design of the wastewater management system has been done to create a sustainable, efficient, and resilient framework that ensures the safe treatment and disposal of wastewater while promoting resource recovery and reuse for irrigation. The existing developments, which are dispersed throughout the smart city development, are all serviced locally through septic tanks. In most of the areas of forecasted development, there are no wastewater disposal infrastructures.

The amount of wastewater to be generated by the smart city was calculated taking into consideration the following:

- Amount of wastewater generated = 80% of water demand where 80% is the collection efficiency of the wastewater generated.
- Safety percentage = 20% for unexpected increase in wastewater generation accounting for various uncertainties and fluctuations that can affect wastewater production, such as increases in occupancy rate, economic activities, seasonal variations, and unforeseen events.
- The required effluent retention time of the septic tank was assumed to be 48 hours, as per the guidelines of Ministry of Housing and Lands.
- The septic tank should be located at a distance of at least 2m from the building.

Based on the assumptions above, the total expected amount of wastewater to be generated by the smart city is 1,687 m^3/day in 2045 when the project will be fully implemented.

Two different wastewater treatment strategies have been proposed as described in **Figure 28** below. In the first process, wastewater will be directed to a septic tank and then to either an absorption pit or a leaching field for further treatment and disposal. In the second process, wastewater will be sent to a sewage treatment plant (STP) for centralized processing and treatment.

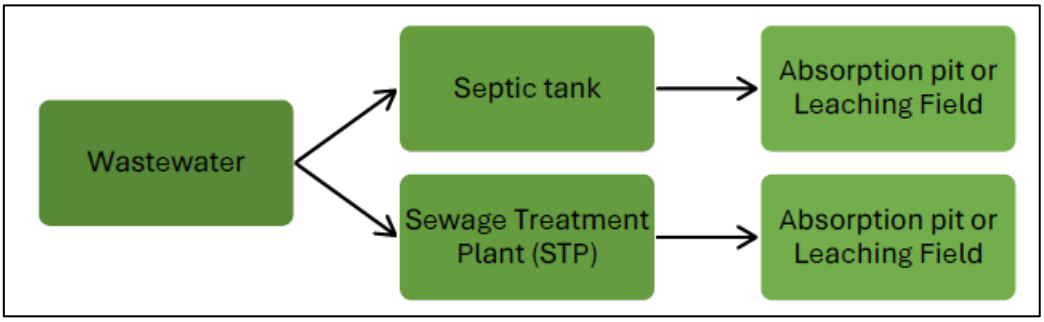


Figure 28: Wastewater Treatment Strategies

The wastewater generated by the occupants on each macro-plot is proposed to be treated within the macro plot itself. It is recommended to use absorption pits instead of leaching fields due to the limited available area around the developments within the macro-plots.

Four different strategies have been proposed for the disposal of the wastewater generated:

1. Strategy 1

Treated effluent from the STP (**Figure 29**) shall be stored in an individual storage tank within each macro-plot, to be then used to irrigate the green spaces within the macro-plot itself. The excess treated water is sent to a soakaway within that specific plot which allows it to safely percolate into the ground, thus preventing surface runoff and potential contamination of nearby water bodies.

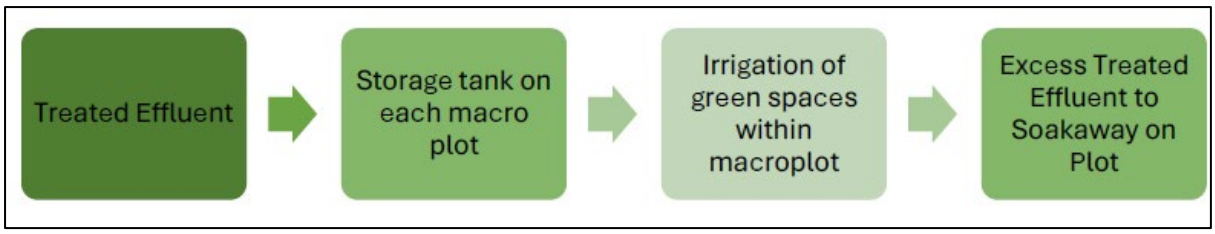


Figure 29: Wastewater Disposal Strategy 1

2. Strategy 2:

Treated effluent (see **Figure 30**) from the STP will be stored in an individual storage tank within each macro-plot and will then be used to irrigate the green spaces within the macro-plot itself in priority. Any excess shall then further be used to irrigate the neighbouring green spaces within specific zones in the vicinity of a particular plot, such as the residential zone at the beginning of the smart city development or the commercial zone. This strategy will entail the installation of a treated water storage and distribution system for irrigation in clustered zones of the smart city.

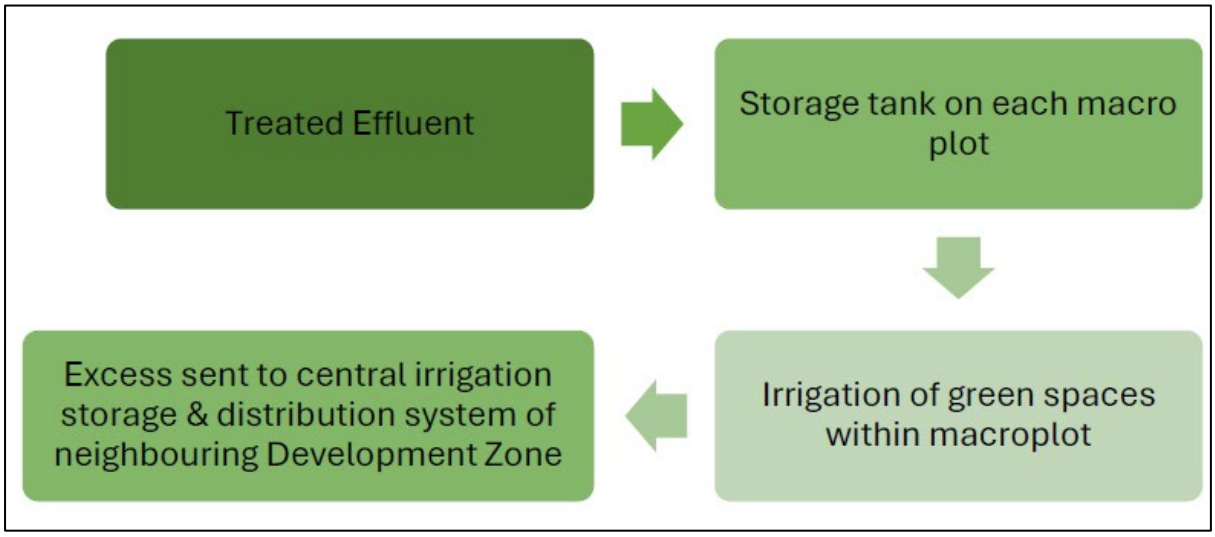


Figure 30: Wastewater Disposal Strategy 2

3. Strategy 3:

Treated effluent from the STP (see **Figure 31**) will be stored in an individual storage tank within each macro-plot. The treated effluent will then be used to irrigate the green spaces within the macro-plot itself in priority, and any excess shall then be used to irrigate the neighbouring green spaces of the smart city development. This strategy would require the installation of a treated water storage and distribution system for irrigation at a centralized location in the smart city.

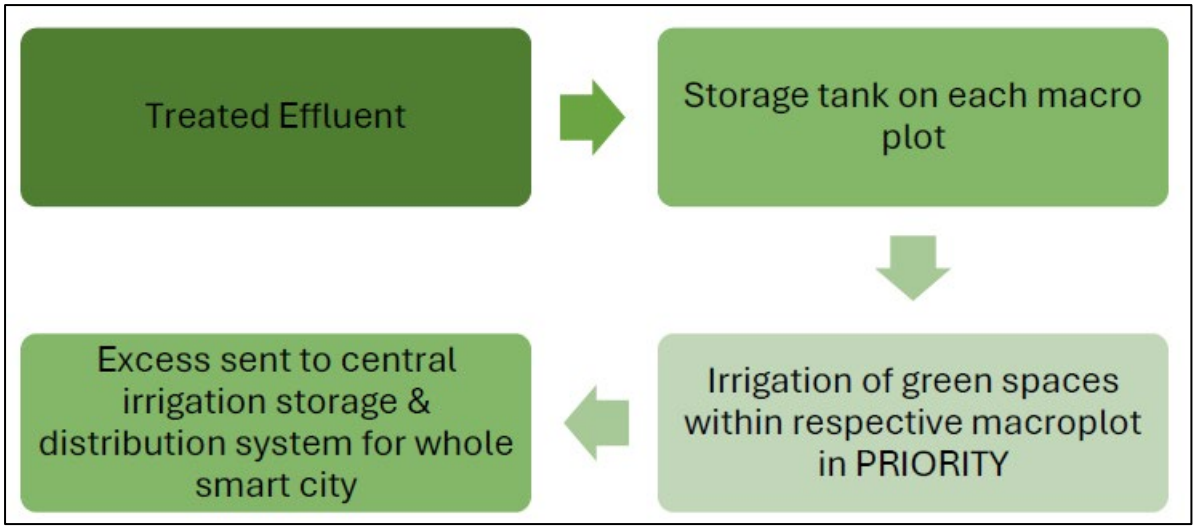


Figure 31: Wastewater Disposal Strategy 3

4. Strategy 4:

Another possible strategy is a combination of Strategy 2 and Strategy 3 above. This strategy obviously entails a more extensive underground network for the distribution of the water treated for irrigation. However, more remote areas covered in green vegetation, which would obviously require water for irrigation, could be exploited for the disposal of excess treated water produced from wastewater generated. This strategy should also enable the smart city development to manage wastewater more effectively and efficiently in proposed areas of development with varying people densities without much worrying about treated wastewater disposal.

6.6 Solid Waste

The amount of solid waste to be generated upon full implementation of the smart city in 2045 has been calculated to be 9.76 tonnes per day. Dustbins will be strategically placed in accessible and high-traffic areas to encourage proper waste disposal. Waste collection points will also be easily accessible for lorries to enter and exit without difficulty.

Waste sorting will be done by using different coloured bins. Coloured bins serve as a visual aid to encourage proper waste segregation, allowing occupants to easily distinguish between recyclables, non-recyclables, and organic waste. Different types of waste will be sorted for recycling and reuse. Sorted plastics can be processed into pellets and used to manufacture new plastic products, such as bottles, containers, and packaging. Recycled glass can be used for bottle manufacture, aggregates and interior design.

Molok waste containers will also be used. These dustbins are partially buried underground, which helps in reducing odour, saving space, and minimizing the frequency of waste collection. The design allows for efficient waste segregation and collection. Molok's system uses gravity to compact waste naturally, increasing the capacity of each bin and reducing the need for

frequent collections. This not only lowers operational costs but also reduces CO_2 emissions associated with waste collection vehicles.

From the total amount of solid waste, about 10 tonnes of organic waste will be generated daily. A biodigester (see **Figure 32**) will be used to convert the organic waste into fertilizers. Inside the biodigester, microorganisms break down organic matter in an oxygen-free environment, producing methane-rich biogas. The remaining slurry, known as digestate, is an excellent organic fertilizer, enhancing soil health and reducing the need for chemical fertilizers. By diverting organic waste from landfills, biodigesters significantly reduce greenhouse gas emissions, particularly methane, which is a potent climate change contributor.

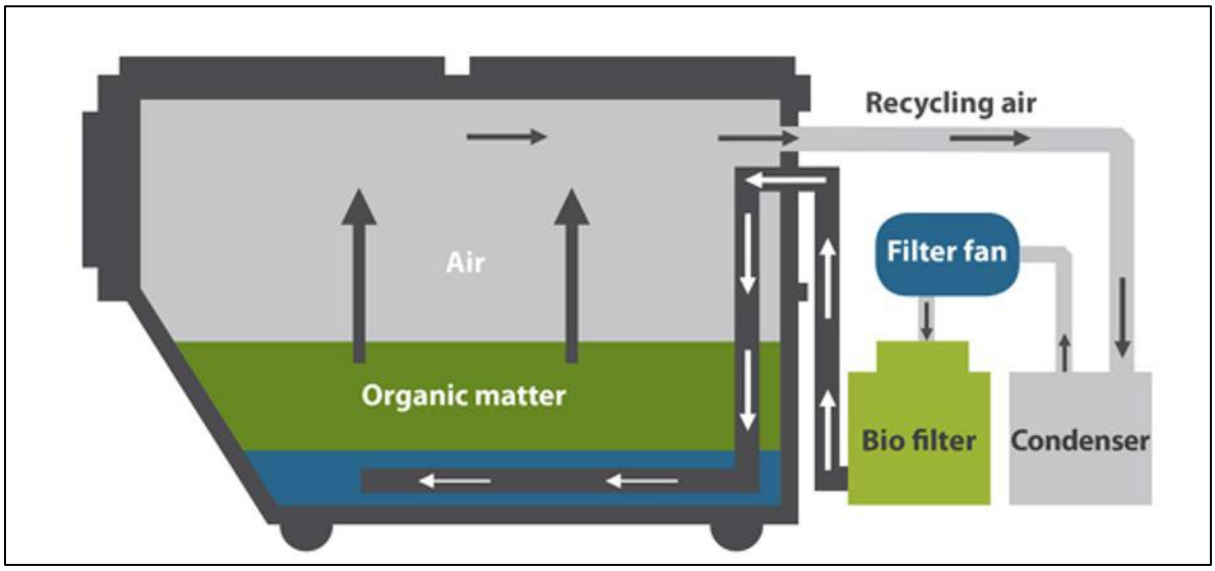


Figure 32: Biobin Digester

6.7 Fire Safety

Fire safety is a paramount concern, and it is important to create a robust and responsive fire safety infrastructure through the integration of advanced technology and innovative systems. Public fire hydrants will be seamlessly integrated into the city's smart infrastructure, enhancing safety and operational efficiency. The siting of public fire hydrants in the smart city project was done following the guidelines in the Mauritius Fire Code. Public fire hydrants have been proposed along the main roads of the Smart City at every 100m. The specific requirements of the fire hydrants, which have been considered, are:

- The fire hydrants will be fixed on branches distributed from public water mains for the purpose of fighting fires and to be used only by the Mauritius Fire and Rescue Service.
- Most of the water demanded for firefighting will be tapped from the public water mains supply. A water supply capable of providing a minimum flow rate of 1,125 L/min at all times is required.

- In cases where the public fire hydrant water main supply does not meet the above requirements, each fire main should be fed from either an elevated reservoir or a suction tank or interconnected tanks having a minimum capacity of 45,000L (to be considered by plot developers on a case-by-case basis).

6.8 Internet of Things (IoT)

The smart city will include intelligent systems that will harness real-time data and analytics to optimize urban operations and deliver personalized services, making everyday life more efficient and enjoyable. The following proposed components empowered by Internet of Things will be part of the smart city, each designed to enhance urban living through advanced technology and data-driven solutions:

1. **Smart electrical monitoring**

Smart electrical metering using IoT has transformed energy management by providing continuous, real-time data on electricity consumption. Unlike traditional meters, IoT-enabled smart meters deliver granular insights into energy use, enhancing accuracy and efficiency. These meters communicate remotely with central systems, allowing utility companies to monitor and manage energy usage without the need for on-site visits. By analysing the data collected, both consumers and utility providers can identify usage patterns, optimize energy consumption, and implement demand response strategies. It enables better detection of anomalies and unauthorized usage.

2. **Smart real time water monitoring, billing and leakage detection**

Smart water metering (see **Figure 33**) helps in identifying and addressing issues such as leaks, unauthorized consumption, or system inefficiencies that contribute to Non-Revenue Water (NRW). By providing accurate data and early detection capabilities, these smart systems enable swift interventions to reduce water losses, improve operational efficiency, and ensure that all water supplied is accounted for and billed correctly. The meters are equipped with IoT sensors that continuously monitor and record water usage data. This real-time data is transmitted to centralized software systems through wireless communication networks. The data collected includes usage volumes, flow rates, pressure levels, and even temperature, providing a comprehensive view of water consumption.

Figure 33: Smart Water Meter

3. Intelligent lighting system

Intelligent lighting systems are proposed for street lighting within the smart city. These systems use sensors and data analytics to adjust lighting levels, based on real-time conditions. The streetlights will be equipped with motion sensors that can increase brightness when pedestrians or vehicles are detected. Additionally, ambient light sensors will reduce light intensity during daylight hours, conserving energy and extending the lifespan of lighting fixtures. These systems will be integrated with central management software that will allow city operators to monitor and control lighting infrastructure remotely.

4. Air quality monitoring

Air quality monitoring systems use a network of IoT sensors to continuously measure concentrations of pollutants in the air, such as particulate matter (PM2.5 and PM10), nitrogen dioxide (NO_2), sulphur dioxide (SO_2), carbon monoxide (CO), and ozone (O_3). These sensors provide real-time data on pollutant levels, which is essential for timely assessments and interventions. The system shall issue alerts when pollutant levels exceed safe thresholds, prompting immediate actions to mitigate exposure. Monitoring systems would help protect public health and reduce the incidence of respiratory and cardiovascular diseases associated with poor air quality.

5. Traffic monitoring

Traffic monitoring using IoT technology represents a significant advancement in urban transportation management. By integrating IoT sensors such as cameras, radar, and inductive loops, with centralized traffic management systems, the smart city shall collect real-time data on traffic conditions, including vehicle counts, speeds, and lane occupancy. IoT systems shall

also enhance incident detection and management by quickly identifying accidents or road hazards, enabling rapid response and alerting drivers through dynamic messaging.

6. **Smart Parking**

Smart parking systems with advanced technologies and IoT integration revolutionize effective parking management. By deploying proposed IoT sensors in parking spaces or along parking lanes, these systems shall continuously monitor occupancy in real time, offering a detailed view of available parking spots. This information will be fed to a central management system.

Mobile applications connected to smart parking systems shall allow users to find, reserve, and even pay for parking spaces conveniently. These apps shall provide information on space availability, pricing, and payment options, streamlining the parking process and enhancing user experience. Additionally, smart parking systems shall generate valuable data on parking usage patterns and occupancy rates, supporting urban planning, and enabling data-driven decisions about parking infrastructure and policies.

7. **Smart EV charging**

Cloud-based management system for smart EV charging stations offers a flexible solution that prioritizes balanced charging times and efficient energy distribution. With this system, charging point owners shall gain seamless access to the cloud, enabling them to remotely initiate, halt, or reboot charging stations. Whether near or far from the charging units, users can enjoy the convenient charging process through the charging station management software.

Users could make multiple adjustments through this EV charge app, including charging session initiation, payment processing, real-time monitoring, remote control, data logging, integration with energy management systems, fault monitoring, network operations integration, and smart grid connectivity to deliver a comprehensive and efficient charging experience.

Proposed strategic placement of EV chargers within the Smart City Development:

- All individual houses and townhouses shall install EV chargers in their garage for private use.
- Apartment blocks shall install EV chargers in communal parking areas or dedicated EV charging stations.
- Office buildings shall install EV chargers in parking lots.
- Shopping malls shall place EV chargers in convenient locations within the parking structure to attract EV owners.
- EV chargers shall be installed in high-traffic areas to encourage EV adoption in public spaces.
- EV chargers shall be provided in municipal parking facilities for general use.

- For mixed-use buildings, EV chargers shall be installed in parking areas accessible to both residents and commercial tenants.

8. Real-time information and communication

The masterplan proposes to install smart lighting poles equipped with digital street signs in the smart city. These digital street signs integrated with the Internet of Things (IoT) significantly enhance the way cities communicate with their residents and visitors. These signs will be equipped with sensors and connectivity that enable them to display real-time information such as traffic updates, weather conditions, public transportation schedules, and emergency alerts. It ensures that people have immediate access to pertinent data, helping them make informed decisions about their travel routes and daily activities.

These signs shall communicate with traffic control systems to provide real-time updates on road conditions, accidents, and detours. They shall display emergency alerts and safety warnings, such as severe weather advisories, road closures, or public safety notifications. In case of emergencies, the signs shall be updated instantly to guide residents and visitors to safety or provide crucial instructions. Additionally, they shall be equipped with cameras and sensors to monitor traffic patterns and detect potential safety hazards. The measures detailed in this section will be implemented progressively when the critical mass of inhabitants will be reached.

7.0 Ecological Survey

7.1 Field Surveys

An ecological survey was carried out on site by two biodiversity specialists to identify the various species of fauna and flora thriving on the site. The surveys were done on the different plots of land on the following days:

- 18th March 2025,
- 31st March 2025,
- 3rd April 2025,
- 20th April 2025.

The aims of the ecological survey were to obtain baseline data on the ecological status of the site and to assess the potential impact of the planned smart city development on the site's biodiversity. The proposed site is classified as an agricultural land and majority of the site is under sugarcane cultivation. A poultry farm is also found on the site and will be relocated further away.

7.2 Flora

During the survey, a total of 210 plant species from 73 different families were recorded. Most of the plants identified are exotic crops, fruit trees, flowering trees and invasive weeds found mainly in the sugarcane fields. 7 endemic plants were also found, out of which 3 are from the Palm group namely the Palmiste blanc (*Dictyosperma album* var *album*), the Palmiste de l'ile Ronde (*D. album* var *conjugatum*) and the Bottle palm (*Hyophorbe langenicaulis*), one Latanier, the Latanier bleu (*Latania loddigesii*), 1 pandanus, the Screw-pine (*Pandanus vendermeeschii*) and 2 woody trees, the Bois de pomme (*Syzygium contracrum*) and the Manglier vert (*Sideroxylon cinereum*). The three palm trees and the pandanus are widely propagated across the site and used for landscaping and rehabilitation of habitats while the two woody trees are located in river reserve. Furthermore, 5 native plants were also recorded among the 210 plant species.

7.3 Fauna

Only 7 species of fauna have been observed on the project site, and these were the Feral Pigeon (*Columba livia*), the House Crow (*Corvus splendens*), the Madagascar Fody (*Foudia madagascariensis*), the House Sparrow (*Passer domesticus*), the Red-whiskered Bulbul (*Pycnonotus jocosus*), the Guttural Toad (*Sclerophrys gutturalis*) and the Agama Lizard (*Calotes versicolor*). No attempt was made to survey the insects' population. No endemic or endangered species of animals have been observed on the project site.

The master list in **Table 5** details the list of flora species observed on site and their classification. **Annex 15** contains the Biological Impact Assessment report.

Table 5: Classification of Flora Species Identified on Site

No.	Species Name	Common Name	Status IUCN/M	Native	Endemic	Exotic	Invasive
ACANTHACEAE							
1.	Asystasia *gangetica*	Herbe pistache	LC	NO	NO	YES	YES
2.	*Pseuderanthemum carrut hersii*	Carruther's false face	LC	NO	NO	YES	NO
3.	*Ruellia simplex*	Filao fleur	LC	NO	NO	YES	NO
4.	*Thunbergia erecta*	Mexican petunia	LC	NO	NO	YES	NO
5.	*Thunbergia grandiflora*	Clock vine	LC	NO	NO	YES	YES
6.	*Thunbergia laevis*	Liane toupee	LC	NO	NO	YES	YES
AMARANTHACEAE							
7.	*Amaranthus dubius*	Brede Malabar	LC	NO	NO	YES	YES
AMARYLLIDACEAE							
8.	*Amaryllis sp.*	*Amaryllis*	LC	NO	NO	YES	NO
9.	*Crinum asiaticum*	Spider lily	LC	NO	NO	YES	NO
ANACARDIACEAE							
10.	*Mangifera indica*	Manguier	LC	NO	NO	YES	NO
11.	*Schinus terebinthifolius*	Poivrier marron	LC	NO	NO	YES	YES
12.	*Spondias dulcis*	Fruit de Cythère	LC	NO	NO	YES	NO
APOCYNACEAE							
13.	*Allamanda cathartica*	Allamanda	LC	NO	NO	YES	NO
14.	*Allamanda violacea*	Allamanda	LC	NO	NO	YES	NO
15.	*Nerium oleander*	Laurier rose	LC	NO	NO	YES	NO
16.	*Plumeria rubra*	Frangipanier	LC	NO	NO	YES	NO

Table 5: Classification of Flora Species Identified on Site (Cont'd)

No.	Species Name	Common Name	Status IUCN/M	Native	Endemic	Exotic	Invasive
ARACEAE							
17.	*Alocacia cucullata*	Chinese taro	LC	NO	NO	YES	NO
18.	*Alocasia macrorrhiza*	Petit via	LC	NO	NO	YES	NO
19.	*Colocasia esculenta*	Songe	LC	NO	NO	YES	NO
20.	*Pistia stratiotes*	Laitue d'eau	LC	NO	NO	YES	YES
21.	*Syngonium auritum*	Arrow head vine	LC	NO	NO	YES	YES
22.	*Thaumatophyllum Xanadu*	Philodendron Xanadu	LC	NO	NO	YES	NO
ARALIACEAE							
23.	*Heptapleurum actinophyllum*	Umbrella tree	LC	NO	NO	YES	NO
24.	*Hydrocotyle bonariensis*	Herbe bol	LC	NO	NO	YES	YES
ARAUCARIACEAE							
25.	*Araucaria columnaris*	Araucaria	LC	NO	NO	YES	NO
ARECACEAE							
26.	*Adonidia merrellii*	Manila palm	LC	NO	NO	YES	NO
27.	*Cocos nucifera*	Cocotier	LC	NO	NO	YES	YES
28.	*Dictyosperma album* var *album*	Palmiste blanc	CR	NO	YES (M & R)	NO	NO
29.	*Dictyosperma album* var *conjugatum*	Palmiste de l'ile Ronde	EW	NO	YES	NO	NO
30.	*Dypsis lutescens*	Palmier multipliant	LC	NO	NO	YES	NO
31.	*Hyophorbe lagenicaulis*	Bottle palm	CR	NO	YES	NO	NO
32.	*Latania loddigesii*	Latanier bleu	EN	NO	YES	NO	NO
33.	*Ptychosperma macarthurii*	Macarthur palm	LC	NO	NO	YES	NO

Table 5: Classification of Flora Species Identified on Site (Cont'd)

No.	Species Name	Common Name	Status IUCN/M	Native	Endemic	Exotic	Invasive
34.	*Livistona chinensis*	Latanier de Chine	LC	NO	NO	YES	NO
35.	*Phoenix dactylifera*	Dattier	LC	NO	NO	YES	NO
36.	*Phoenix roebelenii*	Dattier nain	LC	NO	NO	YES	NO
37.	*Phoenix sylvestris*	Dattier	LC	NO	NO	YES	NO
38.	*Ptychosperma macarthurii*	Macarthur palm	LC	NO	NO	YES	No
39.	*Roystonea regia*	Royal palm	LC	NO	NO	YES	NO
ASCLEPIADACEAE							
40.	*Thlophora* indica	Ipēca sauvage	LC	NO	NO	YES	NO
ASPARAGACEAE							
EN	*Agave americana*	Aloès bleu	LC	NO	NO	YES	YES
42.	*Asparagus densiflorus*	Chevelure de Madeleine	LC	NO	NO	YES	YES
43.	*Cordyline fruticose*	Ti plant	LC	NO	NO	YES	YES
44,	*Dracaena concinna*	Bois de chandelle	EN	YES	NO	NO	NO
45.	*Dracaena reflexa*	Bois de chandelle	LC	YES	NO	NO	NO
46.	*Dracaena trifasciata*	Langue de belle mĕre	LC	NO	NO	YES	NO
47.	*Ophiopogon intermedius*	Muguet	LC	NO	NO	YES	NO
48.	*Yesucca gloriosa*	Yesucca	LC	NO	NO	YES	YES
ASPHODELACEAE							
49.	*Dianella caerulea*	Blueberry lily	LC	NO	NO	YES	NO
ASTERACEAE							
50.	*Ageratum conyzoides*	Herbe de bouc	LC	NO	NO	YES	YES
51.	*Bidens pilosa*	Villebague	LC	NO	NO	YES	YES

Table 5: Classification of Flora Species Identified on Site (Cont'd)

No.	Species Name	Common Name	Status IUCN/M	Native	Endemic	Exotic	Invasive
52.	*Chromolaena odorata*	Chromolaena	LC	NO	NO	YES	YES
53.	*Clibadium surinamense*	Eupatorium	LC	NO	NO	YES	YES
54.	*Conyza canadensis*	Herbe gandia	LC	NO	NO	YES	YES
55.	*Lactuca indica*	Lastron cheval	LC	NO	NO	YES	YES
56.	*Mikania micrantha*	Liane margoze	LC	NO	NO	YES	YES
57.	*Sonchus oleraceus*	Lastron	LC	NO	NO	YES	YES
58.	*Spagneticola trilobata*	Creeping oxeye	LC	NO	NO	YES	YES
BIGNONIACEAE							
59.	*Jacaranda mimosifolia*	Jacaranda	LC	NO	NO	YES	NO
60.	*Spathodea campanulata*	African tulip tree	LC	NO	NO	YES	NO
61.	*Tabebuia pallida*	Tecoma	LC	NO	NO	YES	YES
BORAGINACEAE							
	Ehretia microphylla	Philippine tea tree	NOLC	NO	NO	YES	NO
BROMELIACEAE							
CA	*Ananas comosus*	Pineapple	LC	NO	NO	YES	NO
63	*Billbergia pyramidalis*	Flaming torch	LC	NO	NO	YES	YES
CACTACEAE							
64.	*Selenicereus undatus*	White-fleshed Pitahaya	LC	NO	NO	YES	NO
CAMPANULACEAE							
65.	*Hippobroma longiflora*	Star of Bethlehem	LC	NO	NO	YES	NO
CARICACEAE							
66.	*Carica papaya*	Papaye	LC	NO	NO	YES	NO

Table 5: Classification of Flora Species Identified on Site (Cont'd)

No.	Species Name	Common Name	Status IUCN/M	Native	Endemic	Exotic	Invasive
CLEOMACEAE							
67.	*Cleome gynandra*	Brède Caya	LC	NO	NO	YES	YES
68.	*Cleome rutidosperma*	Purple cleome	LC	NO	NO	YES	NO
COMBRETACEAE							
69.	*Combretum indicum*	Rangoon creeper	LC	NO	NO	YES	NO
70.	*Terminalia arjuna*	Arjun tree	LC	NO	NO	YES	YES
71.	*Terminalia catappa*	Badamier	LC	NO	NO	YES	YES
72.	*Terminalia mantaly*	Badamier de Madagascar	LC	NO	NO	YES	YES
COMMELINACEAE							
73.	*Commelina benghalensis*	Tropical Spiderwort	LC	NO	NO	YES	YES
CONVOLVULACEAE							
74.	*Ipomoea alba*	Manchette de la Vierge	LC	NO	NO	YES	YES
75.	*Ipomoea cairica*	Liane lastique	LC	NO	NO	YES	YES
76.	*Ipomoea obscura*	Obscure morning glory	LC	NO	NO	YES	YES
77.	*Ipomoea violacea*	Beach moon flower	LC	NO	NO	YES	YES
78.	*Merremia peltata*	Peltate morning glory	LC	NO	NO	YES	YES
79.	*Merremia tuberosa*	Liane de Gondelour	LC	NO	NO	YES	YES
CUCURBITACEAE							
80.	*Cucurbita maxima*	Giraumon	LC	NO	NO	YES	NO
CUPRESSACEAE							
81.	*Juniperus bermudiana*	Cyprès	LC	NO	NO	YES	NO
CYATHEACEAE							
82.	*Sphaeropteris cooperi*	Fandia	LC	NO	NO	YES	YES

Table 5: Classification of Flora Species Identified on Site (Cont'd)

No.	Species Name	Common Name	Status IUCN/M	Native	Endemic	Exotic	Invasive
CYPERACEAE							
83.	*Cyperus rotundus*	Herbe à oignon	LC	NO	NO	YES	YES
84.	*Kyllinga elata*	Gros mota	LC	NO	NO	YES	YES
85.	*Pycreus polystachyos*	Many-spiked flat sedge	LC	NO	NO	YES	YES
ELAEOCARPACEAE							
86.	*Elaeocarpus floribundus*	Olivier de Ceylan	LC	NO	NO	YES	NO
EUPHORBIACEAE							
87.	*Acalypha indica*	Herbe chatte	LC	NO	NO	YES	YES
88.	*Acalypha wilkesiana*	Feuilles rouges	LC	NO	NO	YES	YES
89.	*Codiaeum variegatum*	Croton	LC	NO	NO	YES	YES
90.	*Euphorbia hirta*	Jean Robert	LC	NO	NO	YES	YES
91.	*Euphorbia thymifolia*	Petite rougette	LC	NO	NO	YES	NO
92.	*Jatropha curcas*	Pignon d'Inde	LC	NO	NO	YES	NO
FABACEAE							
93.	*Abrus precatorius*	Graine diable	LC	NO	NO	YES	YES
94.	*Adenanthera pavonine*	Bois noir ā graines rouges	LC	NO	NO	YES	NO
95.	*Albizia lebbeck*	Bois noir	LC	NO	NO	YES	YES
96.	*Arachis hypogaea*	Peanut	LC	NO	NO	YES	YES
97.	*Bauhinia variegata*	Bauhinia	LC	NO	NO	YES	NO
98.	*Cassia javanica*	Java cassia	LC	NO	NO	YES	NO
99.	*Delonix regia*	Flamboyant	LC	NO	NO	YES	NO
100.	*Desmanthus virgatus*	Petit acacia	LC	NO	NO	YES	YES
101.	*Indigofera spicata*	Creeping indigo	LC	NO	NO	YES	YES

Table 5: Classification of Flora Species Identified on Site (Cont'd)

No.	Species Name	Common Name	Status IUCN/M	Native	Endemic	Exotic	Invasive
102.	*Leucaena leucocephala*	Acacia	LC	NO	NO	YES	YES
103.	*Mimosa pudica*	Sensitive	LC	NO	NO	YES	YES
104.	*Pithecellobium dulce*	Cassie de Manille	LC	NO	NO	YES	YES
105.	*Pongamia pinnata*	Pongam	LC	NO	NO	YES	YES
106.	*Tadehagi triquetrum*	Winged-stalk Desmodium	LC	NO	NO	YES	YES
107.	*Tamarindus indica*	Tamarinier	LC	NO	NO	YES	NO
108.	*Samanea saman*	Rain tree	LC	NO	NO	YES	NO
HELICONIACEAE							
109.	*Heliconia psittacorum*	Parrot's flower	LC	NO	NO	YES	NO
HYPOXIDACEAE							
110.	*Cucurligo capitulata*	Palm grass	LC	NO	NO	YES	NO
LAMIACEAE							
111.	*Karomia speciosa*	Holmskioldia	LC	NO	NO	YES	NO
112.	*Premna serratifolia*	Bois Sureau	LC	YES	NO	NO	NO
LAURACEAE							
113.	*Cassytha filiformis*	Liane sans fin	LC	NO	NO	YES	YES
114.	*Litsea glutinosa*	Bois d'oiseaux	LC	NO	NO	YES	YES
115.	*Litsea monopetala*	Yesatis	LC	NO	NO	YES	YES
116.	*Persea americana*	Avocatier	LC	NO	NO	YES	NO
LECTHIDACEAE							
117.	*Barringtonia asiatica*	Bonnet de prêtre	LC	NO	NO	YES	YES
LYTHRACEAE							
118.	*Cuphea hysspifolia*	Mexican heather	LC	NO	NO	YES	NO

Table 5: Classification of Flora Species Identified on Site (Cont'd)

No.	Species Name	Common Name	Status IUCN/M	Native	Endemic	Exotic	Invasive
MALPHIGHIACEAE							
119.	*Hiptage benghalensis*	Liane cerf	LC	NO	NO	YES	YES
MALVACEAE							
120.	*Brachychiton acerifolius*	Illawarra flame tree	LC	NO	NO	YES	NO
121.	*Hibiscus rosa-sinensis*	Hibiscus	LC	NO	NO	YES	NO
MELASTOMATACEAE							
122.	*Clidemia hirta*	Koster's curse	LC	NO	NO	YES	YES
123.	*Pleroma granulosum*	Princess flower	LC	NO	NO	YES	NO
MELIACEAE							
124.	*Swietenia mahogoni*	Mahogany	LC	NO	NO	YES	NO
MORACEAE							
125.	*Artocarpus altilis*	Bread fruit	LC	NO	NO	YES	NO
126.	*Artocarpus heterophyllus*	Jack fruit	LC	NO	NO	YES	NO
127.	*Ficus benghalensis*	Banyan	LC	NO	NO	YES	YES
128.	*Ficua benjamina*	Figuier de Madagascar	LC	NO	NO	YES	YES
129.	*Ficus elastica*	Indian rubber tree	LC	NO	NO	YES	YES
130.	*Ficus pumila*	Climbing fig	LC	NO	NO	YES	YES
131.	*Ficus reflexa*	Lafourche batard	LC	YES	NO	NO	YES
MUSACEAE							
132.	*Musa x paradisiaca*	Bananier	LC	NO	NO	YES	NO
MYRTACEAE							
133.	*Callistemon citrinus*	Bottle brush	LC	NO	NO	YES	NO
134.	*Eucalyptus tereticornis*	Forest red gum	LC	NO	NO	YES	YES

Table 5: Classification of Flora Species Identified on Site (Cont'd)

No.	Species Name	Common Name	Status IUCN/M	Native	Endemic	Exotic	Invasive
135.	*Psidium guajava*	Goyavier	LC	NO	NO	YES	NO
136.	*Psidium guineense*	Goyave de l'Inde	LC	NO	NO	YES	NO
137.	*Syzygium contractum*	Bois de pomme	EN	YES	YES	NO	NO
138.	*Syzygium cumini*	Jamblon	LC	NO	NO	YES	YES
139.	*Syzygium jambos*	Jamrosa	LC	NO	NO	YES	YES
NEPHROLEPIDACEA							
140.	*Nephrolepis biserrata*	Giant sword fern	LC	NO	NO	YES	NO
NYCTAGINACEAE							
141.	*Boerhavia coccinea*	Herbe pintade	LC	NO	NO	YES	YES
142.	*Bougainvillea glabra*	Bougainvillier	LC	NO	NO	YES	NO
ORCHIDACEAE							
143.	*Oncidium flexuosum*	Gerbe d'or	LC	NO	NO	YES	NO
OROBANCHACEAE							
144.	*Stringa asiatica*	Witch weed	LC	NO	NO	YES	NO
OXALIDACEAE							
145.	*Averrhoa carambola*	Star fruit	LC	NO	NO	YES	NO
146.	*Oxalis latifolia*	Oseille	LC	NO	NO	YES	YES
PANDANACEAE							
147.	*Pandanus vandermeeschii*	Screw-pine	CR	NO	YES	NO	NO
PAPAVERACEAE							
148.	*Argemone mexicana*	Chardon	LC	NO	NO	YES	YES
PASSIFLORACEAE							
149.	*Passiflora foetida*	Grenadine sauvage	LC	NO	NO	YES	YES

Table 5: Classification of Flora Species Identified on Site (Cont'd)

No.	Species Name	Common Name	Status IUCN/M	Native	Endemic	Exotic	Invasive
150.	*Passiflora suberosa*	Liane poc-poc	LC	NO	NO	YES	YES
PHYLLANTHACEAE							
151.	*Breynia retusa*	Cup saucer plant	LC	NO	NO	YES	NO
152.	*Phyllanthus amarus*	Carry me seed	LC	NO	NO	YES	YES
153.	*Phyllanthus tenellus*	Gale of the wind	LC	YES	NO	NO	YES
PLANTAGINACEAE							
154.	*Plantago lanceolata*	Caroline	LC	NO	NO	YES	YES
155.	*Russelia equisetiformis*	Filao fleur	LC	NO	NO	YES	NO
PLUMBAGINACEAE							
156.	*Plumbago zeylanica*	Pervenche ā fleurs blanches	LC	NO	NO	YES	NO
POACEA							
157.	*Bambusa multiplex*	Bamboo	LC	NO	NO	YES	NO
158.	*Bambusa vulgaris*	Gros bamboo	LC	NO	NO	YES	NO
159.	*Cenchrus echinatus*	Herbe à cateaux	LC	NO	NO	YES	YES
160.	*Cenchrus setaceus*	Fountain grass	LC	NO	NO	YES	YES
161.	*Chloris barbata*	Purple top chloris	LC	NO	NO	YES	YES
162.	*Chrysopogon zizanioides*	Vetiver	LC	NO	NO	YES	NO
163.	*Coix lacryma-jobi*	Collier cipaye	LC	NO	NO	YES	YES
164.	*Cynodon dactylon*	Chiendent	LC	NO	NO	YES	YES
165.	*Dactyloctenium aezyptium*	Chiendent Patte de poule	LC	NO	NO	YES	YES
166.	*Digitaria horizontalis*	Gros Meinki	LC	NO	NO	YES	YES
167.	*Eleusine indica*	Chiendent Patte de poule	LC	NO	NO	YES	YES

Table 5: Classification of Flora Species Identified on Site (Cont'd)

No.	Species Name	Common Name	Status IUCN/M	Native	Endemic	Exotic	Invasive
168.	*Panicum maximum*	Herbe fataque	LC	NO	NO	YES	YES
169.	*Paspalum conjugatum*	Herbe creole	LC	NO	NO	YES	YES
170.	*Pogonatherum paniceum*	Baby bamboo	LC	NO	NO	YES	NO
171.	*Stenotaphrum dimidiatum*	Chiendent bourrique	LC	NO	NO	YES	YES
172.	*Saccharum* sp.	Sugarcane	LC	NO	NO	YES	NO
173,	*Thysanolaena latifolia*	Bamboo fataque	LC	NO	NO	YES	YES
POLYGONACEAE							
174.	*Antigonon leptopus*	Fleur de Mai	LC	NO	NO	YES	NO
175.	*Triplaris surinamensis*	Long John	LC	NO	NO	YES	NO
POLYPODIACEAE							
176.	*Phlebodium aureum*	Golden polypod	LC	NO	NO	YES	YES
177.	*Phymatosorus scolopendria*	Fougère polypode	LC	YES	NO	NO	NO
178.	*Platycerium alcicorne*	Staghorn fern	LC	NO	NO	YES	NO
PROTACEAE							
179.	*Macadamia integrifolia*	Macadamia	LC	NO	NO	YES	NO
RHAMNACEAE							
180.	*Zizyphus mauritiana*	Mason	LC	NO	NO	YES	YES
ROSACEAE							
181.	*Eriobotrya japonica*	Bibasse	LC	NO	NO	YES	NO
182.	*Rubus alceifolius*	Piquant Lulu	LC	NO	NO	YES	YES
RUBIACEAE							
183.	*Ixora alba*	Red Ixora	LC	NO	NO	YES	NO
184.	*Ixora coccina*	Buisson ardent	LC	NO	NO	YES	NO

Table 5: Classification of Flora Species Identified on Site (Cont'd)

No.	Species Name	Common Name	Status IUCN/M	Native	Endemic	Exotic	Invasive
185.	*Mussaenda philippica*	Mussaenda	LC	NO	NO	YES	NO
186.	*Paederia foetida*	Lingue	LC	NO	NO	YES	YES
RUTACEAE							
187.	*Citrus aurantium*	Bigaradier	LC	NO	NO	YES	NO
SALICACEAE							
189.	*Flacourtia indica*	Prune Malgache	LC	NO	NO	YES	YES
190.	*Homalium integrifolium*	Bois de rivière	EN	YES	NO	NO	NO
SANTALACEAE							
191.	*Santalum album*	Bois Santal	LC	NO	NO	YES	YES
SAPINDACEAE							
192.	*Cardiospermum halicacabum*	Liane poc-poc	LC	NO	NO	YES	YES
193.	*Dimocarpus longan*	Longan	LC	NO	NO	YES	NO
194.	*Litchi chinensis*	Lychee	LC	NO	NO	YES	NO
SAPOTACEAE							
195.	*Chrysophyllum oliviform*	Satinleaf	LC	NO	NO	YES	YES
196.	*Mimusops coriacea*	Pomme jacot	LC	YES	NO	NO	NO
197.	*Sideroxylon cinereum*	Manglier vert	VU	NO	YES	NO	NO
SOLANACEAE							
198.	*Solanum americanum*	Brĕde martin	LC	NO	NO	YES	YES
199.	*Solanum mauritianum*	Tabac marron	LC	NO	NO	YES	YES
200.	*Solanum torvum*	Anghive marron	LC	NO	NO	YES	YES

Table 5: Classification of Flora Species Identified on Site (Cont'd)

No.	Species Name	Common Name	Status IUCN/M	Native	Endemic	Exotic	Invasive
STRELITZIACEAE							
201.	*Ravenala madagascariensis*	Ravenale	LC	NO	NO	YES	YES
TALINACEAE							
202.	*Talinum paniculatum*	Fame flower	LC	NO	NO	YES	YES
THEACEAE							
203.	*Camellia japonica*	Camellia	LC	NO	NO	YES	NO
THYMELEACEAE							
204.	*Wikstroemia indica*	Herbe tourterelle	LC	NO	NO	YES	YES
VERBENACEAE							
205.	*Citharexylum spinosum*	Nicaraguan jasmine	LC	NO	NO	YES	NO
206.	*Duranta erecta*	Duranta gold	LC	NO	NO	YES	NO
207.	*Lantana camara*	Vieillefille	LC	NO	NO	YES	YES
208.	*Stachytarpheta jamaicensis*	Queue de rat	LC	NO	NO	YES	YES
209.	*Verbena officinalis*	Verveine sauvage	LC	NO	NO	YES	NO
ZINGIBERACEAE							
210.	*Alpinia zerumbet*	Fleur de mon ame	LC	NO	NO	NO	NO

8.0 Stormwater Management

8.1 Existing Site Conditions

The site is bordered by two rivers, namely Rivière Françoise and Rivière du Poste de Flacq which define its Northern and Southern boundaries respectively. Both natural bodies are bordered by agricultural activities and urbanized areas. **Figure 34** shows the different rivers bordering the site.

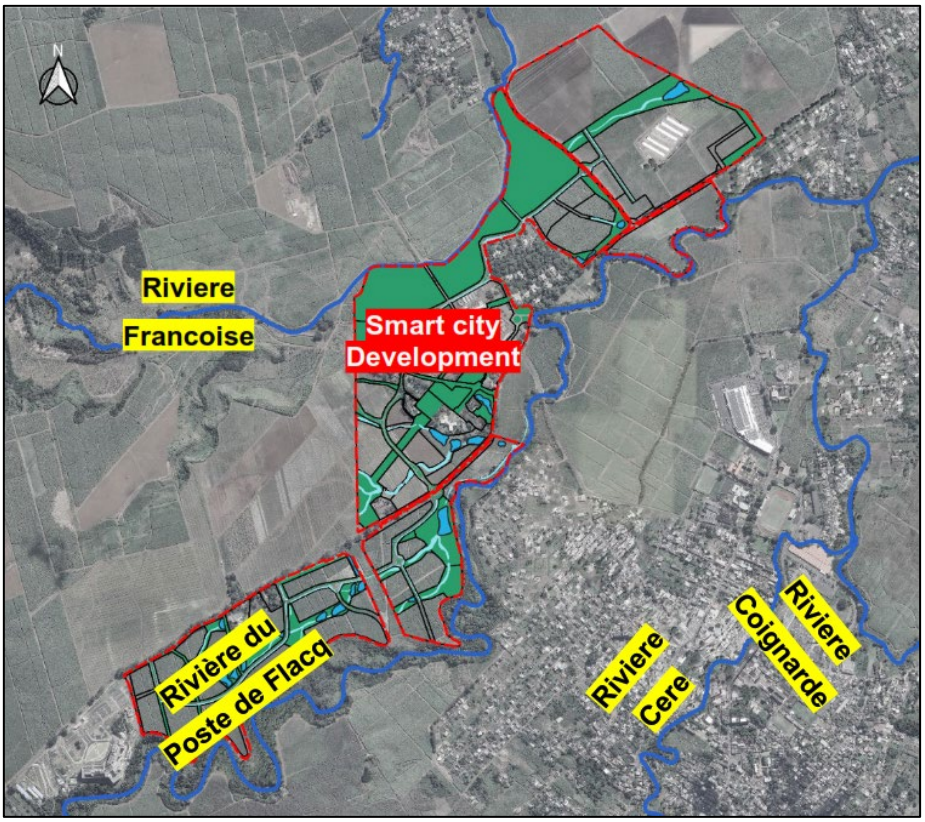


Figure 34: Rivers Bordering the Smart City Development

Catchment areas directing stormwater runoff towards the site and natural drainage paths, known as thalwegs, cross the site. These thalwegs ultimately discharge into Rivière Françoise and Rivière du Poste de Flacq. **Figure 35** shows the different rivers and drainage paths near the site.

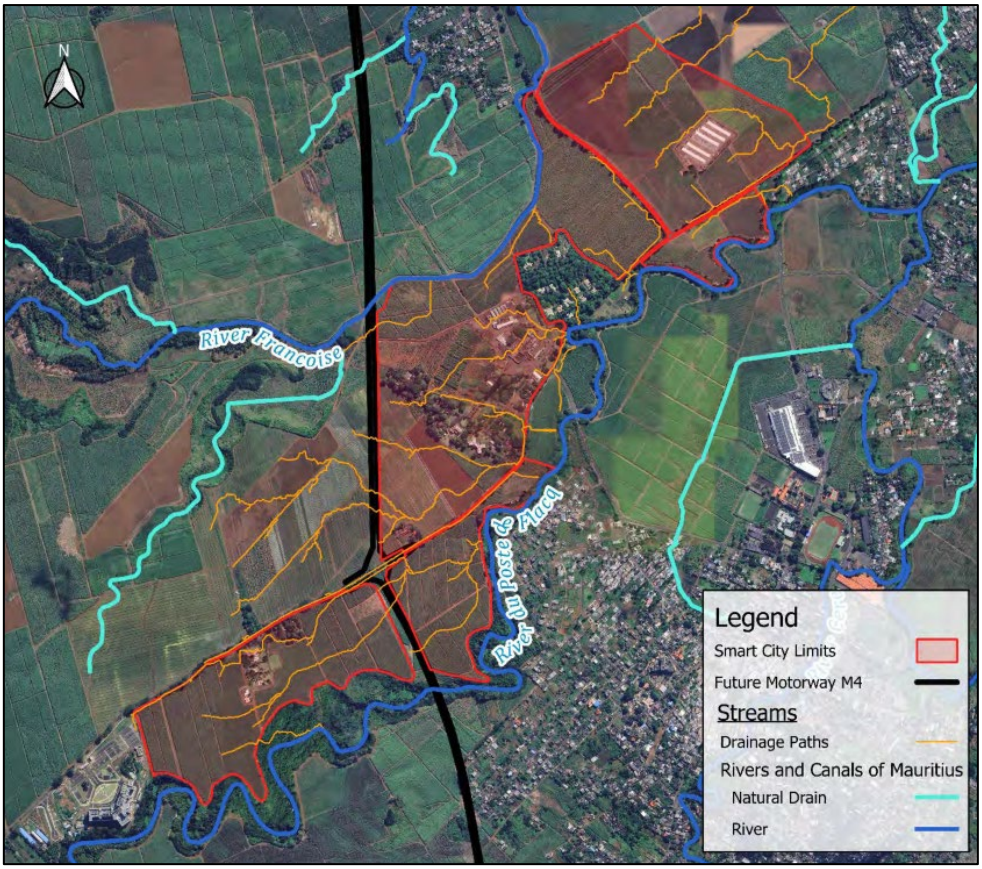


Figure 35: Rivers and Drainage Paths Near The Site

8.2 The Stormwater Management Strategy

The stormwater management strategy for the smart city is founded on a strong commitment to sustainability, with a primary focus on preserving and enhancing the site's natural hydrological systems. "Blue Corridors" which is an open-air hydraulic network has been designed around the site's existing natural water pathways, including rivers, talwegs, and key runoff channels. These corridors not only mitigate flood risks, but also support the region's biodiversity, promoting resilience across the entire ecosystem. The existing hydrological network of the site will be preserved. Sustainable Urban Drainage Systems (SuDs) have been proposed for the management of stormwater. This method of work mimics natural drainage in collecting, storing and cleaning the surface water runoff before allowing it to be released slowly back into the environment. The principle is to effectively manage stormwater runoff, reducing the risk of flooding, and promoting water quality. A Drainage Impact Assessment as provided in **Annex 3** has been carried out and the proposed green stormwater management solution for Constance Smart City, consisting of Sustainable Urban Drainage Systems (SuDS) such as earth swales, talwegs, retention ponds, and green parks, has been rigorously designed and assessed to meet Engineering standards. The system ensures that peak discharge volumes post-development will not exceed pre-development levels. Please refer to letter from LDA on stormwater management strategy at **Annex 4** and Constance reply at **Annex 5**.

8.2.1 Bioswales (Grassed Swales)

Bioswales (see **Figure 36**) are linear, planted, shallow landscape depressions designed to capture, treat and partially infiltrate the stormwater. They can be shaped in different widths and forms. The goal is to naturally capture rainwater as close as possible to where it falls on the ground. The bioswales will be designed to follow the roads. The roadside bioswales located along all the road corridors will directly capture and treat all the runoff from the impervious road and pavement surfaces. The road curbs will be chosen in a way that allows rainwater to flow towards the swales. Where required, check dams will be provided to break the high velocity flows in the swales. Moreover, the vegetation will enhance sedimentation, filtration through the root zone and soil matrix, evapotranspiration, and filtration into the underlying soil. In areas with high urbanization and mineralization where creating a natural swale is not feasible, it is possible to construct a mineral swale. Mineral swales do not allow infiltration into the soil and will therefore be restricted to areas where necessary.

Figure 36: Grassed Swale

8.2.2 Talwegs

Also referred to as the natural drainage paths, a talweg as shown in **Figure 37** is the line of lowest elevation within a watershed. They form the backbone of the entire system by capturing and conveying runoff to the sea. If properly managed, these waterways can help slow runoff, remove pollutants, and protect surrounding areas from flooding. The natural thalwegs within the Smart City Boundary will be preserved and landscaped to allow for a green and ecological

corridor. They will serve as a structural basis for the creation of linear parks, integrating them into the public open space network. Regular pedestrian and cycle-only crossings will be provided to create physical connections between neighbouring villages, enhancing accessibility and community integration.

Figure 37: Landscaped Talweg

(A) Talwegs with Free Runoff

Many of the talwegs will be maintained in their natural formation, with minimalist interventions. These interventions will include the addition of stones and rocks to create a more cohesive flow line, gentle slope adjustments, and the planting of vegetation. Plants with high filtration potential or those capable of treating water will be selected to increase the infiltration and evapotranspiration potential of the talwegs. This approach will enhance the ecological function of the waterways while preserving their natural appearance.

(B) Talwegs with Check Dams

Talwegs with excessive slopes, resulting in high-speed and high-intensity runoff, will be reworked. The intervention aims not to alter the watercourse but to create small barriers along the path, to time and slow the flow. These barriers will form small storage zones along the natural flow line, which gradually fill with water. By decelerating the flow, the barriers help reduce the risk of soil erosion.

8.2.3 Retention Basins

These are shallow landscape depressions, usually with a flat bottom, designed to attenuate rainwater floods. During rainfall events, they should serve as storage and infiltration areas for rainwater and during dry periods, they can be used as recreational areas. In addition, these basins allow stormwater to be slowed and treated to improve its quality. The retention basins located within the low points of the ecological corridors will be designed to capture and retain peak stormwater flow, generated for a storm duration of 2 hours, using a return period of 1 in 50 years. **Figure 38** shows an example of a retention basin before (left) and after (right) a rainfall event.

Figure 38: Retention Basin Before and After Rainfall

8.3 Internal Stormwater Drainage System

The stormwater runoff from road surfaces and from macro-plots will be collected in the landscaped earth swales along the road and the green corridors. The alignment of the natural drainage paths, also known as talwegs, have been maintained within the green spaces. The earth swales and thalwegs ultimately discharge into retention ponds located downstream. Retention will be provided within the macro-plots to ensure that surface runoff is managed at its source. RC Drains and RC Culverts are provided at swales and thalwegs road crossings.

9.0 Landscape and Visual Impact Assessment

A landscape and visual impact assessment was conducted for the proposed smart city to assess the impacts that may arise during the operation phase of the project. It aims to identify and evaluate the changes that could occur to the landscape as a result of the project activities. The detailed landscape and visual impact assessment report is provided in **Annex 18**.

9.1 Methodology

The study encompassed several stages, including a desk review, on-site investigations, photographic documentation, and the creation of photomontages. The impact assessment phase entailed identifying receptors, defining their sensitivity levels, and evaluating the significance of the impacts as illustrated in **Figure 39**.

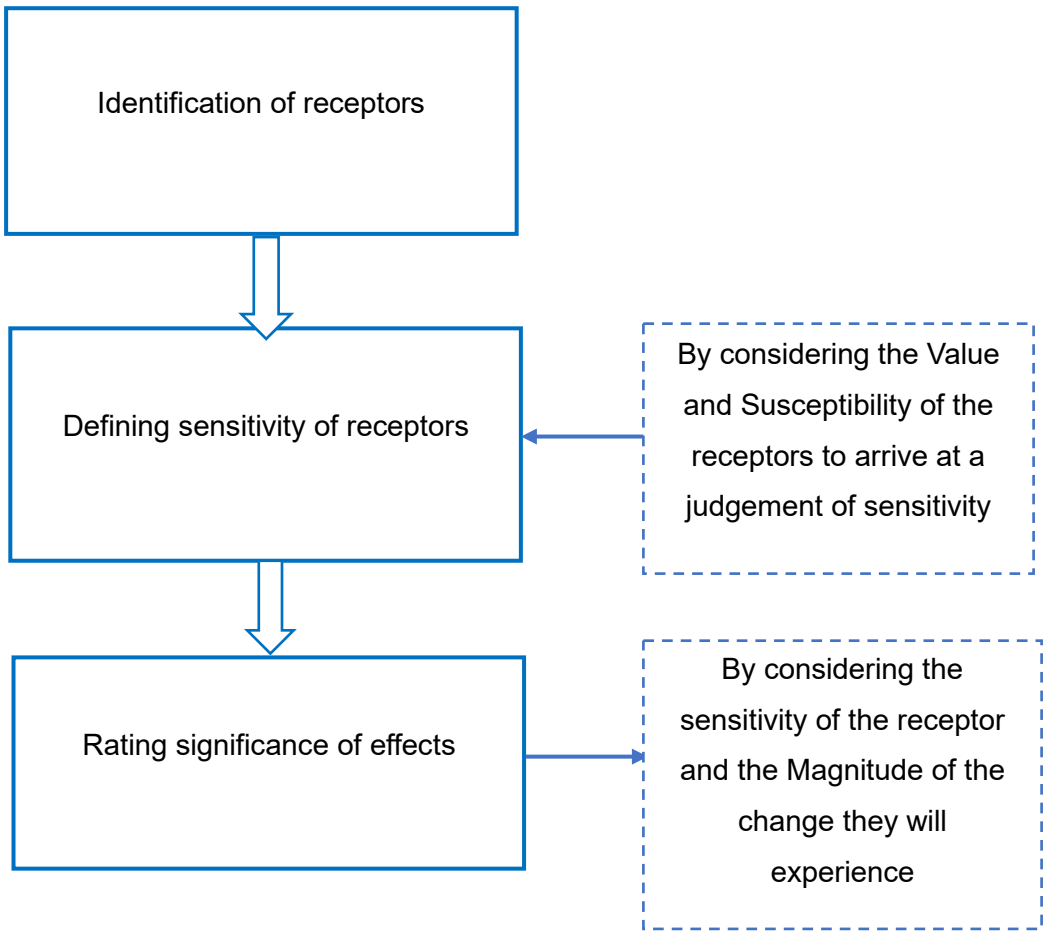


Figure 39: Methodology of the Landscape and Visual Impact Assessment Study

9.2 Sensitive Receptors

A site visit was conducted on 3rd April 2025 to assess landscape character and likely visual impact assessment and to identify the sensitive receptors. A total of 13 sensitive receptors were identified as shown in **Figure 40**.

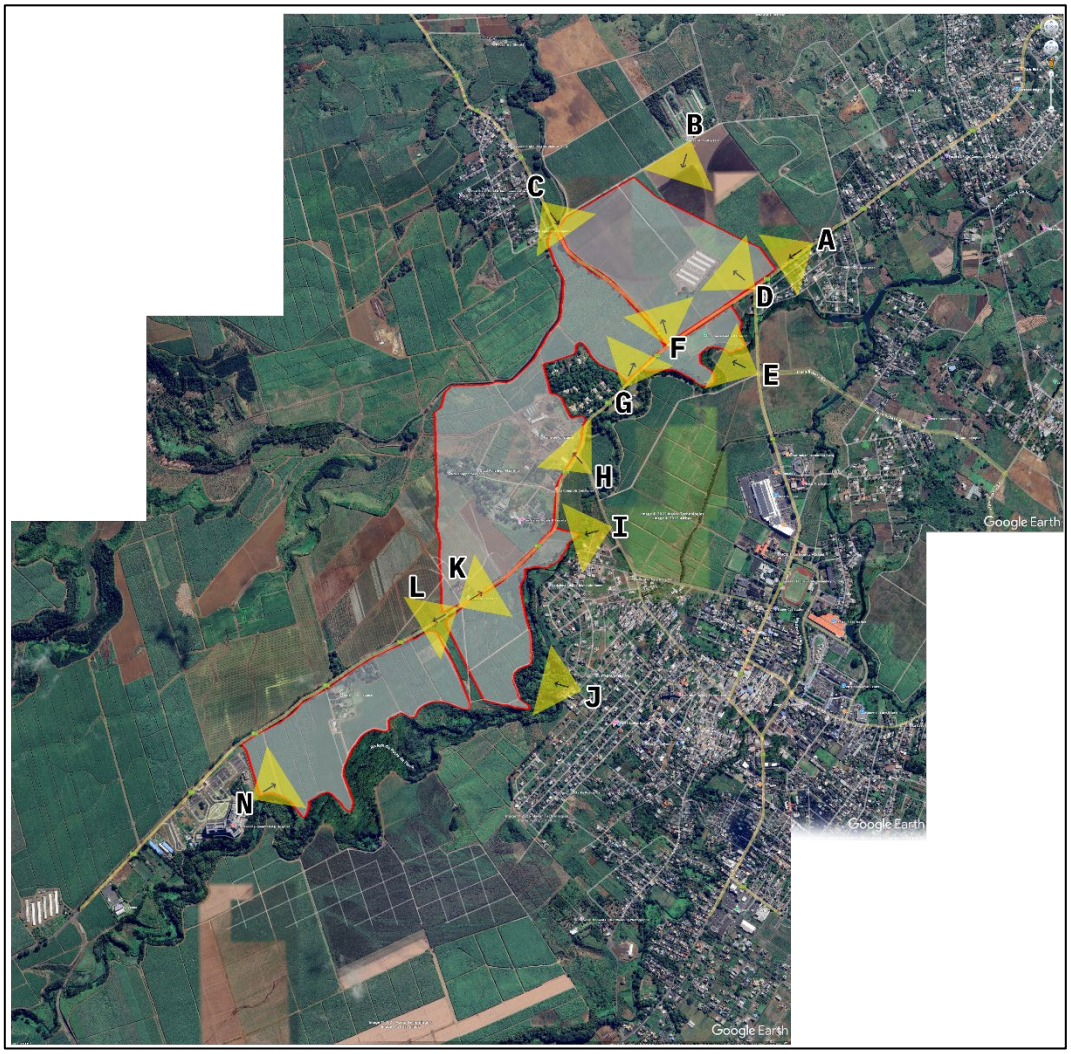


Figure 40: Sensitive Receptors

The identified receptors are as follows:

1. Site A: Along B23 Road – coming from Poste de Flacq,
2. Site B: Lazaret Poultry Farm – located to the north of the site,
3. Site C: Along A2 Road – coming from Pont Blanc village,
4. Site D: Along A7 Road – a junction along A7 and B23 roads facing the site,
5. Site E: Flacq Bypass Road – the junction along A7 road and Flacq bypass road located to the south of the site,
6. Site F: Traffic Light along B23 Road – a junction along A2 and B23 roads,
7. Site G: Morcellement Le Verger – a morcellement found along B23 road,

8. Site H: Route St. Remy – before the junction between B23 road and Route St. Remy
9. Site I: Along Route St. Remy – at a distance of 150m from the site boundary,
10. Site J: Little Masters Preprimary School – a school located in Centre de Flacq at a distance of 362m from the site,
11. Site K: Dukesbridge East School looking towards Poste de Flacq – a primary school found along B23 Road,
12. Site L: Dukesbridge East School looking towards Riche Fond – a primary school found along B23 Road,
13. Site N: Sir Aneerood Jugnauth (SAJ) Hospital – a public hospital located to the south-west of the project site.

9.3 Landscape and Visual Impact

9.3.1 Landscape Impact

The site is located at Constance, Flacq and the different activities undertaken on site are agricultural, business, commercial, sports and leisure, education, medical and industrial activities. The promoter has decided to set up the smart city on areas where land fertility and productivity have declined. In this regard, the magnitude of the impact on the landscape can be classified as **High Beneficial**.

The main alternative of this project from the promoter's point of view is to leave the land in its current state. The promoter is of the opinion that the best alternative to the existing usage of the land is the development of a smart city, given the large extent of land and its strategic location. However, the development of the smart city project in that area will increase the value of the area. The land harbours a cultural heritage site which is the Verandah of Manager's Residence, also known as La Maison 1794. This heritage site has been refurbished by Constance Group. La Maison 1794 will be preserved and will form part of the smart city. In this regard, the sensitivity of the landscape can be classified as **High** importance.

Consequently, combining the low sensitivity of landscape to the low magnitude of landscape effect, the overall impact of the project on the landscape character can be classified as being of High Beneficial Significance.

9.3.2 Visual Impact

The site is surrounded by areas containing some vegetation and access roads. The site will be **Highly** visible from various viewpoints and from the access roads. The smart city being a permanent development will be a permanent feature in the landscape. The smart city will be clearly visible by passing-by and vehicles going through the A2, A7 and B23 roads. Thus, the magnitude of the visual impact for the proposed site is classified as **High Beneficial**.

Consequently, the overall visual impact of the development of the project on the landscape character can be classified as High Beneficial significance.

9.4 Mitigation Measures for Potential Impacts

9.4.1 Landscape

The development of the smart city will have a significant impact on the site at Constance. Impacts on the landscape become long-term and permanent, as the urban infrastructure, transport networks, and built environment establish a new visual and spatial character. Constance Village smart city has been well planned around a list of sustainable objectives to help create liveable communities for people, in harmony with nature. The smart city will protect, restore and promote ecosystems of local flora and fauna. Urban aesthetics and liveability will be enhanced by integrating green infrastructure such as green parks and public spaces. Cultural and historical features will be preserved into the cityscape to protect local identity and foster community pride.

9.4.2 Visual

Considering the location of the proposed site for the smart city at Constance, and based on the photomontage done for the project, it can be considered that the project will have significant (but measured) impact on the visual exposure from the surroundings. Alongside access roads, trees and shrubs will be planted. The masterplan of the smart city has been designed under three main themes; (1) site, (2) activities and (3) built environment. Each theme was linked to definitive actionable items to guide detailed planning and design of neighbourhoods, infrastructure and buildings. Colours and materials that blend with the natural surroundings will be used. Preservation of existing trees, ridgelines, and scenic vistas will also be done. Urban green belts, pocket parks, landscape pathways, sustainable drainage systems and rooftop gardens will be created to enhance the visual of the smart city.

10.0 Accessibility and Mobility

A Traffic Impact Assessment (TIA) has been carried out as per guidelines of the Ministry of Transport and Light Rail to assess the possible traffic-related impacts of the proposed smart city on the surrounding road network. The analysis was carried out to determine whether the existing road network surrounding the proposed development will be able to sustain the additional traffic which will be generated, while still maintaining an acceptable level of service. Furthermore, the assessment also identified improvement measures required to ensure that the road infrastructure is adequate to cater for additional traffic while implementing the proposed smart city.

As shown in **Figure 41** below, access to the smart city will be provided through the A2, A7 and B23 roads with access points strategically located to facilitate easy movement to and from Centre de Flacq and surrounding areas.

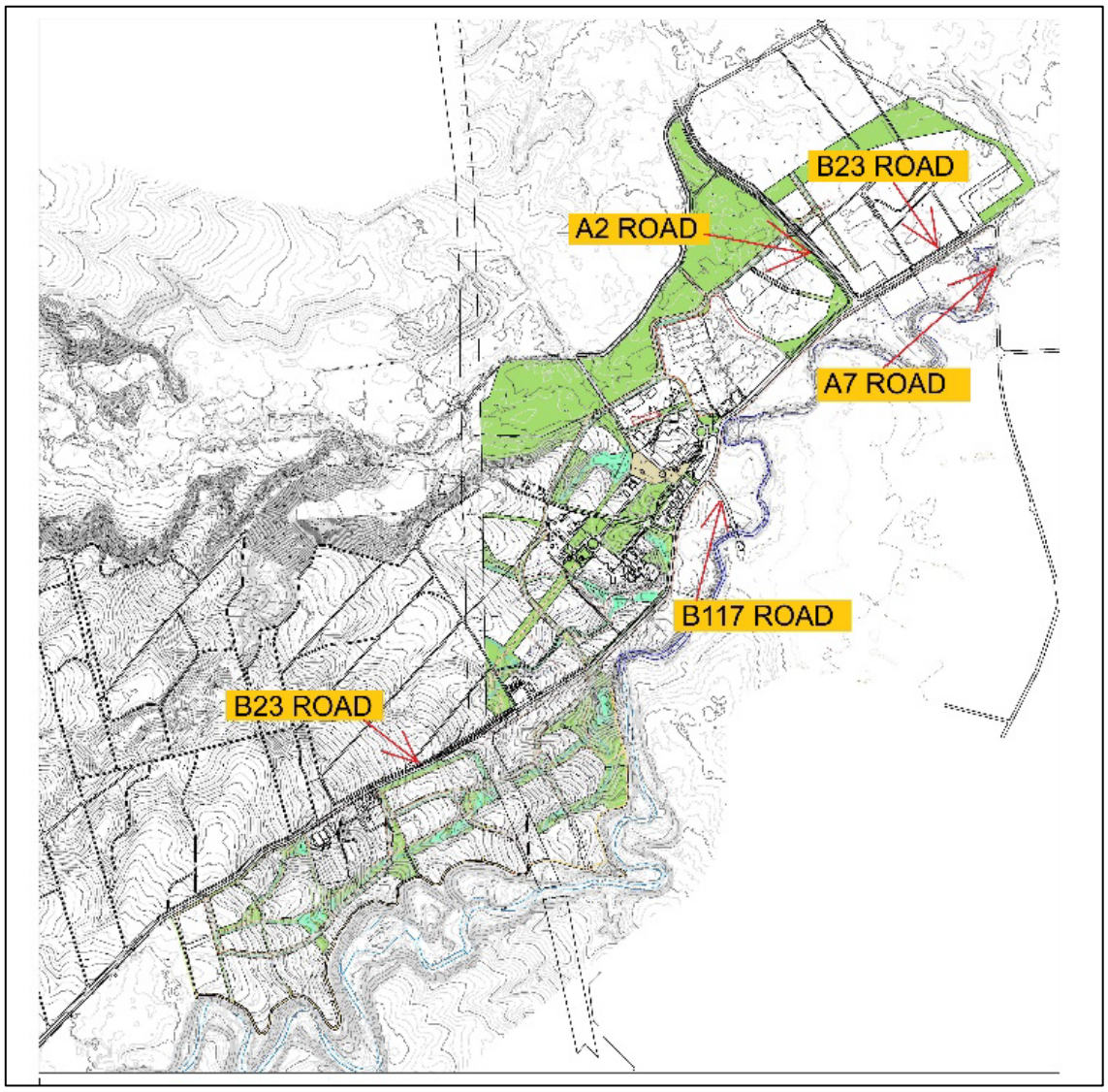


Figure 41: Accessibility of Proposed Development Site

10.1 Proposed New Accesses

The development will consist of internal road networks as shown in **Figure 42** below. Access points from existing public roads (B23, A2, and A7) have been carefully planned to reduce the impact on current infrastructure. Three new access points, namely N1, N2, N3 as indicated, will be added along B23 to improve traffic flow and one new access point will be introduced on A2 namely N6. The B23 will be redesigned as a dual carriageway. The existing carriageway shall be retained, but as a unidirectional way. On the other hand, one existing access point for Le Constance Club will be eliminated, while the remaining access point will be retained for continued use.

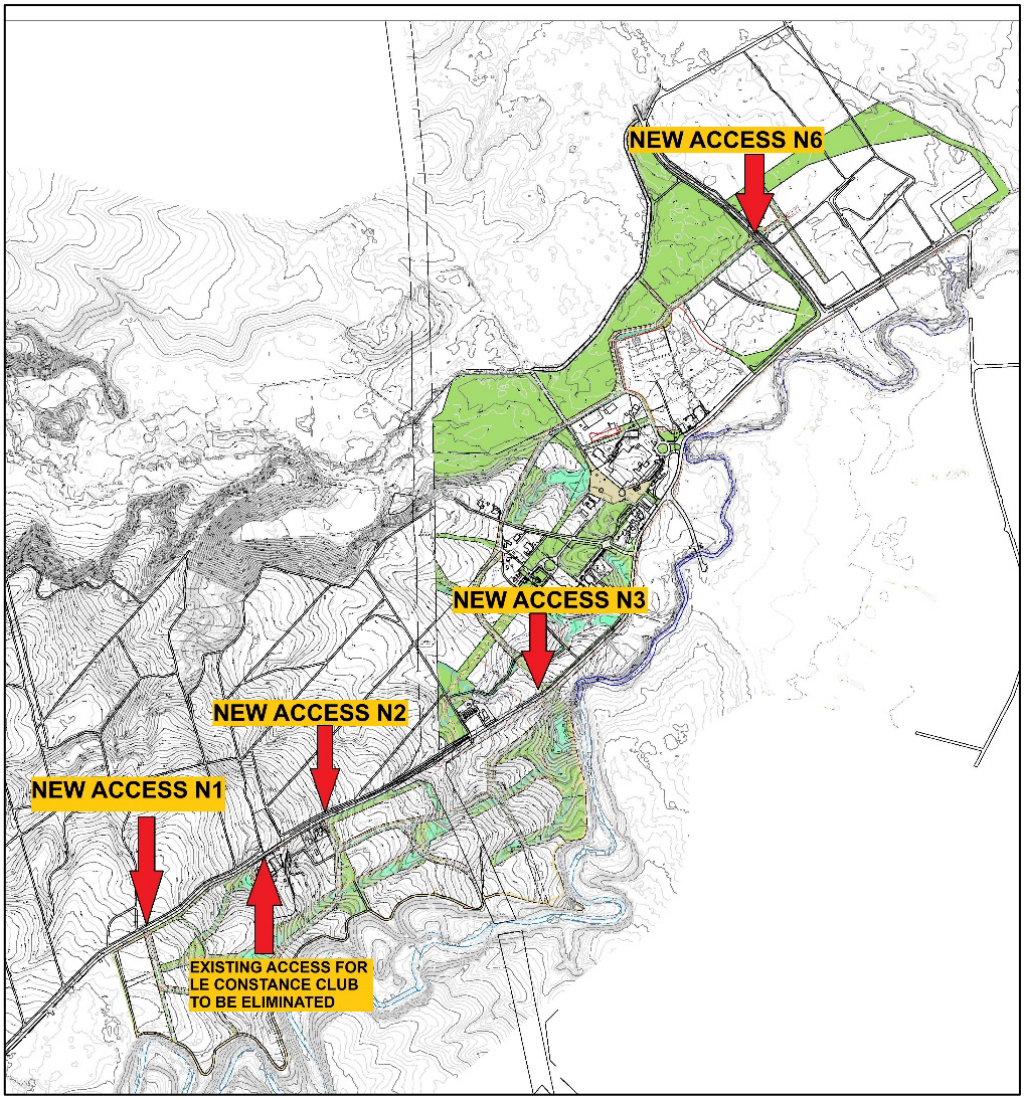


Figure 42: Proposed New Accesses for the Smart City

Based on the findings of the Traffic Impact Assessment, the following conclusions and recommendations have been made:

- Existing Junction B23/B117 (Junction E7)

The existing junction E7 has to be improved, and the existing junction must be replaced by a roundabout immediately. These improvement works are not required due to the Smart city project and must be financed and implemented by the relevant authorities.

- Existing Junction B23/A2 and B23/A7 (Junction E1 and E2) and N6

The existing junctions E1 and E2 must be upgraded by 2027 when considering the increased traffic due to the New Flacq Hospital. The construction of the commercial development in the smart city will add to the traffic at these junctions. Improvement works in the form of roundabouts and dualling of the roads B23 and A2/A7 have been recommended.

- New Junctions for the smart city N1, N2, N3

It has been observed that under Scenario 3, until the time horizon 2037 without the future proposed M4 Motorway, the above junctions will provide an acceptable level of service along B23. Therefore, these junctions can be built anytime inside this time horizon depending on the development schedule of the smart city without any adverse impacts on the traffic along B23.

10.2 Proposed New M4 by Government of Mauritius

The proposed M4 Motorway, which spans approximately 30 km between Bel Air and Forbach, will connect several key regions along its alignment. This new infrastructure is expected to significantly alter travel patterns and enhance road capacity. It is expected that this will contribute to mitigate the effects of expected traffic growth and alleviate congestion at critical junctions within the study area.

11.0 Climate Change and Vulnerability Assessment

While climate change is global in scale, there are also highly localised environmental and social impacts that threaten cities, buildings, communities and society in general. It is therefore critical to consider and integrate climate resilience into the Strategic Environment Assessment (SEA) process. As required by the Environment Act of 2024, SEAs must take into consideration climate change-induced hazards while recognizing their spatial and temporal dimensions (50 to 100 years) as they relate to projects, plans and policies. The main climate change risks that are relevant to Mauritius are: (1) sea level rise, (2) tropical cyclones, (3) storm surges, (4) coastal flooding, (5) flash floods, (6) increased temperatures and extreme weather events, and (7) prolonged droughts [36]. In addition to the impacts of climate change, Mauritius faces significant environmental challenges such as water pollution, deforestation, coral reef degradation, and overfishing. Vulnerability measures a country's exposure, sensitivity and ability to adapt to the negative impact of climate change. Mauritius is ranked 89th on the ND-GAIN index published by the University of Notre Dame [37]. The ND-GAIN index score is composed of a vulnerability score and a readiness score. ND-GAIN measures overall vulnerability by considering vulnerability in six life-supporting sectors: food, water, health, ecosystem service, human habitat and infrastructure. The International Disaster Database lists cyclones as the more relevant natural hazards in the case of Mauritius [38]. On the other hand, Think Hazard [39] identifies landslides and cyclones as the riskiest natural hazards, followed by coastal floods, tsunamis, and extreme heat, most of which are expected to worsen due to climate change. The Climate Change and Vulnerability Assessment presented herein pertains to, and is specifically for, the Constance Village Smart City project located in the district of Flacq. The site of an extent of 1,505,561 m^2 is located at a distance of 4,940 m from the nearest shoreline and is at an elevation of 115 m above mean sea level.

A comprehensive matrix (see **Table 6**) was developed to assess the climate change vulnerability of this proposed smart city in Flacq. The vulnerability score for 11 relevant climate hazards has been calculated using the formula [40]:

Vulnerability Score = Exposure × Sensitivity ÷ Adaptive Capacity

Exposure is the degree to which the project/site is physically exposed to the hazard (1 = low, 5 = very high). Sensitivity is how severely the project will be affected if exposed (1 = low impact, 5 = catastrophic impact) and adaptive capacity is the ability of the project and stakeholders to cope (1 = very weak, 5 = very strong).

Table 6: Vulnerability and Adaptation Matrix for Constance Village Smart City Project

#	Climate Hazard [s]	Key Considerations	Exposure[a] (E) [1–5]	Sensitivity[b] (S) [1–5]	Adaptive Capacity[c] (AC) [1–5]	Vulnerability Score = E×S÷AC	Adaptation Measures
1	Wildfires	The project site is surrounded by sugarcane fields which are known for their flammability especially during the dry season.	5	5	3	8.33	Early warning system and well-equipped firefighting systems both internally and provided by Authorities
2	Heavy Rainfall and Inland Flooding including Flash Flooding	The project site is bordered by Riviere Francoise and Riviere du Poste de Flacq.	5	5	4	6.25	Building design for heavy rainfall and inland flooding includes elevated structures, flood-resistant materials, effective drainage systems, waterproofing, and site planning to redirect water flow. [Refer to the Land Drainage Report in **Annex 3**]
3	Tropical Cyclones		5	5	4	6.25	Building design to include strong foundations, wind-resistant roofs, reinforced walls, secure openings, proper drainage, and materials suited to withstand high winds and flying debris.
4	Drought and Water Scarcity	Mauritius is water stressed with longer spells of dry days. Water scarcity is a recurrent issue, experienced annually.	4	4	3	5.33	Water-efficient technologies, rainwater harvesting, Greywater reuse, Drought-tolerant landscaping, water storage systems Leak detection and maintenance, Demand management. Alternative water sources, Climate-resilient site planning, project design aligned with local water management and drought contingency plans. [Refer to the hydrogeological report in **Annex 7**]
5	Heatwaves and Extreme Temperatures		4	4	3	5.33	Building design to include passive cooling, blended green spaces and parks and existing mature vegetation, solar shading, energy-efficient cooling systems, low density developments as per the Masterplan Design Report in **Annex 26**]
6	Earthquakes		1	5	1	5.00	None
7	Landslides	The site does not have steep slopes that could be prone to rainfall-induced landslides.	1	5	1	5.00	None
8	Subsidence	The Constance region in Flacq is not prone to subsidence.	1	5	4	1.25	None
9	Saltwater Intrusion	The project will use water from boreholes situated at approximately 7.83 km from the shoreline.	1	1	1	1.00	None
10	Sea Level Rise, Coastal Flooding and Storm Surges	Distance from project area to nearest shoreline is 4.94 km and Elevation is 50 to 115 m	1	1	1	1.00	None
11	Tsunamis	The site is 4.94 km from the shoreline and sits at an elevation of 50 to 115m above sea level	1	1	1	1.00	None

a: Exposure = Degree to which the project/site is physically exposed to the hazard (1 = low, 5 = very high).
b: Sensitivity = How severely the project will be affected if exposed (1 = low impact, 5 = catastrophic impact).
c: Adaptive Capacity = The ability of the project and stakeholders to cope (1 = very weak, 5 = very strong).

The highest score obtainable is 25 and the lowest is 0.2. The highest climate hazard vulnerability score is associated to “Wildfires”. The lowest scores of 1.00 relate to Saltwater Intrusion, Sea Level Rise, Coastal Flooding and Storm Surges” and “Tsunamis”.

11.1 Wildfires

Wildfires are large, uncontrolled fires that spread quickly through wild vegetation or planted areas and can cause widespread damage to nature, homes, people and infrastructure including real estate assets. They occur all over the world in forests, grasslands, savannahs, and many other types of ecosystems [41]. They can begin in several ways, both natural and human-induced. One of the most common natural causes of wildfire is lightning. The heat of a single lightning strike can cause vegetation’s moisture to evaporate and spark into flame. Human activities are also significant contributors to wildfires, from lit cigarette butts to harvest-related crop burning. Another cause is faulty power lines, which can create sparks that ignite nearby vegetation. When conditions are particularly dry, like during periods of climate change-induced low rainfall, the fire can quickly spread. High temperatures and fast, dry winds can also exacerbate wildfires. Once a fire starts, it produces heat that dries out nearby vegetation, making it easier for the fire to spread. Wildfires can destroy forests and wildlife habitats and release smoke and pollutants into the air, affecting air quality and climate. Wildfires also threaten human life, livelihoods, and infrastructure.

According to Think Hazard [39] there is less than a 4% chance of experiencing weather that could support a problematic wildfire in Mauritius with only a minor chance of causing disruption in any given year. Although the hazard level is considered to be very low in Mauritius based on available historical weather information, locally specific conditions such as the occurrence of dry fuels (sugarcane) and steep slopes require that wildfires be considered possible. The presence of sugarcane plantations surrounding the project site strongly suggest that wildfires should be considered as highly probable.

The project’s Vulnerability Score associated with wildfires is 8.33, making “Wildfires” the most significant climate hazard to the project. Adaptation measures that are recommended to avoid and mitigate the impacts of wildfires are detailed in the subsections that follow.

11.1.1 Vegetation and Fuel Management

By maintaining a fuel break of at least 10–15 m between sugarcane fields and buildings/infrastructure, regular clearing of dry grass, leaves, and crop residues near structures. Green buffer zones (e.g., lawns, fire-retardant hedges) between buildings and cane fields should be adopted. Use of low-flammability native plants (for example bois noir, pandanus) for landscaping near buildings will also help to create barriers to fire.

11.1.2 Site Selection and Orientation

Placing buildings directly downwind of large cane plantations should be avoided, especially on slopes. The site layout design should use access roads and driveways to act as firebreaks around properties. Designers should ensure that multiple access and exit routes are provided in case fire blocks primary roads.

11.1.3 Fire-Resistant Construction Materials

Non-combustible roofing materials such as metal sheets or tiles should be used. Fire-resistant external walls, like concrete, cement render, or fire-treated timber should be specified. External cladding and untreated thatch roofs should be avoided near cane fields. Where possible, metal mesh screens should be installed over vents and windows to block embers.

11.1.4 Building design and Detailing

Elevated wooden structures off the ground and shielded underfloor spaces should be favoured. Use of double-glazed or toughened glass on windows facing cane fields are preferable. Metal gutters should be regularly cleared of dry leaves and cane trash. Roofs should be designed with minimal valleys or complex shapes to avoid ember accumulation.

11.1.5 Landscape and Buffer Zones

Elevated wooden structures off the ground and shielded underfloor spaces should be favoured. Use of double-glazed or toughened glass on windows facing cane fields are preferable. Metal gutters should be regularly cleared of dry leaves and cane trash. Roofs should be designed with minimal valleys or complex shapes to avoid ember accumulation.

11.1.6 Firefighting Infrastructure

On-site water storage tanks (min. 5,000–10,000 litres) should be installed with hose connections. Hydrants or standpipes accessible to fire services should be provided. All roads should be able to accommodate fire trucks (minimum 3 m width, 4 m clearance).

11.1.7 Operational Preparedness

A fire response plan for the occupants or staff of the smart city should be developed. Fire drills should be carried out during the dry season (August–November). Fire extinguishers and basic firefighting tools should be stored on-site. Regular communications with local fire services and nearby operators should be maintained.

11.1.8 Policy and Community Measures

Collaboration with sugarcane field owners to regulate pre-harvest cane burning (timing, wind conditions, supervision) is essential. Community fire watch groups should be encouraged to report illegal or dangerous burning. Cooperative firebreak maintenance between adjacent properties and growers must also be encouraged.

11.2 Heavy Rainfall and Inland Flooding Including Flash Flooding

Inland floods occur when rivers overflow their banks (fluvial flooding) or when precipitation exceeds local capacity to absorb water (pluvial flooding) in soils or urban drainage systems. The relationship between climate change and flooding is complex. The most well-established connection between human-induced climate change and inland flooding is that more warming leads to more intense rainfall (even in dry places), which in turn increases flood severity. Flooding in Mauritius (see **Table 7**) generally results from periods of intense rainfall. One of the most significant flood events for the country occurred in March 2013, when more than 150 mm of rain fell in less than two hours. This flooding caused 11 fatalities.

Precipitation in Mauritius consistently declined from 1950 to 2000, by 31.21 mm per decade (3% decrease per decade with respect to the 1990–2020 reference period). However, since 2000, the precipitation trend in Mauritius has reversed to an increasing pattern. Precipitation has risen sharply, with an increasing trend of 86.65 mm per decade (or 8.6%) from 1990 to 2020. Climate change is expected to cause a long-term decline in the average annual precipitation levels, from 1054 mm during the historical period to 1023 mm for 2040–2059, but interannual variability and inter-model dispersion remains very high, so the annual trends are not significant. The seasonal trend differences suggest that most of the precipitation decrease occurs from November to January (the beginning of the rainy season), indicating a projected delay in the start of the rainy season, along with an increase in droughts during this period. However, intense precipitation events will likely recur more frequently (the return periods will decrease, see **Figure 43**). Extreme precipitation events with return periods of 50, and 100 years are projected to occur more than twice as often by the end of the 21st century (2070–2099) compared to historical values from 1985–2014.

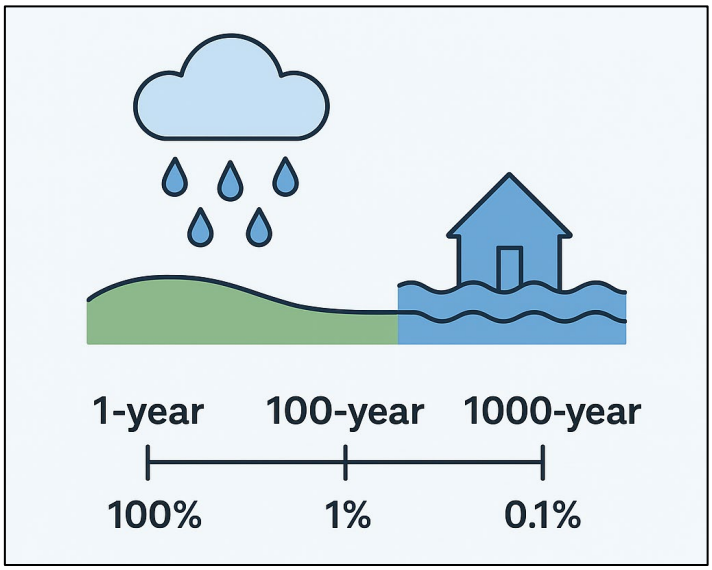


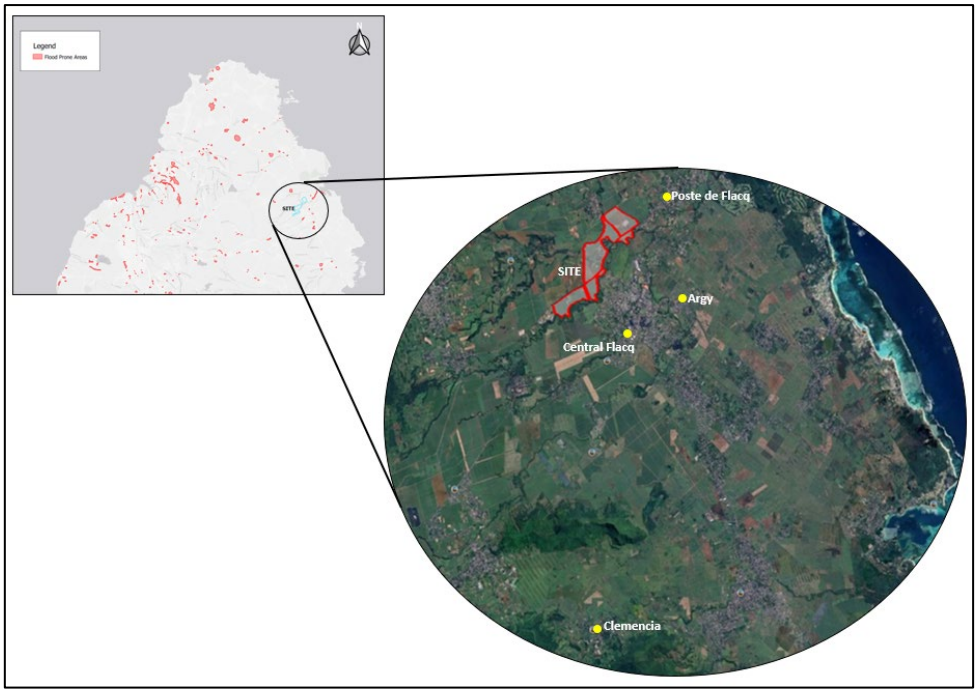
Figure 43: Return Periods and Probability of Exceedance

There are 4 flood-prone areas in the vicinity of the site (see **Figure 44**). In addition, the site to be developed into the smart city lies between two natural water courses; Riviere Francoise and Riviere du Poste de Flacq (see **Figure 45**). The project's vulnerability score to "Heavy Rainfall and Inland Flooding including Flash Flooding" is 6.25, making it the second highest.

Table 7: Recent Flooding Events in Mauritius

Date	Location(s)	Cause	Impacts
26 March 2008	Across Mauritius (Mon Goût etc.)	Torrential rainfall / flash flooding	4 people died.
30 March 2013	Port Louis (capital)	Flash flood after heavy rainfall (~152 mm in ~3 hours)	~11 people died; major inundation in city centre; many buildings, roads, vehicles damaged. Worst flood events in memory.
10 February 2016	Fond du Sac	Torrential rainfall / flood event	~192 households affected.
May 2017	Poste de Flacq (Eastern Mauritius)	Heavy rains / flash floods	Several houses inundated; people displaced.
January 2018	Mauritius (national, incl. Rodrigues)	Cyclone Berguitta brought extreme rains, lasting heavy rainfall over days	Severe floods: damage to buildings, disruption of electricity and water supplies in Port Louis, crop damage. 2 people died.
16-19 April 2021	Southern coastal regions; Bambous Virieux	Heavy to violent rains; flash floods	383.6 mm recorded in <12 hours at Plaisance road obstruction; homes inundated; students trapped; damage to water supply.
January 2024 (Cyclone Belal, ~15-16 Jan)	Port Louis and other affected localities (e.g. Pailles)	Cyclone Belal; torrential rains & wind causing flooding	Flooded streets, one death (motorcyclist), ~100,000 people impacted, damage to infrastructure & property

Source: Generated using ChatGPT



Source: [LDA, GoogleEarth]

Figure 444: Flood Prone Areas around the Site

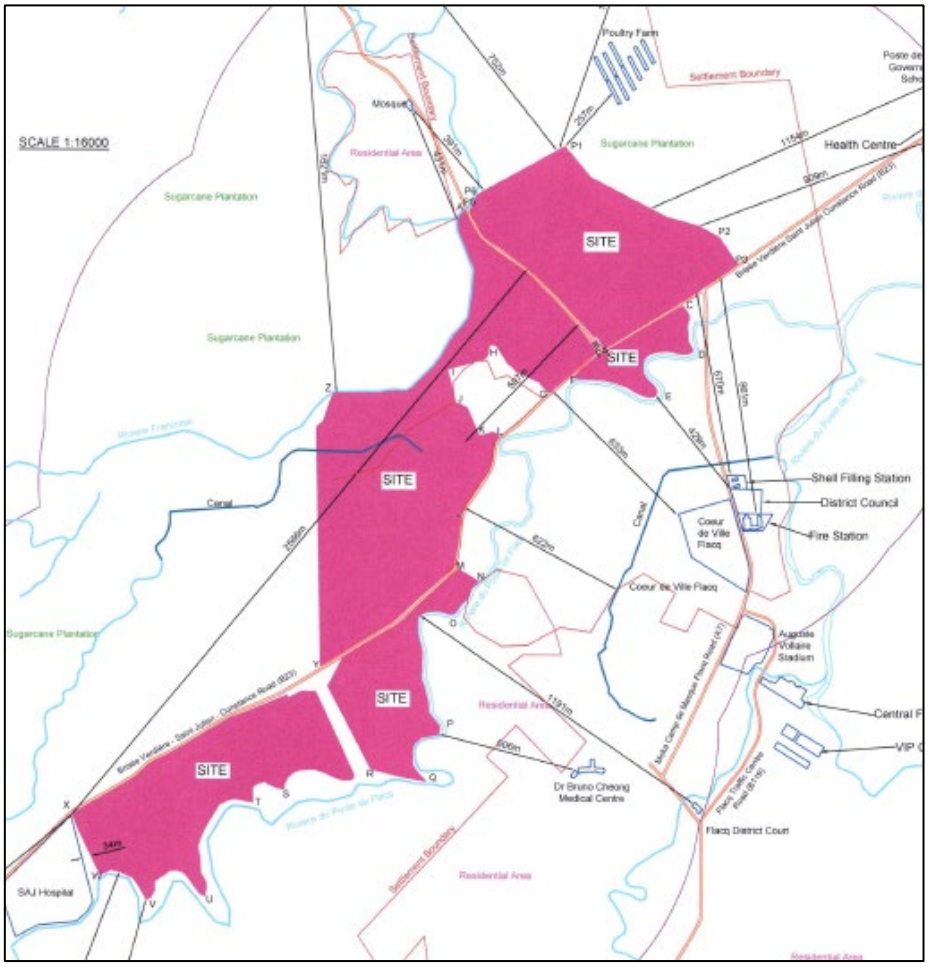


Figure 45*:* Watercourses around the Site

11.2.1. Site Planning and Land Use

Recommended site planning and land use measures include:

1. Avoiding flood-prone zones by using flood hazard maps during site selection.
2. Prioritising construction on higher ground or elevated land wherever possible.
3. Implementing zoning regulations to restrict development in known floodplains or low-lying coastal areas.
4. Designing green corridors or retention basins in urban plans to safely channel flood waters.

11.2.2 Building Elevation and Structural Design

Recommended building and structural measures include:

1. Raising floor levels above historical flood levels by using plinths, stilts, or platforms.
2. Using reinforced concrete foundations that resist water infiltration and scouring.
3. Installing flood barriers or skirting walls around critical infrastructure (homes, hospitals, substations).
4. Designing multi-storey buildings with emergency shelter spaces on higher floors in flood-prone areas.

11.2.3. Drainage and Water Management

Recommended drainage and water management measures include:

1. Designing and connecting to efficient stormwater drainage systems, sized to handle intense tropical downpours.
2. Using permeable surfaces (e.g. gravel, permeable paving) for driveways, courtyards, and parking to reduce runoff.
3. Incorporating rain gardens, vegetated swales, or bio-retention systems to slow and absorb runoff.
4. Installing overflow channels, culverts, and safe discharge paths that divert water away from buildings.

11.2.4. Rainwater Harvesting and Storage

Recommended rainwater and storage measures include:

1. Installing rainwater harvesting systems (gutters, tanks) to reduce runoff and provide backup water during disruptions.
2. Designing roofs and piping systems to capture and direct rainwater away from building foundations and paths.

11.2.5. Materials and Building Envelope

Recommended measures regarding building materials include:

1. Use of water-resistant materials for ground floors: concrete, tiles, treated timber, moisture-resistant gypsum boards.
2. Application of waterproofing membranes to foundations, basements, and retaining walls.
3. Use of seal windows, doors, and vents to prevent water ingress during flash flooding.

11.2.6 Flood-Resilient Infrastructure

Recommended measures for flood resilience include:

1. Elevating and protecting electric panels, generators, and telecom systems above expected flood levels.
2. Using backflow prevention valves in sewer lines to stop water from backing into buildings.
3. Ensuring critical facilities (e.g. health centres, police stations) remain operational and accessible during floods.

11.2.7 Landscaping and Natural Solutions

Recommended nature-based solutions include:

1. Preserving or restoring wetlands, riverbanks, and coastal buffers (e.g., mangroves, ravines) that absorb excess rainwater.
2. Using terracing and contour bunds on slopes in rural/agricultural zones to slow runoff and reduce erosion.
3. Maintaining and regularly clearing river channels and canals (such as Rivière Francoise and Riviere du Poste de Flacq) to ensure unimpeded flow.

11.2.8 Community and Emergency Preparedness

Recommended community and emergency preparedness measures include:

1. Including flood warning signage, escape routes, and emergency shelters in project plans.
2. Designing buildings with emergency exits on multiple sides and elevated safe zones.
3. Promoting rainfall and flood alert systems (e.g., SMS or radio alerts) for users or residents.

11.2.9 Policy and Maintenance

Recommended policy and maintenance measures include:

1. Following guidelines under the Mauritius Building Control Act, National Disaster Risk Reduction Policy, and Planning Policy Guidance (PPGs).
2. Ensuring regular inspection and maintenance of drainage systems, embankments, and flood protection infrastructure.

11.3 Tropical Cyclones

Mauritius lies within the core cyclone zone (see **Figure 46**) and is significantly affected during the cyclone season, spanning from October to May. Cyclonic events often lead to severe coastal damage, destruction of infrastructure, loss of biodiversity, landslides, and the displacement of communities.

Cyclone hazard in Mauritius is classified as ***high*** according to information currently available in the Think Hazard system [41]. This means that there is more than a 20% chance of potentially damaging wind speeds in the Mauritius project area in the next 10 years. Based on this information, the impact of cyclones must be considered in all project phases, especially during design and construction. Project planning decisions, project design, and construction methods should take into account the level of cyclone hazard. It is to be noted that damage can occur not only due to wind (>280km/h) but also by cyclone-induced heavy rainfall and subsequent flooding.

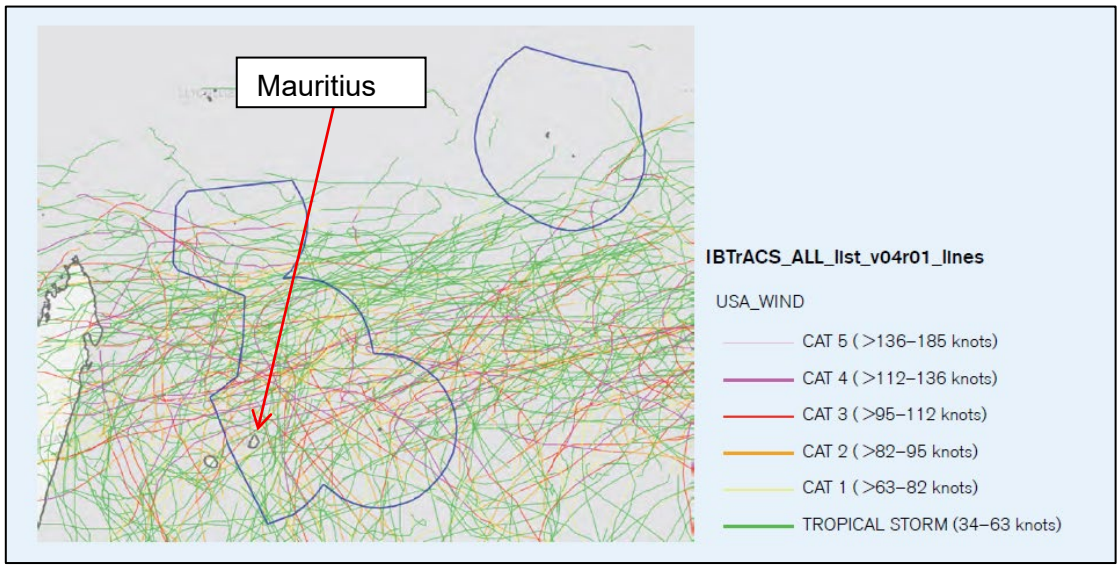


Figure 46: Observed Historical Cyclones Mauritius 1840 to Present

Climate change impacts on cyclonic wind speed and rainfall are likely to increase in the future, while the global average frequency of tropical cyclones is likely to decrease or remain unchanged. It is possible that the frequency of the most intense tropical cyclones will increase substantially in some ocean regions [41]. The present hazard level in areas currently affected by tropical cyclones may increase in the long-term. Projects located in such areas should be designed to be robust to future increases in cyclone hazards.

The project's Vulnerability Score for "Tropical cyclones" is 6.25, making it the third highest among the 11 vulnerability classes considered.

11.3.1. Site Selection and Planning

Recommended measures include:

1. Avoid flood-prone and low-lying coastal areas vulnerable to storm surges.
2. Conduct cyclone risk assessments during the feasibility study phase.
3. Position critical infrastructure away from wind corridors and exposed slopes.

11.3.2. Building Design and Engineering

Recommended measures include:

1. Design structures to withstand winds exceeding 250 km/h, following Mauritian Building Codes (MS 128:2021).
2. Use aerodynamic shapes and hipped roofs to reduce wind uplift.
3. Ensure adequate roof anchoring and wall reinforcement.
4. Use cyclone-rated shutters or impact-resistant glazing.

11.3.3. Materials and Construction

Recommended measures include:

1. Use high-quality, cyclone-resistant construction materials (e.g., reinforced concrete, corrosion-resistant fasteners).
2. Install robust roofing systems with secure fixings.
3. Avoid lightweight or loosely fixed external elements such as awnings or signage.

11.3.4. Drainage and Flood Management

Recommended measures include:

1. Design elevated foundations or stilts in flood-prone zones.
2. Implement proper drainage systems to prevent waterlogging.
3. Use permeable paving and rainwater harvesting to reduce surface runoff.

11.3.5. Landscaping and Environmental Buffering

Recommended measures include:

1. Plant windbreaks such as native trees and shrubs to reduce wind speed.
2. Avoid tall, shallow-rooted trees close to buildings.
3. Preserve mangroves and coastal vegetation that act as natural storm buffers.

11.3.6. Emergency Preparedness Infrastructure

Recommended measures include:

1. Provide cyclone shelters or designated safe rooms in residential complexes.
2. Install backup power systems (e.g., generators, solar with battery storage).

3. Ensure water storage and emergency supply systems are cyclone-ready.

11.3.7. Building Codes and Regulatory Compliance

Recommended measures include:

1. Comply with the Mauritius Building Control Act and cyclone safety regulations issued by the Ministry of National Infrastructure.
2. Obtain all relevant planning and environmental permits with cyclone risk assessments included.

11.3.8. Maintenance and Inspections

Recommended measures include:

1. Schedule regular inspections of structural elements before cyclone seasons (typically November to April).
2. Ensure roof fixings, drainage, and protective elements are maintained annually.
3. Educate property owners and tenants on cyclone safety and building features.

11.3.9. Insurance and Risk Transfer

Recommended measures include:

1. Secure comprehensive insurance for cyclone and flood damage.
2. Encourage buyers and tenants to obtain home insurance with natural disaster coverage.

11.3.10 Community Engagement and Awareness

Recommended measures include:

1. Provide buyers with cyclone preparedness guides and emergency plans.
2. Work with local authorities to support community cyclone response efforts.
3. Incorporate signage and emergency contact details in common areas of the whole development.

11.4 Drought and Water Scarcity

Mauritius is not particularly prone to drought, but it is classified as a water-stressed island state, challenged by occasional water scarcity. Even though precipitation in Mauritius [40] has experienced a sharp increase during the last 20 years, the maximum number of consecutive ***dry days*** per year has also been increasing significantly and consistently since 1950, at a rate of roughly one additional day per decade. As a result, the longest dry spells, which lasted 10 days in the 1950s, extended to 17 days by 2020, representing an increase of 70%. Between 1951 and 2020, the trend in the yearly maximum number of consecutive dry days showed an increase of 0.81 days per decade. This trend intensified slightly when considering the period from 1971 to 2020, with an increase of 1.18 days per decade. More recently, from 1991 to

2020, the trend remains elevated at 1.05 days per decade, indicating a persistent rise in the duration of dry spells.

Looking ahead, the maximum number of consecutive dry days is not expected to change significantly due to climate change. However, extended drought periods are likely to become slightly longer from September to December, during the transition from the dry season to the rainy season. This suggests a potential delay in the onset of the rainy season, which aligns with the projected decrease in precipitation during those months.

With a vulnerability score of 5.33, “Drought and Water Scarcity” is the fourth most significant hazard that the project at hand will have to adapt to. Adaptation measures that are recommended to address the issue include:

1. Water-efficient technologies – Use of low-flow fixtures, drip irrigation, and water-saving appliances throughout the smart city
2. Rainwater harvesting – Collection and storage of rainwater for non-potable use and, if treated, for potable use.
3. Greywater reuse – Recycling of water from sinks, showers, and laundry for irrigation or flushing.
4. Drought-tolerant landscaping – Use of native, low-water plants (xeriscaping) to reduce irrigation needs.
5. Water storage systems – Incorporation of tanks, cisterns, or underground reservoirs to store water during wet periods.
6. Leak detection and maintenance – Adoption of systems designed for easy monitoring and repair to minimize water loss.
7. Demand management – Promotion of water conservation through education, incentives, or smart metering.
8. Alternative water sources – Using treated wastewater when feasible and sustainable.
9. Climate-resilient site planning – Positioning of buildings and infrastructure to minimize water demand and maximize capture.
10. Integration of the Smart City’s policy – Alignment of project design with the country’s water management and drought contingency plans.

11.5 Heatwaves and Extreme Temperatures

Extreme heat hazard is classified as ***medium*** based on modelled heat information currently available to the Think Hazard [41] tool for Mauritius. This means that there is more than a 25% chance that at least one period of prolonged exposure to extreme heat, resulting in heat stress, will occur in the next five years. Project planning decisions, project design, and construction methods should take into account the level of this extreme hazard.

According to the most recent assessment report of the Intergovernmental Panel on Climate Change [48], continued emissions of greenhouse gases will cause further warming, and it is virtually certain that there will be more frequent hot temperature extremes over most land areas during the next fifty years. Warming will not be regionally uniform. In the Mauritius area, the temperature increase in the next fifty years will be much lower than the worldwide average, but still significant. Hence, it would be prudent to design projects in this area to be robust to global warming in the long-term.

Flacq is located at an elevation of 50 to 155 m above sea level and has a tropical monsoon climate. The yearly average temperature is 24.86ºC, which is -0.23% lower than Mauritius's average. Flacq typically receives about 103 mm of precipitation per year and has 176 rainy days annually [43]. Heatwaves and extreme temperatures have attracted a vulnerability score of 5.33, making the latter the fifth most significant climate hazard that the project will have to adapt to.

For new developments in Flacq, site selection and building orientation are the first critical steps toward heat resilience. It is advisable to build on slightly elevated land where natural breezes are more effective at cooling and where stagnant air and moisture accumulation are minimized. Coastal sites should be planned with attention to salt air corrosion and higher humidity levels. Buildings should be oriented along an east–west axis, reducing solar exposure on the longer façades and minimizing overheating from the intense afternoon sun. Design should prioritize exposure to prevailing winds—typically trade winds from the southeast—to promote natural ventilation. Additionally, high-use spaces such as bedrooms and living rooms should be placed to benefit from breezes, while buffer spaces like bathrooms and storage rooms can be located on the hotter west-facing sides.

11.5.1 Building Envelope and Solar Control

The building envelope should be optimized to reflect heat and allow for adequate ventilation. Roofs, being the most exposed surfaces, should be constructed with light-coloured or reflective materials to reduce solar absorption. Ventilated or double-layered roofs (with a gap between roof and ceiling) are particularly effective in this climate. Installing ridge vents or providing shaded attic spaces can help release trapped hot air. Roof overhangs should be extended to shade walls and windows while also managing the heavy rainfall during the wet season.

External walls should use materials that are either well-insulated or have low thermal mass, particularly in coastal or lowland areas where night cooling is less effective. However, in slightly elevated inland areas where nighttime temperatures drop, using some thermal mass (such as concrete or masonry) can help buffer interior temperatures if combined with night

ventilation. All external walls should be well-shaded by vegetation, overhangs, or vertical shading devices, particularly on the east and west sides, to prevent heat gain. Using light-coloured or reflective paints on exterior walls will further reduce solar heat absorption.

11.5.2 Ventilation and Night Cooling

Natural ventilation is key to maintaining comfort in Flacq's climate. Buildings should be designed for cross-ventilation, with windows or vents on opposite sides of rooms to allow air movement. Higher vents or clerestory windows can help hot air escape from the top of rooms, enhancing vertical airflow. Where security permits, windows should be operable at night to allow cooler air to flush out accumulated daytime heat—especially in areas slightly inland where nights are cooler. All openings must be protected from rain intrusion using overhangs, louvers, or well-positioned shutters, especially during the cyclone season.

11.5.3 Shading and Daylight Control

Effective solar shading is essential. Roof eaves, canopies, balconies, and pergolas should be used to shade building facades. Shading elements should be designed based on sun angles—horizontal shading works well on south-facing windows, while vertical fins or operable shutters are effective on east and west façades. Trees and green landscaping also provide natural shading and help reduce the surrounding air temperature. Strategic planting of native or fast-growing shade trees on the east and west sides of the building can significantly reduce thermal load.

Daylighting should be balanced with heat gain—preferably through shaded clerestory windows or smaller openings that admit indirect light rather than large, glazed areas. Reflective or adjustable blinds, external shutters, and double glazing (if feasible) can help modulate solar heat gain while still allowing daylight.

11.5.4 Interior Layout and Zoning

A building's internal layout should support heat mitigation by organizing rooms according to their heat and ventilation needs. High-occupancy or sleeping areas should be placed on the cooler sides of the building and aligned with prevailing winds to take advantage of ventilation. Rooms that generate heat or are used less often—such as kitchens, bathrooms, or storage—can be positioned on warmer sides to act as thermal buffers. Higher ceilings are beneficial, allowing hot air to rise above the occupant zone. Avoid deep floor plans that restrict airflow and use open or semi-open layouts to encourage air movement through the structure.

11.5.5 Landscaping and Outdoor Spaces

Outdoor and transitional spaces, such as verandas, shaded patios, and covered walkways, provide thermal buffers between indoor and outdoor environments. Landscaping should include permeable surfaces and ground cover rather than extensive concrete, which

contributes to local heat islands. Water features, where maintenance is feasible, can assist with microclimate cooling. All exterior design must also incorporate adequate stormwater management due to the high rainfall during the wet season. Rain gardens, permeable paving, and contouring the land to direct runoff away from buildings can help avoid both flooding and excess humidity around the structure.

11.5.6 Mechanical Systems and Energy Efficiency

While passive strategies should be prioritized, mechanical systems may still play a role. Ceiling fans are an effective low-energy way to enhance comfort and are suitable for year-round use. Where air conditioning is necessary, it should be limited to the most heat-sensitive areas and use high-efficiency units. To reduce overall energy use, install energy-efficient lighting, appliances, and solar water heating. The high solar availability in Flacq makes rooftop photovoltaic systems a viable long-term investment, especially for off-grid or low-infrastructure areas. Incorporating smart building systems to automate shading, lighting, and night-time ventilation can further improve thermal performance and occupant comfort.

11.5.7 Moisture, Durability, and Adaptability

Materials used in Flacq's humid and occasionally saline environment must resist mould, corrosion, and degradation. Wall and roof systems should be sealed against leaks, while also allowing indoor materials to "breathe" where possible to avoid trapped humidity. Near coastal zones, corrosion-resistant fasteners, coatings, and materials are essential. Buildings should also be designed with future climate shifts in mind—greater temperature extremes, more intense storms, and possible flooding. Modular design elements and flexible spaces can allow for later upgrades, such as additional shading, insulation, or mechanical cooling systems. Additionally, buildings should be cyclone-resilient, with robust roof anchoring and impact-resistant windows or shutters.

11.5.8 Economic and Regulatory Considerations

Flacq's developments often vary in budget, and many rural or inland projects may be resource-constrained. In such cases, passive measures like orientation, ventilation, and shading should be prioritized, as they cost little but offer significant thermal benefit. Using locally available, low-embodied-energy materials helps reduce costs and carbon footprint. Ongoing maintenance of key elements like shading devices, vegetation, and reflective surfaces is essential to ensure long-term effectiveness. Designers and builders should also reference local Mauritian regulations on energy efficiency and construction standards, aiming to exceed them where feasible in anticipation of worsening climate stress.

11.6 Earthquake

Earthquakes are common in the Southwest Indian Ocean region, but the major seismic sources in the region are far from Mauritius [38]. The two major sources of seismic activity are the Mid-Indian Ridge in the Indian Ocean and the East-African Rift system. Earthquakes in these regions are frequent but usually of low to moderate magnitude. Consequently, Mauritius has no history of economic losses or casualties from earthquakes. Significant losses from earthquakes are expected to occur infrequently. The analysis presented in the Country Risk Profile: Mauritius (2025) [38] suggests that direct losses are not expected for earthquakes with a 500-year return period. Average annual losses from earthquakes in Mauritius are driven by extremely rare earthquakes with return periods greater than once every 500 years. Hence, earthquake hazard in Mauritius is classified as ***very low*** according to the information that is currently available in the Think Hazard system [41]. This means that there is less than a 2% chance of potentially damaging earthquake shaking in the Mauritius area in the next 50 years.

"Earthquake" has attracted a vulnerability score of 5.00. The response to the impact of earthquakes should be considered more as precautionary rather than necessary. Low-magnitude tremors and indirect seismic effects from distant quakes (such as those from the Indian Ocean region) can still occur. Given this, the project should adopt precautionary measures as part of a comprehensive disaster risk reduction strategy, especially considering climate change and regional seismic activity. No specific measures are necessary.

11.7 Landslides

Worldwide, landslides pose a serious threat to populations, causing fatalities, widespread damage, and significant economic losses. Various phenomena influence slope stability and can trigger landslides, with rainfall being the main factor. Rainfall is strongly controlled and influenced by climate and its variations. Therefore, climate change is expected to influence slope stability at different temporal and geographical scales.

There are currently three identified potential landslide areas in Mauritius: (1) Quatre Soeurs, (2) Vallée Pitot, and (3) Chitrakoot [42]. In these areas, specific landslide monitoring equipment has been installed, and the communities have been sensitized. The smart city project by CLG is not in a landslide prone zone; hence, the low vulnerability score of 5.00. No specific adaptation measures are recommended.

11.8 Subsidence

Subsidence is the gradual sinking or downward settling of the Earth's surface, which may occur naturally or as a result of human activities. Natural causes include the compaction of sediments, where loose soil or clay compresses under its own weight; tectonic movements that shift the Earth's crust; and the dissolution of underground rocks such as limestone or salt,

which can create cavities that eventually collapse. Human-induced subsidence is often linked to groundwater extraction, which reduces underground pressure and causes land to sink, as well as underground mining and the removal of oil, natural gas, or mineral resources, which leave voids beneath the surface.

Construction and land reclamation projects can also trigger settlement when heavy loads are placed on soft soils. The impacts of subsidence can be significant, ranging from damage to infrastructure such as roads, buildings, and pipelines, to increased flood risk in coastal areas where sinking land compounds the effects of sea-level rise. It can also harm ecosystems by causing wetland loss and saltwater intrusion.

In Mauritius, the concern is more about subtle vertical land motion, as even small amounts of sinking or uplift can greatly influence relative sea-level rise, coastal flooding, and erosion. Recent cases (2019, 2020) of subsidence in Port Louis, resulting in cracks in the De Caen bypass and lowering of the Caudan Metro Express Station ramp, were due to construction over ground with seawater underground.

As global temperatures rise and the occurrence of dry weather increases, the emergence of subsidence due to climate change will become more likely. When the ground beneath a property sinks, pulling the foundations down and causing the walls and floors to shift, the resulting effect will destabilise the structure of the property [44]. Climate change is putting an increasing number of real estate buildings at risk in the coming years. Properties exposed to subsidence may also require engineering work for land stabilisation or replacement of damaged infrastructure, which can increase costs.

11.9 Saltwater Intrusion

In coastal areas, fresh groundwater from inland sources mixes with saline (salty) groundwater originating beneath the ocean floor (see **Figure 47**). The boundary between fresh groundwater and saline groundwater does not always remain in the same place and can often shift inland or seaward, depending on the conditions beneath the surface.

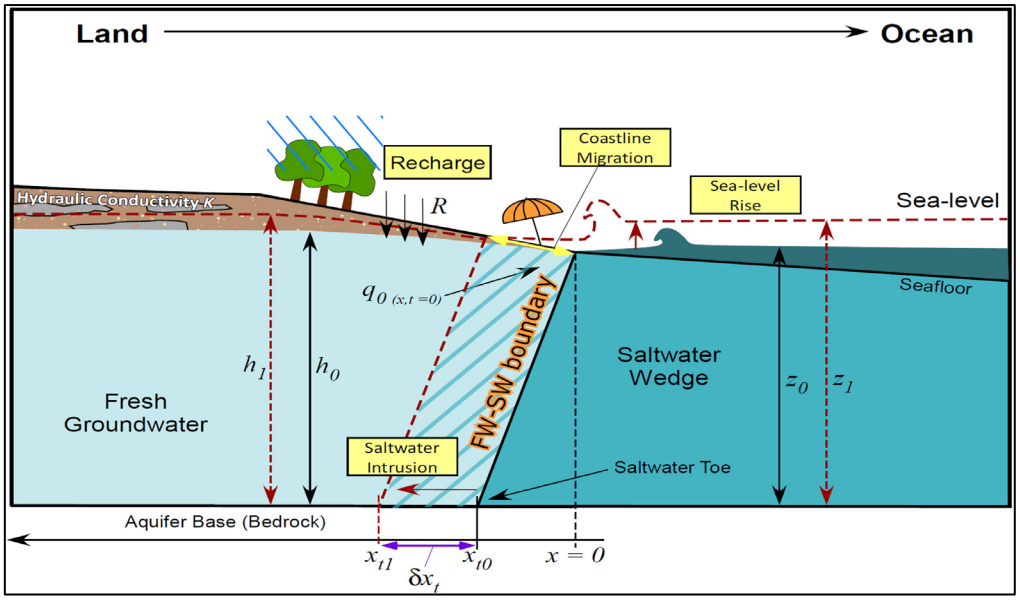


Figure 47: Saltwater Intrusion

When the fresh groundwater supply decreases (due to climate change-induced dry summer months), the boundary can move further inland. Conversely, when the fresh groundwater supply increases (during wetter spring months), the boundary can shift seaward. When the mixing of saltwater with freshwater beneath the surface occurs in an area that was previously fresh, the process is referred to as saltwater intrusion. Saltwater intrusion can become a problem when saltwater moves far enough inland that it “intrudes” into fresh groundwater sources such as boreholes and wells [45].

Given that the project is located at least 5 km away from the shoreline and at an elevation of 50 to 115 m above sea level, the risk that saltwater intrusion poses to ground water is practically nil and no specific adaptation measures are required.

11.10 Sea Level Rise, Coastal Flooding and Storm Surges

Tide gauge measurements indicate a historical increase of 6.02 ± 1.39 mm per year in Port Louis (the capital and port of the island of Mauritius) from 1993 to 2019. According to altimetry (satellite) data, sea level rose 13 cm in total from 1993 to the present in Port Louis. Sea level is expected to rise 15 cm from 2020 to 2050 in Port Louis, with a likely range from 12 to 20 cm, and is expected to rise 18 cm (15 to 24 cm) for the same period on Rodrigues Island. This means that by 2050, sea level rise in Port Louis, on the main island, is projected to reach 0.19 m, and by 2100, it is expected to reach 0.84 m under the SSP3-7.0 scenario relative to the historical period (1995–2014).

Over the next three decades, sea level rise is expected to be roughly the same across all emission and warming scenarios. However, beyond that period, high-emission scenarios predict significantly higher sea level rise. Although there are still high uncertainties, it is certain

that sea levels will continue to rise in all scenarios for centuries, driven by the long-term inertia of the oceans. This makes long-term planning essential.

In the case of Mauritius, coastal flood hazard is classified as ***medium*** according to the information that is currently available in Think Hazard [41]. This means that there is more than a 20% chance of potentially damaging coastal flood waves occurring in the next 10 years. Based on this information, the impact of coastal flooding should be considered in different project design phases for activities located near the coast.

The Constance Village Smart City project will be built inland at a distance of 4,940 m from the shoreline and at an elevation of 115 m above mean sea level. Hazards associated with sea level rise, coastal flooding and storm surges are thus rated with a Vulnerability Score of 1, making it one of the least threatening climate hazards for the project at hand. Given that the project is located at least 5 km away from the shoreline and at an elevation of 50 to 115 m above sea level, the risk that Sea Level Rise, Coastal Flooding and Storm Surges poses to the project is practically nil and no specific adaptation measures are required.

11.11 Tsunamis

Tsunamis usually result from high-magnitude, subduction-zone earthquakes. The Southwest Indian Ocean region does not experience many high-magnitude earthquakes, nor does it contain major subduction zones. The entire region is at risk, however, of tsunamis generated by subduction zones elsewhere in the Indian Ocean. The recent tsunami event that affected the Southwest Indian Ocean region was the 2004 Indian Ocean tsunami. Mauritius experienced only minor inundation, with greater impacts on Rodrigues. In the case of Mauritius tsunami hazard is classified as ***medium*** according to the information that is currently available in the Think Hazard system [41].

This means that there is more than a 10% chance of a potentially damaging tsunami occurring in Mauritius in the next 50 years. Based on this information, the impact of tsunamis should be considered in different phases of projects located near the coast. The areas at risk of tsunami in Mauritius will increase as global mean sea level rises. According to the IPCC [46], global mean sea level rise depends on a variety of factors, and estimates for the year 2100 horizon range from ~20 cm to nearly 1 m. However, regional changes in sea level are difficult to predict. Projects in low-lying coastal areas such as deltas or in island states should be designed to be robust to projected increases in global sea level.

The Constance Village Smart City project will be built inland at a distance of 4,940 m from the shoreline and at an elevation of 115 m above mean sea level. Tsunami hazard is thus rated with a Vulnerability Score of 1, making it one of the least threatening climate hazards for the project at hand.

With a Vulnerability Score of 1, Tsunamis do not pose a climate related hazard to the Constance Village Smart City project.

12.0 Method of Assessment

A Strategic Environmental Assessment (SEA) is a systematic process used to evaluate the environmental impacts of proposed policies, plans, or programs (PPP). It is a high-level environmental assessment tool, focusing on the sustainability of strategic decisions made during planning and policy development, typically at a regional, national, or sectoral level. SEA evaluates the broader environmental impacts of strategic initiatives [47].

The purpose of a SEA is to ensure that environmental considerations are integrated into the decision-making process early on, aligning them with sustainable development goals. The goal is to improve the quality of policies, plans, and programs by anticipating and mitigating potential negative environmental effects before they are implemented. The methodological framework for preparing a SEA report is illustrated in **Figure 48**.

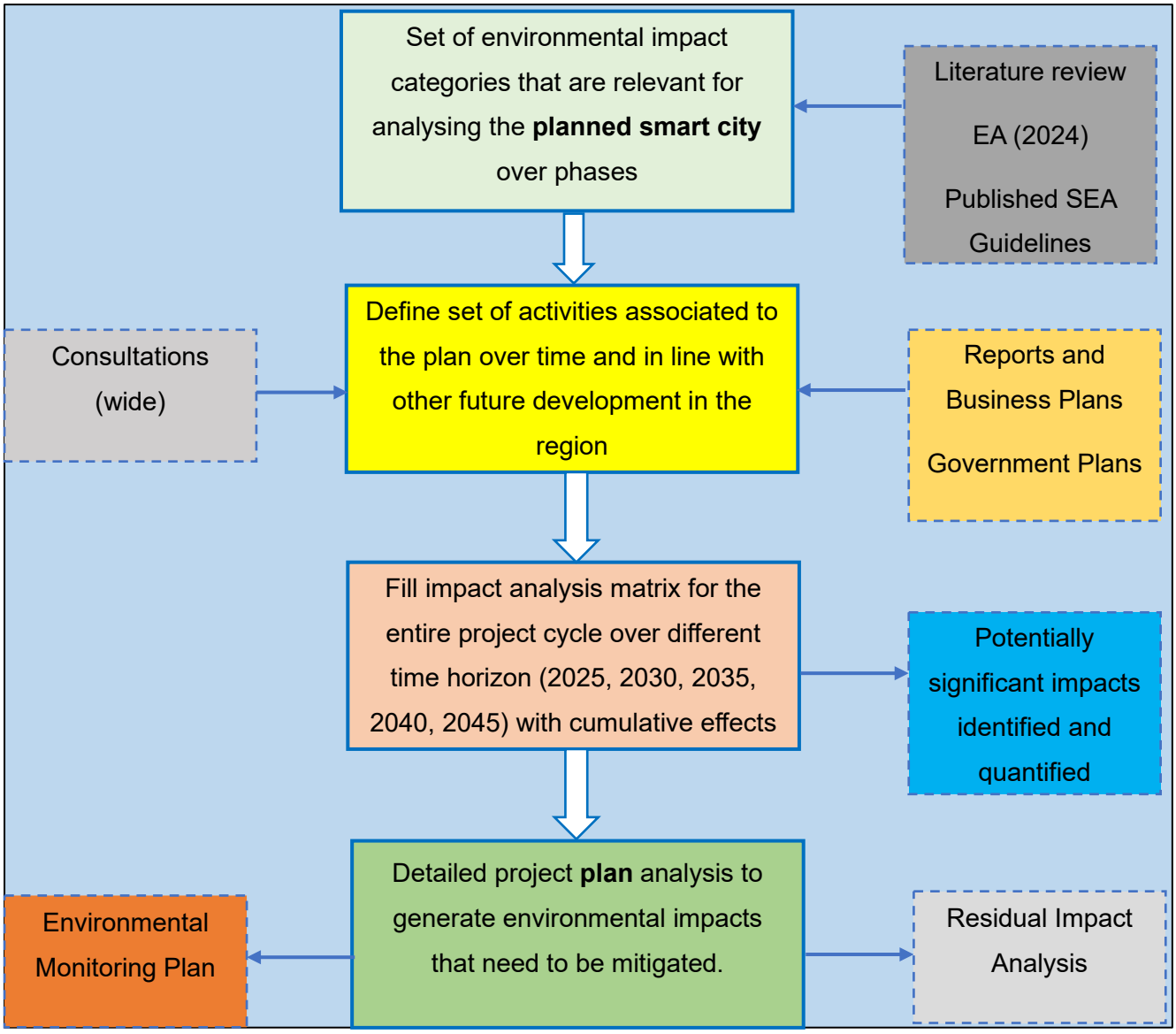


Figure 48: Methodological Framework for the Preparation of SEA

For the smart city development, the methodological framework of the Strategic Environmental Assessment (SEA) begins with **screening**; identifying whether the smart city plan, policy, or programme requires a SEA based on national regulations and the scale of potential urban transformation, including land-use changes, resource demand, digital infrastructure, and socio-economic effects. The **scoping** stage defines the spatial boundaries (city footprint, peri-urban buffers, transport corridors, and utility catchments) and temporal horizon (20 years to reflect infrastructure lifecycles), while selecting key environmental and social attributes such as: air quality, noise and light pollution, urban heat islands, energy demand and renewable potential, water resources and flood risk, biodiversity and green/blue spaces, cultural heritage, community cohesion, and digital infrastructure impacts (data centres, ICT networks, e-waste). Stakeholders including municipal planners, utility providers, tech companies, transport authorities, NGOs, and community representatives are identified for consultation. Impact criteria and indicators, such as magnitude, duration, reversibility, and significance, are established for evaluation.

Baseline data collection compiles current environmental and socio-economic conditions using GIS mapping, remote sensing, and surveys. Physical data include climate, hydrology, air quality, soil, and noise; biological data cover flora, fauna, habitats, and ecosystem connectivity; socio-economic data capture population, health, housing, transport equity, and digital access. Ongoing pressures, such as urban expansion, industrial activity, and climate change, are assessed to identify vulnerabilities.

During **impact identification and prediction**, the likely effects of the proposed smart city and its alternatives are evaluated, including direct, indirect, cumulative, and synergistic impacts. Scenario comparisons include compact mixed-use versus urban sprawl, different transport modes, and energy supply mixes. Predictive tools such as air-quality modelling, carbon footprint analysis, noise modelling, and GIS-based spatial assessment help quantify impacts.

The **impact evaluation** assesses magnitude, significance, likelihood, reversibility, and cumulative effects over the different phases of the project. Particular attention is paid to air and noise pollution, flood risk, energy demand, ecosystem fragmentation, and digital infrastructure-related environmental pressures, ensuring the assessment reflects strategic and long-term consequences.

Mitigation and enhancement measures are developed to avoid, reduce, or compensate adverse impacts while enhancing positive outcomes. Nature-based solutions such as urban forests, green roofs, permeable surfaces, and water-sensitive urban design are integrated. Circular economy practices for construction materials and e-waste are promoted. Low-carbon

mobility and resilient utilities including renewable microgrids, smart water systems, and decentralized energy are prioritized.

Reporting consolidates findings into the SEA report with visual tools such as maps, dashboards, and impact matrices. It includes methodology, baseline conditions, predicted impacts, mitigation strategies, scenario comparisons, and a justification of the preferred alternative. **Consultation and participation** are conducted using both in-person and digital platforms to engage diverse stakeholders, including marginalized communities, ensuring inclusivity and transparency.

In the **decision and integration stage**, SEA findings inform zoning, transport, energy, and ICT strategies, embedding environmental safeguards into the smart city master plan. Finally, a **monitoring and adaptive management program** tracks key indicators like air quality, greenhouse gas emissions, urban heat intensity, renewable energy share, biodiversity health, and digital equity using IoT sensors and open-data platforms, allowing for plan adjustments if thresholds are exceeded.

This approach ensures that the smart city development is environmentally sustainable, socially inclusive, digitally responsible, and resilient to future climate and socio-economic challenges.

13.0 Potential Impacts, Mitigation Measures and Residual Impacts

13.1 Environmental Impact Scoring Matrix

An environmental impact scoring matrix was developed to assess the environmental impacts associated with various activities during the various time horizons (T_0, T_5, T_{10}, T_{15}, T_{20}) and different phases of the smart city project. A set of six standard evaluation criteria was defined, namely: magnitude, duration, scale, reversibility, commitment of resources, and probability. Each of these criteria was assigned a score on a scale from 0 to 5, where 0 represents no impact and 5 represents the highest level of impact (e.g., very high magnitude, permanent duration, irreversible, or definite probability). For each time horizon, the project activity was defined, and for each project activity, the impacts were assessed against the six criteria. The individual scores were combined into a composite value scaled to a range of 0 to 100. This provides a quantitative measure of the overall significance of each impact. The matrix also presents scores for both the “before mitigation” and “after mitigation” scenarios, allowing the effectiveness of proposed control measures to be demonstrated by showing reduced impact levels. Based on the final scores, impacts are classified into qualitative categories such as Low, Moderate, or High, and residual impacts are described accordingly. Impacts with significance greater than 67 are classified as high. Those with significance between 33 and 67 are deemed moderate, and those with significance less than 33 are considered low. The environmental impact score matrix for time horizons T_0, T_5, T_{10}, T_{15} and T_{20} are provided in **Table 8**, **Table 9**, **Table 10**, **Table 11** and **Table 12** respectively.

T_0: Site Clearing & Infrastructure and Construction Works

T_5: Infrastructure and Construction Works & Operation Phase 1

T_{10}: Infrastructure and Construction Works & Operation Phase 1 & 2

T_{15}: Infrastructure and Construction Works & Operation Phase 1 & 2

T_{20}: Operation Phase 1 & 2

13.1.1 T_0 – Site Clearing & Infrastructure and Construction Works

Table 8: Environmental Impact Score Matrix for Time Horizon T_0

	Activities	Potential Environmental Impacts	Environmental Significance before Mitigation									Recommended Mitigation Measures	Environmental Significance after Mitigation									Residual Impact
			Magnitude [0 to 5]	Duration [0 to 5]	Scale [0 to 5]	Reversibility [0 to 5]	Commitment of Resources [0 to 5]	Probability [0 to 5]	Scaled Score [0 to 100]	Status [-ve, +ve, Direct, Indirect, Cumulative]	Significance		Magnitude [0 to 5]	Duration [0 to 5]	Scale [0 to 5]	Reversibility [0 to 5]	Commitment of Resources [0 to 5]	Probability [0 to 5]	Score [0 to 100]	Status [-ve, +ve, Direct, Indirect, Cumulative]	Significance	
Changes in Land Use: Site Clearing																						
1	Site Clearing	Habitat Loss (Biodiversity)	4	5	2	5	4	5	80	-ve, Direct	High	Preservation of mature and important trees.	3	4	2	3	3	3	45	-ve, Direct	Moderate	Partial loss of habitat (biodiversity)
2		Soil Erosion	4	5	3	5	4	5	84	-ve, Direct	High	Creation of green spaces and parks.	3	4	3	3	3	2	25.6	-ve, Direct	Low	Minimal soil erosion
3		Water Cycle Disruption	4	5	4	3	4	4	64	-ve, Indirect	High	Proper management of water resources Reforestation to enhance better water cycle	2	3	4	2	2	2	26	-ve, Indirect	Low	Minimal disruption in rainwater patterns
4		Increased Carbon Emissions	4	3	2	5	4	5	72	-ve, Indirect	High	Use of energy-efficient equipment and machinery. Regular maintenance of vehicles, equipment and machinery.	3	3	2	3	3	3	42	-ve, Indirect	Moderate	Reduced carbon emissions
6		Air Quality (Dust, Vehicular)	5	3	2	5	4	5	76	-ve, Direct	High	Heavy vehicle wheel washing station. Water spraying on the soil during dry weather conditions.	3	3	2	3	3	3	42	-ve, Direct	Moderate	Reduced air pollution
7		Excessive Noise and Vibration	5	3	2	5	4	5	76	-ve, Direct	High	Noise monitoring to ensure noise levels are within permissible limits. Ear protection equipment provided to workers. Use of noise reduction technologies and practices.	3	3	2	2	3	2	26	-ve, Direct	Low	Minimal noise nuisance
8		Impact on Waterways	5	5	3	5	4	5	88	-ve, Indirect	High	Preservation of existing natural drainage pathways	3	3	3	3	3	3	45	-ve, Indirect	Moderate	Minimal damage to existing natural waterpaths
9		Traffic Congestion	5	3	2	4	4	5	72	-ve, Direct	High	Vehicular movement limited during off-peak hours. Road signage and flag persons will be employed for warning.	3	3	2	2	5	2	30	-ve, Direct	Low	Reduced traffic congestion
10		Waste Generation	5	3	1	4	5	5	72	-ve, Direct	High	Implementation of a waste haulage plan	4	3	1	3	3	3	42	-ve, Direct	Moderate	Additional stress on landfill

Table 8: Environmental Impact Score Matrix for Time Horizon T_0 (Cont'd)

	Activities	Potential Environmental Impacts	Environmental Significance before Mitigation									Recommended Mitigation Measures	Environmental Significance after Mitigation									Residual Impact
			Magnitude [0 to 5]	Duration [0 to 5]	Scale [0 to 5]	Reversibility [0 to 5]	Commitment of Resources [0 to 5]	Probability [0 to 5]	Scaled Score [0 to 100]	Status [-ve, +ve, Direct, Indirect, Cumulative]	Significance		Magnitude [0 to 5]	Duration [0 to 5]	Scale [0 to 5]	Reversibility [0 to 5]	Commitment of Resources [0 to 5]	Probability [0 to 5]	Scaled Score [0 to 100]	Status [-ve, +ve, Direct, Indirect, Cumulative]	Significance	
11	Site Clearing	Domestic Wastewater Generation	4	3	2	5	3	4	54	-ve, Direct	Moderate	Temporary toilet facilities for workers	3	3	2	2	3	2	26	-ve, Direct	Low	No contamination of soil and watercourses due to improper disposal of wastewater
12		Domestic Solid Waste Generation	4	3	2	5	3	4	54	-ve, Direct	Moderate	Bins placed at key locations for domestic solid wastes	3	3	2	2	3	2	26	-ve, Direct	Low	Proper handling and disposal of solid wastes
13		Spills of Chemicals and Oils	4	3	1	5	4	3	41	-ve, Direct	Moderate	Implementation of a chemicals management plan. Prohibition of maintenance of vehicles and machines on site.	3	3	1	3	3	2	26	-ve, Direct	Low	Low probability of chemical spills and oil leakages. No contamination of soil and waterways.
14		Climate change and natural hazards	4	4	4	4	4	4	64	-ve, cumulative	High	Proper solid waste management Proper wastewater management Implementation of dust management plan Implementation of a proper and effective drainage system	3	4	4	2	2	2	30	-ve, Cumulative	Low	Less significant impacts on climate change
15		Socio-economic and socio-cultural	5	4	4	3	4	5	80	+ve, Direct	High								0		Low	
16		Visual impacts	4	4	1	4	4	5	68	-ve, Direct	High	Hoardings will be placed around construction site	2	4	1	2	2	2	22	-ve, Direct	Low	No significant visual impacts
Start of Construction																						
17	Infrastructure & Construction Works	Air Pollution and Dust	5	4	3	3	4	5	76	-ve, Cumulative	High	Implementation of a dust management plan Use of energy efficient equipment and machineries	2	4	3	2	2	2	26	-ve Cumulative	Low	Reduced air pollution
18		Noise and Vibration	5	3	2	5	4	5	76	-ve, Cumulative	High	Noise monitoring to ensure noise levels are within permissible limits. Restricted working hours (during daytime only)	3	3	2	2	3	2	26	-ve Cumulative	Low	Minimal noise nuisance
19		Soil Erosion	5	5	3	5	4	5	88	-ve, Direct	High	Implementation of erosion control measures Proper stormwater management	3	4	3	3	3	2	32	-ve direct	Low	Minimal soil erosion

Table 8: Environmental Impact Score Matrix for Time Horizon T_0 (Cont'd)

Activities		Potential Environmental Impacts	Environmental Significance before Mitigation									Recommended Mitigation Measures	Environmental Significance after Mitigation									Residual Impact
			Magnitude [0 to 5]	Duration [0 to 5]	Scale [0 to 5]	Reversibility [0 to 5]	Commitment of Resources [0 to 5]	Probability [0 to 5]	Scaled Score [0 to 100]	Status [-ve, +ve, Direct, Indirect, Cumulative]	Significance		Magnitude [0 to 5]	Duration [0 to 5]	Scale [0 to 5]	Reversibility [0 to 5]	Commitment of Resources [0 to 5]	Probability [0 to 5]	Scaled Score [0 to 100]	Status [-ve, +ve, Direct, Indirect, Cumulative]	Significance	
20	Infrastructure & Construction Works	Pollution of Watercourses	5	5	3	5	4	5	88	-ve, Indirect	High	Setback between river and site boundary will be respected Preservation of natural drainage pathways Regular inspection of watercourses	3	3	3	3	3	3	45	-ve, Indirect	Moderate	Minimal damage to exisiting natural waterpaths
21		Traffic Impacts	5	3	2	4	4	5	72	-ve, Direct	High	Implementation of a traffic management plan New Road networks will be constructed	4	4	2	2	5	2	34	-ve, Direct	Moderate	Reduced traffic congestion
22		Transmission of Infectious Disease	4	4	2	3	4	3	41	-ve, Direct	Moderate	Worker health screening will be done on a regular basis	2	4	2	2	3	2	26	-ve, Direct	Low	Less risk of disease contamination
23		Domestic Wastewater Generation	5	4	2	5	4	4	64	-ve, Direct	High	Temporary toilet facilities for workers Emptying of septic tanks by registered wastewater carriers	3	3	2	2	3	2	26	-ve, Direct	Low	No contamination due to improper disposal of wastewater
24		Domestic Solid Waste Generation	5	4	2	5	4	4	64	-ve, Direct	High	Bins placed at key locations for domestic solid wastes Waste segregation will be done Reuse and recycling will be encouraged	3	3	2	2	3	2	26	-ve, Direct	Low	Proper handling and disposal of solid wastes
25		Construction Waste Generation	4	4	2	4	4	4	58	-ve, Direct	Moderate	A construction waste management plan including sorting and recycling will be implemented	3	4	2	2	2	2	26	-ve, Direct	Low	Proper management of construction waste
26		Spills of Chemicals and Oils	4	3	1	5	4	3	41	-ve, Direct	Moderate	Implementation of a chemicals management plan. Prohibition of maintenance of vehicles and machines on site.	3	3	1	3	3	2	26	-ve, Direct	Low	Low probability of chemical spills and oil leakages. No contamination of soil and waterways.
27		Socio-economic and socio-cultural	5	4	4	3	4	5	80	-ve, Direct	High	Job opportunities for locals Creation of indirect jobs Community engagement	3	4	4	2	3	2	32		Low	Support of local knowledge and experience Community involvement
28		Visual impacts	4	4	1	4	4	5	68	-ve, Direct	High	Hoardings will be placed around construction site	2	4	1	2	2	2	22	-ve, Direct	Low	No significant visual impacts

13.1.2 T_5 – Infrastructure and Construction Works & Operation Phase 1

Table 9: Environmental Impact Score Matrix for Time Horizon T_5

	Activities	Potential Environmental Impacts	Environmental Significance before Mitigation									Recommended Mitigation Measures	Environmental Significance after Mitigation									Residual Impact
			Magnitude [0 to 5]	Duration [0 to 5]	Scale [0 to 5]	Reversibility [0 to 5]	Commitment of Resources [0 to 5]	Probability [0 to 5]	Scaled Score [0 to 100]	Status [-ve, +ve, Direct, Indirect, Cumulative]	Significance		Magnitude [0 to 5]	Duration [0 to 5]	Scale [0 to 5]	Reversibility [0 to 5]	Commitment of Resources [0 to 5]	Probability [0 to 5]	Score [0 to 100]	Status [-ve, +ve, Direct, Indirect, Cumulative]	Significance	•
Construction Phase																						
1	Infrastructure and Construction Works	Air Pollution and Dust	5	4	3	3	4	5	76	-ve, Cumulative	High	Implementation of a dust management plan Use of energy efficient equipment and machineries	2	4	3	2	2	2	26	-ve Cumulative	Low	Reduced air pollution
2		Noise and Vibration	5	3	2	5	4	5	76	-ve, Cumulative	High	Noise monitoring to ensure noise levels are within permissible limits. Restricted working hours (during daytime only)	3	3	2	2	3	2	26	-ve Cumulative	Low	Minimal noise nuisance
3		Soil Erosion	5	5	3	5	4	5	88	-ve, Direct	High	Implementation of erosion control measures Proper stormwater management	3	4	3	3	3	2	32	-ve direct	Low	Minimal soil erosion
4		Pollution of Watercourses	5	5	3	5	4	5	88	-ve, Indirect	High	Setback between river and site boundary will be respected Preservation of natural drainage pathways Regular inspection of watercourses	3	3	3	3	3	3	45	-ve, Indirect	Moderate	Minimal damage to exisiting natural waterpaths
6		Traffic Impacts	5	3	2	4	4	5	72	-ve, Direct	High	Implementation of a traffic management plan New road networks will be constructed	4	4	2	2	5	2	34	-ve, Direct	Moderate	Reduced traffic congestion
7		Transmission of Infectious Disease	4	4	2	3	4	3	41	-ve, Direct	Moderate	Worker health screening will be done on a regular basis	2	4	2	2	3	2	26	-ve, Direct	Low	Less risk of disease contamination

Table 9: Environmental Impact Score Matrix for Time Horizon T_5 (Cont'd)

Activities		Potential Environmental Impacts	Environmental Significance before Mitigation									Recommended Mitigation Measures	Environmental Significance after Mitigation									Residual Impact
			Magnitude [0 to 5]	Duration [0 to 5]	Scale [0 to 5]	Reversibility [0 to 5]	Commitment of Resources [0 to 5]	Probability [0 to 5]	Scaled Score [0 to 100]	Status [-ve, +ve, Direct, Indirect, Cumulative]	Significance		Magnitude [0 to 5]	Duration [0 to 5]	Scale [0 to 5]	Reversibility [0 to 5]	Commitment of Resources [0 to 5]	Probability [0 to 5]	Scaled Score [0 to 100]	Status [-ve, +ve, Direct, Indirect, Cumulative]	Significance	
8	Infrastructure & Construction Works	Domestic Wastewater Generation	5	4	2	5	4	4	64	-ve, Direct	High	Temporary toilet facilities for workers Emptying of septic tanks by registered wastewater carriers	3	3	2	2	3	2	26	-ve, Direct	Low	No contamination due to improper disposal of wastewater
9		Domestic Solid Waste Generation	5	4	2	5	4	4	64	-ve, Direct	High	Bins placed at key locations for domestic solid wastes Waste segregation will be done Reuse and recycling will be encouraged	3	3	2	2	3	2	26	-ve, Direct	Low	Proper handling and disposal of solid wastes
10		Construction Waste Generation	4	4	2	4	4	4	58	-ve, Direct	Moderate	A construction waste management plan including sorting and recycling will be implemented	3	4	2	2	2	2	26	-ve, Direct	Low	Proper management of construction waste
11		Spills of Chemicals and Oils	4	3	1	5	4	3	41	-ve, Direct	Moderate	Implementation of a chemicals management plan. Prohibition of maintenance of vehicles and machines on site.	3	3	1	3	3	2	26	-ve, Direct	Low	Low probability of chemical spills and oil leakages. No contamination of soil and waterways.
12		Socio-economic and socio-cultural	5	4	4	3	4	5	80	+ve, Direct	High	Job opportunities for locals Creation of indirect jobs Community engagement	3	4	4	2	3	2	32		Low	Support of local knowledge and experience Community involvement
13		Visual impacts	4	4	1	4	4	5	68	-ve, Direct	High	Hoardings will be placed around construction site	2	4	1	2	2	2	22	-ve, Direct	Low	No significant visual impacts

Table 9: Environmental Impact Score Matrix for Time Horizon T_5 (Cont'd)

	Activities	Potential Environmental Impacts	Environmental Significance before Mitigation									Recommended Mitigation Measures	Environmental Significance after Mitigation									Residual Impact
			Magnitude [0 to 5]	Duration [0 to 5]	Scale [0 to 5]	Reversibility [0 to 5]	Commitment of Resources [0 to 5]	Probability [0 to 5]	Scaled Score [0 to 100]	Status [-ve, +ve, Direct, Indirect, Cumulative]	Significance		Magnitude [0 to 5]	Duration [0 to 5]	Scale [0 to 5]	Reversibility [0 to 5]	Commitment of Resources [0 to 5]	Probability [0 to 5]	Scaled Score [0 to 100]	Status [-ve, +ve, Direct, Indirect, Cumulative]	Significance	
Operation Phase																						
14	Phase 1	Energy Consumption	3	4	4	3	3	5	68	-ve, Direct	High	Tapping off of electricity from Existing Spare Capacity. Upgrading FUEL CEB GIS Station. Implementation of a Smart Metering System. Setting up of PV Systems and energy storage system	2	4	4	2	3	3	45	-ve, Direct	Moderate	Less dependency on national grid by ensuring self suffiency
15		Water Consumption	3	4	4	3	3	5	68	-ve, Direct	High	New borehole at Beau Bois, next to existing boreholes BH1449 & BH729 Increase in water storage capacity Implementation of a Centralised Water Storage and Smart Metering System	2	4	4	2	3	3	45	-ve, Direct	Moderate	Reduced dependency of CWA supply. Controlled usage of water.
16		Solid Waste Generation	3	4	3	3	3	5	64	-ve, Indirect	High	Segregation of waste at source. Use of Molok Waste Containers & Biobin Digesters	2	2	3	2	2	2	22	-ve, Indirect	Low	General cleanliness will be observed. No littering. Recycling of wastes and composting.
17		Wastewater Generation	3	4	3	3	3	5	64	-ve, Indirect	High	Implementation of onsite STPs. Use of treated effluent for irrigation of green spaces. Excess treated effluent to absorption pits.	2	3	3	2	1	2	22	-ve, Indirect	Low	Ensuring proper wastewater management.

Table 9: Environmental Impact Score Matrix for Time Horizon T_5 (Cont'd)

Activities		Potential Environmental Impacts	Environmental Significance before Mitigation									Recommended Mitigation Measures	Environmental Significance after Mitigation									Residual Impact
			Magnitude [0 to 5]	Duration [0 to 5]	Scale [0 to 5]	Reversibility [0 to 5]	Commitment of Resources [0 to 5]	Probability [0 to 5]	Scaled Score [0 to 100]	Status [-ve, +ve, Direct, Indirect, Cumulative]	Significance		Magnitude [0 to 5]	Duration [0 to 5]	Scale [0 to 5]	Reversibility [0 to 5]	Commitment of Resources [0 to 5]	Probability [0 to 5]	Scaled Score [0 to 100]	Status [-ve, +ve, Direct, Indirect, Cumulative]	Significance	
19	Phase 1	Visual impacts	3	5	3	4	3	5	72	-ve, Direct	High	Colours and materials that blend with the natural surroundings will be used. Preservation of existing trees, ridgelines, and scenic vistas. Creation of urban green belts, pocket parks, landscape pathways, sustainable drainage systems and rooftop gardens	2	5	3	2	3	3	45	-ve, Direct	Moderate	No significant visual impacts
18		Traffic Congestion	4	5	3	3	4	4	61	-ve, Direct	High	New Road Networks, Improvement of Existing Junctions, 5 Roundabouts, Dual Carriageways.	3	5	3	2	4	2	34	-ve, Direct	Moderate	Reduction in traffic congestion
20		Socio-economic and cultural environment	5	4	4	3	4	5	80	-ve, Direct	High	Job opportunities for locals Creation of indirect jobs Community engagement	3	4	4	2	3	2	32		Low	Support of local knowledge and experience Community involvement

13.1.3 T_{10} – Infrastructure and Construction Works & Operation Phases 1 & 2

Table 10: Environmental Impact Score Matrix for Time Horizon T_{10}

	Activities	Potential Environmental Impacts	Environmental Significance before Mitigation									Recommended Mitigation Measures	Environmental Significance after Mitigation									Residual Impact
			Magnitude [0 to 5]	Duration [0 to 5]	Scale [0 to 5]	Reversibility [0 to 5]	Commitment of Resources [0 to 5]	Probability [0 to 5]	Scaled Score [0 to 100]	Status [-ve, +ve, Direct, Indirect, Cumulative]	Significance		Magnitude [0 to 5]	Duration [0 to 5]	Scale [0 to 5]	Reversibility [0 to 5]	Commitment of Resources [0 to 5]	Probability [0 to 5]	Score [0 to 100]	Status [-ve, +ve, Direct, Indirect, Cumulative]	Significance	
Construction Phase																						
1	Infrastructure and Construction Works	Air Pollution and Dust	5	4	3	4	4	5	80	-ve, Cumulative	High	Implementation of a dust management plan Use of energy efficient equipment and machineries	2	4	3	2	2	2	26	-ve Cumulative	Low	Reduced air pollution
2		Noise and Vibration	5	4	3	5	4	5	84	-ve, Cumulative	High	Noise monitoring to ensure noise levels are within permissible limits. Restricted working hours (during daytime only)	3	3	2	2	3	2	26	-ve Cumulative	Low	Minimal noise nuisance
3		Soil Erosion	5	5	3	5	4	5	88	-ve, Direct	High	Implementation of erosion control measures Proper stormwater management	3	4	3	3	3	2	32	-ve direct	Low	Minimal soil erosion
4		Pollution of Watercourses	5	5	3	5	4	5	88	-ve, Indirect	High	Setback between river and site boundary will be respected Preservation of natural drainage pathways Regular inspection of watercourses	3	3	3	3	3	3	45	-ve, Indirect	Moderate	Minimal damage to exisiting natural waterpaths
6		Traffic Impacts	5	4	3	4	4	5	80	-ve, Direct	High	Implementation of a traffic management plan New road networks will be constructed	4	4	2	2	5	2	34	-ve, Direct	Moderate	Reduced traffic congestion
7		Transmission of Infectious Disease	4	4	3	4	4	3	46	-ve, Direct	Moderate	Worker health screening will be done on a regular basis	2	4	2	2	3	2	26	-ve, Direct	Low	Less risk of disease contamination

Table 10: Environmental Impact Score Matrix for Time Horizon T_{10} (Cont'd)

	Activities	Potential Environmental Impacts	Environmental Significance before Mitigation									Recommended Mitigation Measures	Environmental Significance after Mitigation									Residual Impact
			Magnitude [0 to 5]	Duration [0 to 5]	Scale [0 to 5]	Reversibility [0 to 5]	Commitment of Resources [0 to 5]	Probability [0 to 5]	Scaled Score [0 to 100]	Status [-ve, +ve, Direct, Indirect, Cumulative]	Significance		Magnitude [0 to 5]	Duration [0 to 5]	Scale [0 to 5]	Reversibility [0 to 5]	Commitment of Resources [0 to 5]	Probability [0 to 5]	Scaled Score [0 to 100]	Status [-ve, +ve, Direct, Indirect, Cumulative]	Significance	
8	Infrastructure & Construction Works	Domestic Wastewater Generation	5	4	3	5	4	4	67	-ve, Direct	High	Temporary toilet facilities for workers Emptying of septic tanks by registered wastewater carriers	3	3	2	2	3	2	26	-ve, Direct	Low	No contamination due to improper disposal of wastewater
9		Domestic Solid Waste Generation	5	4	3	5	4	4	67	-ve, Direct	High	Bins placed at key locations for domestic solid wastes Waste segregation will be done Reuse and recycling will be encouraged	3	3	2	2	3	2	26	-ve, Direct	Low	Proper handling and disposal of solid wastes
10		Construction Waste Generation	5	4	3	4	4	4	64	-ve, Direct	High	A construction waste management plan including sorting and recycling will be implemented	3	4	2	2	2	2	26	-ve, Direct	Low	Proper management of construction waste
11		Spills of Chemicals and Oils	5	4	2	5	4	4	64	-ve, Direct	High	Implementation of a chemicals management plan. Prohibition of maintenance of vehicles and machines on site.	3	3	1	3	3	2	26	-ve, Direct	Low	Low probability of chemical spills and oil leakages. No contamination of soil and waterways.
12		Socio-economic and socio-cultural	5	4	4	3	4	5	80	+ve, Direct	High	Job opportunities for locals Creation of indirect jobs Community engagement	3	4	4	2	3	2	32		Low	Support of local knowledge and experience Community involvement
13		Visual impacts	5	4	2	4	4	5	76	-ve, Direct	High	Hoardings will be placed around construction site	2	4	1	2	2	2	22	-ve, Direct	Low	No significant visual impacts

Table 10: Environmental Impact Score Matrix for Time Horizon T_{10} (Cont'd)

	Activities	Potential Environmental Impacts	Environmental Significance before Mitigation									Recommended Mitigation Measures	Environmental Significance after Mitigation									Residual Impact
			Magnitude [0 to 5]	Duration [0 to 5]	Scale [0 to 5]	Reversibility [0 to 5]	Commitment of Resources [0 to 5]	Probability [0 to 5]	Scaled Score [0 to 100]	Status [-ve, +ve, Direct, Indirect, Cumulative]	Significance		Magnitude [0 to 5]	Duration [0 to 5]	Scale [0 to 5]	Reversibility [0 to 5]	Commitment of Resources [0 to 5]	Probability [0 to 5]	Scaled Score [0 to 100]	Status [-ve, +ve, Direct, Indirect, Cumulative]	Significance	
Operation Phase																						
14	Phase 1 & 2	Energy Consumption	4	4	4	3	4	5	76	-ve, Direct	High	Tapping off of electricity from Existing Spare Capacity. Upgrading FUEL CEB GIS Station. Implementation of a Smart Metering System. Setting up of PV Systems and energy storage system	2	4	4	2	3	3	45	-ve, Direct	Moderate	Less dependency on national grid by ensuring self suffiency
15		Water Consumption	4	4	4	3	4	5	76	-ve, Direct	High	New borehole at Beau Bois, next to existing boreholes BH1449 & BH729 Increase in water storage capacity Implementation of a Centralised Water Storage and Smart Metering System	2	4	4	2	3	3	45	-ve, Direct	Moderate	Reduced dependency of CWA supply. Controlled usage of water.
16		Solid Waste Generation	4	4	3	3	4	5	72	-ve, Indirect	High	Segregation of waste at source. Use of Molok Waste Containers & Biobon Digesters	2	2	3	2	2	2	22	-ve, Indirect	Low	General cleanliness will be observed. No littering. Recycling of wastes and composting.
17		Wastewater Generation	4	4	3	3	4	5	72	-ve, Indirect	High	Implementation of onsite STPs. Use of treated effluent for irrigation of green spaces. Excess treated effluent to absorption pits.	2	3	3	2	1	2	22	-ve, Indirect	Low	Ensuring proper wastewater management.
18		Traffic Congestion	4	5	3	3	4	4	61	-ve, Direct	High	New Road Networks, Improvement of Existing Junctions, 5 Roundabouts, Dual Carriageways.	3	5	3	2	4	2	34	-ve, Direct	Moderate	Reduction in traffic congestion

Table 10: Environmental Impact Score Matrix for Time Horizon T_{10} (Cont'd)

	Activities	Potential Environmental Impacts	Environmental Significance before Mitigation									Recommended Mitigation Measures	Environmental Significance after Mitigation									Residual Impact
			Magnitude [0 to 5]	Duration [0 to 5]	Scale [0 to 5]	Reversibility [0 to 5]	Commitment of Resources [0 to 5]	Probability [0 to 5]	Scaled Score [0 to 100]	Status [-ve, +ve, Direct, Indirect, Cumulative]	Significance		Magnitude [0 to 5]	Duration [0 to 5]	Scale [0 to 5]	Reversibility [0 to 5]	Commitment of Resources [0 to 5]	Probability [0 to 5]	Scaled Score [0 to 100]	Status [-ve, +ve, Direct, Indirect, Cumulative]	Significance	
19	Phase 1 & 2	Visual impacts	4	5	3	4	3	5	76	-ve, Direct	High	Colours and materials that blend with the natural surroundings will be used. Preservation of existing trees, ridgelines, and scenic vistas. Creation of urban green belts, pocket parks, landscape pathways, sustainable drainage systems and rooftop gardens	2	5	3	2	3	3	45	-ve, Direct	Moderate	No significant visual impacts
20		Socio-economic and cultural environment	5	4	4	3	4	5	80	ive, Direct	High	Job opportunities for locals Creation of indirect jobs Community engagement	3	4	4	2	3	2	32		Low	Support of local knowledge and experience Community involvement

13.1.4 T_{15} – Infrastructure and Construction Works & Operation Phase 1 & 2

Table 11: Environmental Impact Score Matrix for Time Horizon T_{15}

	Activities	Potential Environmental Impacts	Environmental Significance before Mitigation									Recommended Mitigation Measures	Environmental Significance after Mitigation									Residual Impact
			Magnitude [0 to 5]	Duration [0 to 5]	Scale [0 to 5]	Reversibility [0 to 5]	Commitment of Resources [0 to 5]	Probability [0 to 5]	Scaled Score [0 to 100]	Status [-ve, +ve, Direct, Indirect, Cumulative]	Significance		Magnitude [0 to 5]	Duration [0 to 5]	Scale [0 to 5]	Reversibility [0 to 5]	Commitment of Resources [0 to 5]	Probability [0 to 5]	Score [0 to 100]	Status [-ve, +ve, Direct, Indirect, Cumulative]	Significance	
Construction Phase																						
1	Infrastructure and Construction Works	Air Pollution and Dust	4	3	3	3	4	5	68	-ve, Cumulative	High	Implementation of a dust management plan Use of energy efficient equipment and machineries	2	4	3	2	2	2	26	-ve Cumulative	Low	Reduced air pollution
2		Noise and Vibration	4	4	3	5	3	4	61	-ve, Cumulative	High	Noise monitoring to ensure noise levels are within permissible limits. Restricted working hours (during daytime only)	3	3	2	2	3	2	26	-ve Cumulative	Low	Minimal noise nuisance
3		Soil Erosion	4	5	3	5	3	4	64	-ve, Direct	High	Implementation of erosion control measures Proper stormwater management	3	4	3	3	3	2	32	-ve direct	Low	Minimal soil erosion
4		Pollution of Watercourses	4	5	3	5	3	4	64	-ve, Indirect	High	Setback between river and site boundary will be respected Preservation of natural drainage pathways Regular inspection of watercourses	3	3	3	3	3	3	45	-ve, Indirect	Moderate	Minimal damage to exisiting natural waterpaths
6		Traffic Impacts	4	4	3	4	3	5	72	-ve, Direct	High	Implementation of a traffic management plan New road networks will be constructed	3	3	2	2	5	2	30	-ve, Direct	Low	Reduced traffic congestion
7		Transmission of Infectious Disease	4	4	3	4	4	3	46	-ve, Direct	Moderate	Worker health screening will be done on a regular basis	2	4	2	2	3	2	26	-ve, Direct	Low	Less risk of disease contamination

Table 11: Environmental Impact Score Matrix for Time Horizon T_{15} (Cont'd)

	Activities	Potential Environmental Impacts	Environmental Significance before Mitigation									Recommended Mitigation Measures	Environmental Significance after Mitigation									Residual Impact
			Magnitude [0 to 5]	Duration [0 to 5]	Scale [0 to 5]	Reversibility [0 to 5]	Commitment of Resources [0 to 5]	Probability [0 to 5]	Scaled Score [0 to 100]	Status [-ve, +ve, Direct, Indirect, Cumulative]	Significance		Magnitude [0 to 5]	Duration [0 to 5]	Scale [0 to 5]	Reversibility [0 to 5]	Commitment of Resources [0 to 5]	Probability [0 to 5]	Scaled Score [0 to 100]	Status [-ve, +ve, Direct, Indirect, Cumulative]	Significance	
8	Infrastructure & Construction Works	Domestic Wastewater Generation	4	4	3	5	3	4	61	-ve, Direct	High	Temporary toilet facilities for workers Emptying of septic tanks by registered wastewater carriers	3	3	2	2	3	2	26	-ve, Direct	Low	No contamination due to improper disposal of wastewater
9		Domestic Solid Waste Generation	4	4	3	5	3	4	61	-ve, Direct	High	Bins placed at key locations for domestic solid wastes Waste segregation will be done Reuse and recycling will be encouraged	3	3	2	2	3	2	26	-ve, Direct	Low	Proper handling and disposal of solid wastes
10		Construction Waste Generation	3	4	3	4	3	4	54	-ve, Direct	Moderate	A construction waste management plan including sorting and recycling will be implemented	3	4	2	2	2	2	26	-ve, Direct	Low	Proper management of construction waste
11		Spills of Chemicals and Oils	3	4	2	5	3	3	41	-ve, Direct	Moderate	Implementation of a chemicals management plan. Prohibition of maintenance of vehicles and machines on site.	3	3	1	3	3	2	26	-ve, Direct	Low	Low probability of chemical spills and oil leakages. No contamination of soil and waterways.
12		Socio-economic and socio-cultural	5	4	4	3	4	5	80	+ve, Direct	High	Job opportunities for locals Creation of indirect jobs Community engagement	3	4	4	2	3	2	32		Low	Support of local knowledge and experience Community involvement
13		Visual impacts	3	3	2	4	3	3	36	-ve, Direct	Moderate	Hoardings will be placed around construction site	2	4	1	2	2	2	22	-ve, Direct	Low	No significant visual impacts

Table 11: Environmental Impact Score Matrix for Time Horizon T_{15} (Cont'd)

	Activities	Potential Environmental Impacts	Environmental Significance before Mitigation									Recommended Mitigation Measures	Environmental Significance after Mitigation									Residual Impact
			Magnitude [0 to 5]	Duration [0 to 5]	Scale [0 to 5]	Reversibility [0 to 5]	Commitment of Resources [0 to 5]	Probability [0 to 5]	Scaled Score [0 to 100]	Status [-ve, +ve, Direct, Indirect, Cumulative]	Significance		Magnitude [0 to 5]	Duration [0 to 5]	Scale [0 to 5]	Reversibility [0 to 5]	Commitment of Resources [0 to 5]	Probability [0 to 5]	Scaled Score [0 to 100]	Status [-ve, +ve, Direct, Indirect, Cumulative]	Significance	
Operation Phase																						
14	Phase 1 & 2	Energy Consumption	5	5	4	3	4	5	84	-ve, Direct	High	Tapping off of electricity from Existing Spare Capacity. Upgrading FUEL CEB GIS Station. Implementation of a Smart Metering System. Setting up of PV Systems and energy storage system	2	4	4	2	3	3	45	-ve, Direct	Moderate	Less dependency on national grid by ensuring self suffiency
15		Water Consumption	5	5	4	3	4	5	84	-ve, Direct	High	New borehole at Beau Bois, next to existing boreholes BH1449 & BH729 Increase in water storage capacity Implementation of a Centralised Water Storage and Smart Metering System	2	4	4	2	3	3	45	-ve, Direct	Moderate	Reduced dependency of CWA supply. Controlled usage of water.
16		Solid Waste Generation	5	5	3	3	4	5	80	-ve, Indirect	High	Segregation of waste at source. Use of Molok Waste Containers & Biobon Digesters	2	2	3	2	2	2	22	-ve, Indirect	Low	General cleanliness will be observed. No littering. Recycling of wastes and composting.
17		Wastewater Generation	5	5	3	3	4	5	80	-ve, Indirect	High	Implementation of onsite STPs. Use of treated effluent for irrigation of green spaces. Excess treated effluent to absorption pits.	2	3	3	2	1	2	22	-ve, Indirect	Low	Ensuring proper wastewater management.
18		Traffic Congestion	5	5	3	3	4	4	64	-ve, Direct	High	New Road Networks, Improvement of Exiisting Junctions, 5 Roundabouts, Dual Carriageways.	3	5	3	2	4	2	34	-ve, Direct	Moderate	Reduction in traffic congestion

Table 11: Environmental Impact Score Matrix for Time Horizon T_{15} (Cont'd)

	Activities	Potential Environmental Impacts	Environmental Significance before Mitigation									Recommended Mitigation Measures	Environmental Significance after Mitigation									Residual Impact
			Magnitude [0 to 5]	Duration [0 to 5]	Scale [0 to 5]	Reversibility [0 to 5]	Commitment of Resources [0 to 5]	Probability [0 to 5]	Scaled Score [0 to 100]	Status [-ve, +ve, Direct, Indirect, Cumulative]	Significance		Magnitude [0 to 5]	Duration [0 to 5]	Scale [0 to 5]	Reversibility [0 to 5]	Commitment of Resources [0 to 5]	Probability [0 to 5]	Scaled Score [0 to 100]	Status [-ve, +ve, Direct, Indirect, Cumulative]	Significance	
19	Phase 1 & 2	Visual impacts	5	5	3	4	3	5	80	-ve, Direct	High	Colours and materials that blend with the natural surroundings will be used. Preservation of existing trees, ridgelines, and scenic vistas. Creation of urban green belts, pocket parks, landscape pathways, sustainable drainage systems and rooftop gardens	2	5	3	2	3	3	45	-ve, Direct	Moderate	No significant visual impacts
20		Socio-economic and cultural environment	5	4	4	3	4	5	80	-ve, Direct	High	Job opportunities for locals Creation of indirect jobs Community engagement	3	4	4	2	3	2	32		Low	Support of local knowledge and experience Community involvement

13.1.5 T_{20} – Operation Phase 1 & 2

Table 12: Environmental Impact Score Matrix for Time Horizon T_{20}

	Activities	Potential Environmental Impacts	Environmental Significance before Mitigation									Recommended Mitigation Measures	Environmental Significance after Mitigation									Residual Impact
			Magnitude [0 to 5]	Duration [0 to 5]	Scale [0 to 5]	Reversibility [0 to 5]	Commitment of Resources [0 to 5]	Probability [0 to 5]	Scaled Score [0 to 100]	Status [-ve, +ve, Direct, Indirect, Cumulative]	Significance		Magnitude [0 to 5]	Duration [0 to 5]	Scale [0 to 5]	Reversibility [0 to 5]	Commitment of Resources [0 to 5]	Probability [0 to 5]	Score [0 to 100]	Status [-ve, +ve, Direct, Indirect, Cumulative]	Significance	
Operation Phase																						
1	Phase 1 & 2	Energy Consumption	5	5	4	3	4	5	84	-ve, Direct	High	Tapping off of electricity from Existing Spare Capacity. Upgrading FUEL CEB GIS Station. Implementation of a Smart Metering System. Setting up of PV Systems and energy storage system	2	4	4	2	3	3	45	-ve, Direct	Moderate	Less dependency on national grid by ensuring self suffiency
2		Water Consumption	5	5	4	3	4	5	84	-ve, Direct	High	New borehole at Beau Bois, next to existing boreholes BH1449 & BH729 Increase in water storage capacity Implementation of a Centralised Water Storage and Smart Metering System	2	4	4	2	3	3	45	-ve, Direct	Moderate	Reduced dependency of CWA supply. Controlled usage of water.
3		Solid Waste Generation	5	5	3	3	4	5	80	-ve, Indirect	High	Segregation of waste at source. Use of Molok Waste Containers & Biobon Digesters	2	2	3	2	2	2	22	-ve, Indirect	Low	General cleanliness will be observed. No littering. Recycling of wastes and composting.
4		Wastewater Generation	5	5	3	3	4	5	80	-ve, Indirect	High	Implementation of onsite STPs. Use of treated effluent for irrigation of green spaces. Excess treated effluent to absorption pits.	2	3	3	2	1	2	22	-ve, Indirect	Low	Ensuring proper wastewater management.
5		Traffic Congestion	5	5	3	3	4	4	64	-ve, Direct	High	New Road Networks, Improvement of Existing Junctions, 5 Roundabouts, Dual Carriageways.	3	5	3	2	4	2	34	-ve, Direct	Moderate	Reduction in traffic congestion

Table 12: Environmental Impact Score Matrix for Time Horizon T_{20} (Cont'd)

	Activities	Potential Environmental Impacts	Environmental Significance before Mitigation									Recommended Mitigation Measures	Environmental Significance after Mitigation									Residual Impact
			Magnitude [0 to 5]	Duration [0 to 5]	Scale [0 to 5]	Reversibility [0 to 5]	Commitment of Resources [0 to 5]	Probability [0 to 5]	Scaled Score [0 to 100]	Status [-ve, +ve, Direct, Indirect, Cumulative]	Significance		Magnitude [0 to 5]	Duration [0 to 5]	Scale [0 to 5]	Reversibility [0 to 5]	Commitment of Resources [0 to 5]	Probability [0 to 5]	Scaled Score [0 to 100]	Status [-ve, +ve, Direct, Indirect, Cumulative]	Significance	
6	Phase 1 & 2	Visual impacts	5	5	3	4	3	5	80	-ve, Direct	High	Colours and materials that blend with the natural surroundings will be used. Preservation of existing trees, ridgelines, and scenic vistas. Creation of urban green belts, pocket parks, landscape pathways, sustainable drainage systems and rooftop gardens	2	5	3	2	3	3	45	-ve, Direct	Moderate	No significant visual impacts
7		Socio-economic and cultural environment	5	4	4	3	4	5	80	-ve, Direct	High	Job opportunities for locals Creation of indirect jobs Community engagement	3	4	4	2	3	2	32		Low	Support of local knowledge and experience Community involvement

13.2 Significance of Impacts and Mitigation Measures During Site Clearing

13.1.1 Habitat Loss (Biodiversity)

During the site clearing phase of the smart city development, habitat loss can be considerable, if not carefully managed. Removal of trees, shrubs, and ground cover eliminates nesting sites, food sources, and protective shelter for wildlife, while disturbing the soil destroys seed banks and the microorganisms needed for natural regeneration. Birds, reptiles, small mammals, and amphibians may be killed or forced to migrate, and those species with limited mobility are especially vulnerable. The creation of access roads and utility corridors fragments the natural areas, isolating wildlife populations and reducing genetic exchange. Noise and dust generated during site clearing can drive animals away from adjacent habitats, and the disturbed soils provide opportunities for invasive species to establish themselves.

Mitigation Measures:

An ecological survey was conducted on the proposed site for the smart city, to identify the flora and fauna species on site. 210 plant species and 7 fauna species were observed during the ecological survey. Out of the 210 plants, 5 native plants were recorded. The ecological survey concluded that no endemic or endangered species of animals were observed on the project site. All mature and important trees found on the site will be preserved and post-construction revegetation and restoration will be done using native species to further help offset unavoidable losses and maintain local biodiversity.

13.2.2 Soil Erosion

Soil erosion is a major concern during the site clearing phase because vegetation removal exposes bare soil to wind and water. When trees, shrubs, and ground cover are stripped away, the natural root systems that stabilize the soil are lost, making slopes and open areas highly susceptible to runoff during rainfall. Heavy machinery used during site clearing compacts the soil surface, reducing infiltration and increasing the speed of surface water flow, which accelerates sheet, rill, and gully erosion. Exposed soils can be carried into nearby rivers and wetlands, elevating sediment loads, clogging of drainage systems, and degrading aquatic habitats [48].

Mitigation Measures:

To minimize these impacts, phased clearing of the site will be planned, to limit the amount of exposed ground at any one time. Silt fences and sediment traps will be installed and drainage channels will be constructed. Preservation of natural vegetation buffers along waterways will also be encouraged. Prompt re-vegetation or hydroseeding of cleared areas, along with the use of mulches or erosion-control mats, will help stabilize the soil surface. During rainy

seasons, careful scheduling of earthworks will be done to reduce the risk of significant erosion and sedimentation.

13.2.3 Water Cycle Disruption

Site clearing can significantly disrupt the natural water cycle by altering how water is absorbed, stored, and released in the landscape. Removing vegetation eliminates the canopy interception and root systems that normally slow rainfall, promote infiltration, and recharge groundwater. As a result, more rainwater runs off the surface rather than soaking into the soil, reducing groundwater replenishment and lowering the local water table. Compaction of soil by heavy machinery also decreases infiltration and increases the speed and volume of stormwater runoff, which can lead to localized flooding and downstream sedimentation. Loss of wetlands, riparian zones, and other natural depressions reduces the area's capacity to store and filter water, degrading water quality and disturbing aquatic habitats [50].

Mitigation Measures:

The following actions will be taken to mitigate the impact of site clearing on water cycle disruption:

- Restoration of green buffers and vegetation.
- Preservation of natural drainage corridors.
- Implementation of low-impact development practices such as permeable pavements and rain gardens.
- Implementation of sustainable drainage systems.
- Phased clearing to limit exposed soil.
- Scheduling of earthworks outside of peak rainy seasons.

These measures help maintain infiltration, control runoff, and preserve a more balanced hydrological cycle during and after construction.

13.2.4 Increased Carbon Emission

Site clearing contributes to carbon emissions in several interconnected ways. The removal of trees, shrubs, and other vegetation releases carbon stored in plant biomass back into the atmosphere as carbon dioxide. Soil disturbance from heavy machinery and excavation exposes organic matter that oxidizes when in contact with air, releasing stored carbon. The operation of bulldozers, excavators, trucks, and other diesel-powered equipment adds direct emissions of carbon dioxide and other greenhouse gases during the clearing process. At the same time, the long-term capacity of the site to act as a carbon sink diminishes because the vegetation that once absorbed CO_2 through photosynthesis is lost.

The estimated greenhouse gas emissions from the site clearing have been calculated taking into consideration emissions from (1) plant biomass and (2) machineries. The calculations are as follows [49]:

(1) GHG Emissions from Plant Biomass

Site area = 1,505,561 m^2

Biomass of sugar cane & agricultural crops (dry) = 82.4 tons/ha

= 8.24 kg/m^2

Percentage of site covered with sugar cane & agricultural crops = 80%

Overall biomass = 8.24 x 0.80 x 1,505,561

= 9,925 kg

= 9.9 tons

Typical Carbon fraction of dry biomass = 0.45

Carbon in biomass = 0.45 x 9.925

= 4.467 tons of Carbon

CO_2 emitted = 4.467 x $\frac{44}{12}$ = **16.38 tons of CO_2**

(2) GHG Emissions from Machines

Clearing fuel = 20L of diesel/ha

Site area = 1,505,561 m^2

Site covered with sugar cane & agricultural crops = 80%

= 1,204,448.8 m^2 (120.45 ha)

Diesel emission factor = 2.68 kg CO_2/L

CO_2 emitted = 2.68 x 120.45 = **6.46 tons of CO_2**

Total GHG Emissions resulting from Clearing of Site = 16.38 + 6.46

= 22.84 tons of CO_2

Mitigation Measures:

Selective clearing of the site will be prioritized, instead of complete removal of the vegetation. Cleared timber will be reused wherever possible. Mature and important trees will be preserved on site to help conserve the soil organic matter and retain carbon stocks. Native vegetation will be planted, and the implementation of green infrastructure, such as green parks and green roofs, will gradually offset some of the unavoidable emissions over the life of the development.

13.2.5 Air Quality (Dust & Vehicular)

The local air quality can noticeably degrade during site clearing, if preventive measures are not taken. The removal of vegetation exposes bare soil, which is easily disturbed by wind and by the movement of heavy machinery, generating dust that can travel to nearby homes, schools, and natural habitats. This dust can irritate the eyes, throat, and lungs, aggravate conditions such as asthma, and reduce visibility. Operation of bulldozers, excavators, and trucks also emits exhaust gases including nitrogen oxides, sulphur dioxide, carbon monoxide, and fine particulates, contributing to smog formation and greenhouse effects.

Mitigation Measures:

Some measures to mitigate the impact of site clearing on air quality are:

- Phasing the clearing to limit the area of exposed soil.
- Using water sprays or dust suppressants on dry surfaces and haul roads.
- Covering or stabilizing stockpiled materials.
- Enforcing low-speed limits for site vehicles to reduce dust generation.
- Regular maintenance and tuning of diesel equipment to minimize exhaust emissions.
- Use of electric or low-emission machinery, where feasible, to reduce pollutants.

Together, these steps help protect air quality for workers, nearby residents, and surrounding ecosystems during the site-clearing phase.

13.2.6 Excessive Noise & Vibration

Noise and vibration levels can typically rise sharply during the site clearing because of the heavy equipment and construction methods involved. Bulldozers, excavators, chainsaws, rock breakers, and haul trucks generate continuous and intermittent sounds that can exceed permissible noise limits. These activities also create ground vibrations that can travel through soil and bedrock, potentially disturbing nearby residents, businesses, and wildlife. Prolonged exposure can lead to stress, sleep disturbance, and reduced productivity for workers.

Mitigation Measures:

All operations will be scheduled during daytime hours only. Regular inspection and maintenance of the heavy machinery and equipment will be done to ensure proper functioning of mufflers and vibration dampers. Modern, quieter machinery will be used where possible. Temporary acoustic barriers or earth berms will be installed around the site and buffer zones will be kept between clearing areas and the neighbourhood. Advance notice will be provided to the community, to help manage expectations and complaints. Monitoring of noise and vibration levels will be done throughout the clearing phase, to allow early detection of exceedances so that work practices can be adjusted promptly, ensuring compliance with

environmental and occupational standards, while safeguarding workers and community wellbeing.

13.2.7 Impact on Waterways

Site clearing for the smart city development can significantly affect nearby waterways if not carefully managed. Removing vegetation and disturbing soil increases the volume and speed of surface runoff, which carries sediment, nutrients, and construction debris into streams, rivers, and wetlands. Elevated sediment loads can smother aquatic habitats, reduce light penetration, and impair fish spawning grounds, while excess nutrients may trigger algal blooms and lower dissolved oxygen levels. Heavy machinery and stockpiles near riverbanks can compact soils, destabilize slopes, and cause channel erosion, altering natural flow patterns [50]. Accidental spills of fuel, oil or chemicals from equipment can pose an additional risk of water contamination.

Mitigation Measures:

Mitigation measures include maintaining buffer zones of native vegetation near rivers and watercourses to filter runoff. Proper stormwater management systems, such as retention ponds, bioswales and talwegs, will be implemented to slow runoff before it enters waterways. Regular maintenance of equipment to prevent leaks, careful storage of fuels and chemicals, and scheduling earthworks outside heavy rainfall periods, will help reduce the likelihood of pollution. By integrating these practices into site planning, protection of water quality, aquatic ecosystems, and downstream users will be ensured during the construction phase of the smart city.

13.2.8 Traffic Congestion

Traffic congestion will increase during the site clearing phase because construction activity introduces extra vehicles, temporary road changes, and occasional blockages into the surrounding network. Heavy machinery, dump trucks hauling soil or vegetation, and delivery vehicles add to normal traffic volumes, while partial lane closures or detours around the site can reduce road capacity and create bottlenecks at intersections. These conditions slow travel times for commuters, increase fuel consumption and vehicle emissions, and heighten the risk of accidents, especially where sightlines are reduced or where construction traffic crosses public roads.

Mitigation Measures:

The promoter, together with local authorities, will implement a detailed traffic management plan before the beginning of site clearing. Key measures include scheduling deliveries and hauling during off-peak hours, establishing clearly marked haul routes that avoid residential streets and sensitive areas such as schools, and providing temporary signage, flaggers, or

traffic lights to guide drivers safely through work zones. Maintaining safe pedestrian pathways and communicating anticipated disruptions to the public in advance through signage, local media, or digital platforms will help residents and businesses plan alternative routes. Where possible, on-site staging areas will be used to reduce the number of daily truck trips. Coordination with public transportation agencies to adjust service or add capacity will further limit congestion and improve safety throughout the site clearing phase.

13.2.9 Green Waste Generation

Site clearing generates substantial amounts of green waste, mainly branches, tree trunks, shrubs, grasses, and other organic debris removed to prepare the land. For the development of Constance Village Smart City, a total land area of 1,505,561 m^2 will be cleared. The total amount of green wastes to be generated from the site clearing activities are as follows [51]:

Site area = 1,505,561 m^2

Biomass of sugar cane & agricultural crops = 82.4 tons/ha

= 8.24 kg/m^2

Percentage of site covered with sugar cane & agricultural crops = 80%

Overall biomass = 8.24 x 0.80 x 1,505,561

= 9,925 kg

= **9.9 tons of green waste**

This material can quickly accumulate, occupying valuable space and creating fire hazards, if left unmanaged. Decomposition of large piles may release methane, a potent greenhouse gas, and leachate from decaying vegetation can contaminate nearby soil and waterways. Clearing of such land area can also lead to habitat and biodiversity losses.

Mitigation Measures:

A green waste management plan will be established before the site clearing phase. Mature trees and valuable vegetation will not be destroyed, to reduce waste generation in the first place. Cleared material will be sorted for reuse: logs and large branches may be milled for timber or wood chips, and smaller plant matter can be composted or mulched for landscaping and erosion control. Stockpiles will be located away from watercourses and stabilized to prevent runoff. Coordination will be undertaken with composting facilities, licensed recycling centres, to ensure that most organic debris is repurposed, rather than sent to landfill or burned, turning a potential disposal problem into a resource for the wider community.

13.2.10 Domestic Wastewater Generation

During the site clearing phase of a smart city development, domestic wastewater is produced mainly from the temporary facilities that support the construction workforce, rather than from the clearing activity itself. Portable site offices, worker camps, and canteens generate sewage from toilets, washrooms, kitchens, and hand-washing stations. If not properly managed, this wastewater, rich in organic matter, nutrients, and pathogens can contaminate nearby soil, surface water, and groundwater, posing risks to public health, and aquatic ecosystems [52].

Mitigation Measures:

Common measures to ensure proper wastewater management on site include:

- Provision for temporary toilets or modular restroom units connected to sealed holding tanks.
- Regular emptying of holding tanks and disposal to WMA approved sites by licensed wastewater carriers.
- Greywater from wash areas can be filtered, treated and reused for dust suppression or irrigation.
- Clear signage, routine maintenance, and proper disposal records to help ensure compliance with environmental and health standards.

By treating and disposing of domestic wastewater responsibly, protection of local water resources and surrounding communities will be ensured during the site clearing phase.

13.2.11 Domestic Solid Waste Generation

Domestic solid waste is produced mainly from the workers' day-to-day activities. Domestic solid wastes generated are food scraps, packaging materials such as plastic bottles, food wrappers, cardboard, and small amounts of office waste from site offices, rest areas, and worker camps. If this waste is not promptly collected and contained, it can attract pests, create unpleasant odours, and be blown or washed into nearby waterways, leading to littering and localized pollution.

Mitigation Measures:

A solid waste management plan will be put in place during the site clearing phase. Clearly marked, designated bins will be placed at convenient locations. Separation of recyclable waste, such as plastics, metals, paper, and cardboards, will be encouraged. Non-recyclable waste will be stored in designated areas to be later disposed of at the landfill by licensed waste carriers. Worker training on proper segregation and timely removal of waste will be done to help maintain site hygiene and to ensure compliance with environmental and public health regulations.

13.2.12 Spills of Chemicals and Oils

Spills of oils and chemicals from heavy machinery and equipment can pose a significant risk during the site clearing phase because the heavy equipment and temporary facilities rely on fuels, lubricants, hydraulic fluids, and cleaning agents. Accidental leaks from machinery, ruptured storage containers, or improper refuelling can release petroleum hydrocarbons and other contaminants onto bare soil. These pollutants quickly infiltrate the ground, degrade soil quality, and migrate into surface water or groundwater, harming aquatic life and posing long-term health hazards for nearby communities. Even small, repeated drips from construction vehicles can accumulate over time, creating persistent contamination hotspots [53].

Mitigation Measures:

A spill prevention and response plan will be implemented. Key measures include designating secure, clearly labelled storage areas with secondary containment (e.g., bunded tanks or drip trays) to store fuels and chemicals. Refuelling and maintenance of heavy machinery and equipment will be prohibited on site. Regular inspection and maintenance of machinery and equipment will be done to reduce the chance of leaks. Spill kits containing absorbent pads, booms, and neutralizing agents will be made readily accessible at different locations on site. Training will also be provided to the staff, thereby ensuring that any spills are reported, handled, and cleaned up immediately. Emergency procedures, including rapid notification of environmental authorities, will help limit environmental damage and legal liabilities if any spills occur.

13.2.13 Socio-economic & Socio-cultural Impacts

Site clearing over a large extent can trigger a range of socio-economic and socio-cultural impacts that go beyond environmental effects, as it directly influences nearby communities, livelihoods, and cultural heritage. Socio-economic impacts often arise from the displacement of land uses and disruption of local livelihoods. Clearing activities generate dust, noise, and traffic congestion, which can disturb daily life and business operations in surrounding communities. At the same time, the influx of workers and construction vehicles may place additional pressure on local infrastructure, such as roads, water supply, and sanitation. On the positive side, the site-clearing phase can create short-term employment opportunities for local labourers, contractors, and service providers, contributing to the local economy if managed equitably [54].

Socio-cultural impacts include potential loss or disturbance of sites with cultural, historical, or spiritual value that may be located within the development footprint. Noise, dust, and restricted access may disrupt religious practices, cultural ceremonies, or social events in nearby

communities. The arrival of a transient construction workforce can sometimes lead to social tensions if not carefully managed, especially in culturally-sensitive or tightly-knit communities.

Mitigation Measures:

An early and thorough stakeholder engagement has been done to identify and protect community priorities and cultural sites, fair compensation or livelihood restoration programmes for affected households, and prioritizing local hiring to ensure economic benefits are shared. Establishing clear communication channels between developers and community representatives will help address grievances promptly, while codes of conduct for workers will reduce the risks of social conflict. By integrating these social and cultural considerations into site clearing plans, the smart city project can foster community trust and ensure development proceeds in a more inclusive and sustainable manner.

13.2.14 Visual Impacts

Site clearing creates pronounced visual impacts by abruptly altering the landscape's natural character and scenic quality. The removal of trees, shrubs, and other vegetation exposes bare soil, heavy machinery, and stockpiled debris, transforming a previously green or rural setting into an active construction zone. This sudden change can be disruptive where the site is visible from residential areas, tourism routes, or culturally significant viewpoints. Dust plumes, night lighting for extended work hours, and the presence of large equipment further heighten the visual intrusion and may diminish the aesthetic value of surrounding neighbourhoods or natural features [55].

Mitigation Measures:

To reduce the visual impacts associated with site clearing, the following actions will be taken:

- Retention of natural vegetation buffers wherever possible.
- Designing phased clearing so that only limited areas are exposed at any given time.
- Stabilizing or replanting cleared land not immediately needed for construction.
- Installation of temporary screening such as green mesh fencing, earth berms, or strategically placed plantings, to soften the view from adjacent properties and public roads.
- Clear organization of material stockpiles, proper equipment storage, and dust-control practices to help reduce visual clutter.

By incorporating these strategies into early project planning, the visual impact associated with site clearing can be limited, and a more harmonious interface with the surrounding landscape and community can be maintained.

13.3 Significance of Impacts and Mitigation Measures During Infrastructure & Construction Works

14.3.1 Air Pollution and Dust

During the infrastructure and construction phase, significant air pollution and dust emissions can occur due to a range of activities. Dust, including coarse particles (PM_{10}) and fine particles ($PM_{2.5}$), is released during excavation, earthworks, and the transportation or handling of construction materials such as aggregates, soil, and cement to the site. Unpaved roads and exposed soil surfaces are also prone to wind erosion, further contributing to fugitive dust. In addition, construction machinery, heavy-duty vehicles, and equipment powered by diesel generate exhaust emissions containing nitrogen oxides (NO_x), sulphur dioxide (SO_2), carbon monoxide (CO), volatile organic compounds (VOCs), and carbon dioxide (CO_2) which add to both local air pollution and greenhouse gas emissions. These pollutants can negatively impact human health, leading to respiratory illnesses such as asthma and bronchitis, eye and skin irritation, and increased risks of cardiovascular diseases from fine particulate exposure. The surrounding environment will also be affected, as dust deposition on vegetation can reduce photosynthesis and crop productivity [56]. As a consequence, the surrounding communities will experience reduced air quality, nuisance from dust settling on surfaces, and visual degradation of their surroundings.

Mitigation Measures:

In order to reduce air pollution and dust emissions, a dust management plan will be implemented. Water spraying will be done on a daily basis on dusty surfaces and access roads, and a wheel washing facility will be implemented to ensure that there is no mud entrainment from the site onto the existing access roads. All material stockpiles and transport trucks will be covered, and construction works will be limited during high-wind conditions. Well-maintained machinery, low-sulphur fuels, or electric powered equipment will be used to reduce exhaust emissions, while enforcing no-idling policies and installing dust extraction systems in cement batching plants to control pollution. Additionally, green buffer zones near sensitive receptors will be established. Air quality will be constantly monitored on site to help effectively manage air pollution and dust emissions during construction.

13.3.2 Noise and Vibration

Noise and vibration are common environmental concerns arising from various activities during the construction phase of the smart city. High noise levels are typically generated from the operation of heavy machinery, such as excavators, bulldozers, jackhammers, cranes, and concrete mixers. Noise is also emitted from the continuous movement of trucks to and from the construction site. Continuous and excessive noise emissions can cause disturbance to nearby communities, affecting comfort, sleep, and overall quality of life. Prolonged exposure

to noise may lead to hearing impairment or stress-related health effects, especially for the workers. Vibration is mainly produced during piling, compaction, and the movement of heavy vehicles or equipment, and can result in structural damage to nearby buildings, particularly older or sensitive structures, as well as discomfort or annoyance for residents. Sensitive receptors, such as schools, hospitals, and residential areas are especially vulnerable to these impacts.

Mitigation Measures:

To mitigate noise and vibration, several measures can be adopted. These include:

- The use of modern, well-maintained equipment fitted with silencers, mufflers, or acoustic enclosures.
- Noisy operations will be scheduled during daytime hours only to reduce disturbance at night.
- Temporary noise barriers or acoustic screens can be placed around high-noise activity zones.
- Noise monitoring will be conducted to ensure that the noise levels are kept within permissible limits.
- Personal Protective Equipment (PPE), such as earplugs, will be provided to the workers.

For vibration, adopting less intrusive construction techniques (e.g., bored piling instead of driven piling), limiting simultaneous use of vibration-intensive equipment, and monitoring vibration levels near sensitive structures are effective strategies. Establishing buffer zones, maintaining clear communication with nearby communities, and carrying out regular noise and vibration monitoring in line with World Health Organization (WHO) and World Bank Environmental, Health and Safety (EHS) guidelines are also essential for minimizing impacts and ensuring compliance with acceptable standards [57].

13.3.3 Soil Erosion

Soil erosion is a common environmental concern resulting from land clearing, excavation, and earthworks. When the topsoil is exposed, it becomes highly vulnerable to wind and water erosion, particularly during rainfall events, or in areas with steep slopes. Construction activities such as stockpiling of soil, trenching for utility lines, and uncontrolled runoff from disturbed areas, can accelerate the detachment and transport of soil particles. This process not only leads to the loss of fertile topsoil, but also contributes to sedimentation in nearby drainage channels, rivers, and wetlands. This can lead to reduced water quality, clogged stormwater systems, and harmed aquatic ecosystems. If not managed properly, soil erosion during

construction can also cause gullying, slope instability, and long-term degradation of land productivity.

Mitigation Measures:

Infrastructure and construction works will be done in different phases, in order to minimize the extent of exposed soil at any given time. Material stockpiles will be covered. Silt fences, sediment traps, and retention ponds will be used to capture eroded soil before it enters water bodies. Proper stormwater management systems, such as bioswales and retention ponds will be implemented. A proper stormwater management system can reduce runoff velocity and soil displacement. Additionally, adopting best practices like avoiding construction during heavy rainfall, maintaining buffer zones along watercourses and rivers, and enforcing erosion and sediment control plans ensures that soil erosion related impacts are minimized.

13.3.4 Pollution of Watercourses

Pollution of watercourses can occur through multiple pathways if appropriate safeguards are not in place. Excavation and earthworks often generate loose soil, which, when washed away by rainfall, enters nearby rivers and watercourses. This leads to sedimentation and increased turbidity of the watercourses and rivers, which further reduces light penetration and affects aquatic life. Pollution of waterways also leads to clogging of drainage systems. In addition, construction activities frequently involve the use of fuels, lubricants, paints, solvents, and concrete, all of which pose risks of accidental spills and leakages. Runoff carrying these pollutants can contaminate surface waters, harming aquatic ecosystems and potentially affecting downstream water users. Improper disposal of domestic wastewater and solid waste from construction workers' shelters can degrade water quality by introducing pathogens, nutrients, and organic matter, contributing to eutrophication and public health risks.

Mitigation Measures:

Erosion and sediment control practices, such as silt fences, sediment basins, and vegetative buffer strips, should be implemented to reduce soil wash-off into water bodies. Necessary setbacks between the rivers and the site boundaries and from the natural drainage pathways will be maintained. Regular inspections of the watercourses should be done. Designated fuel and chemical storage areas equipped with secondary containment systems will be put in place to prevent spills. Any concrete mixing and washing should be conducted in contained areas away from drainage channels. Proper wastewater management and solid waste management will be implemented to prevent pollution of the watercourses. Regular water quality monitoring around the site will be done for early detection of any potential contamination.

13.3.5 Traffic Impacts

Frequent movement of heavy machinery, trucks, and construction workers to and from the site can impact negatively on the traffic in the region of the project. Large volumes of vehicles transporting construction materials can lead to congestion on local roads, reduced road capacity, and longer travel times for the surrounding community. The presence of slow-moving or oversized vehicles disrupts normal traffic flow, increasing the risk of accidents and road safety hazards, particularly near schools, residential zones, and busy intersections. Increased vehicular activity also contributes to secondary impacts, such as higher noise levels, dust generation from unpaved access roads, and exhaust emissions that degrade local air quality. In addition, repeated heavy truck movements may damage existing road surfaces, leading to potholes and accelerated wear.

Mitigation Measures:

Effective planning and management strategies will be implemented during the infrastructure and construction phase of the smart city to reduce traffic impacts. These include preparing a traffic management plan that schedules deliveries during off-peak hours, clearly designating construction vehicle routes, and avoiding the use of narrow or residential roads where possible. On-site traffic circulation should be well organized with designated entry and exit points to reduce congestion. Adequate signage, flagmen, and speed controls will be provided to improve road safety for both workers and the public. Where feasible, the use of centralized batching plants and bulk deliveries will be encouraged to minimize the number of trips required. New road networks, such as roundabouts and dual carriageways, will be constructed to ease access to and from the site.

13.3.6 Transmission of Infectious Diseases

The transmission of infectious diseases is a potential social and health impact, particularly when large numbers of workers are employed and temporary camps are established. The influx of migrant labour can place pressure on local health services and create conditions that facilitate the spread of communicable diseases. Inadequate sanitation, poor waste management, and insufficient access to clean water in workers' camps can increase the risks of waterborne diseases such as cholera. Crowded living conditions can also contribute to outbreaks of respiratory infections, including influenza and tuberculosis, while mosquito breeding in stagnant water near construction sites can lead to the spread of vector-borne diseases such as malaria, dengue, or chikungunya. There is also a risk of transmission of sexually transmitted infections (STIs), including HIV/AIDS, due to the interaction of a transient workforce with local communities [58].

Mitigation Measures:

The promoters will ensure that adequate health, safety, and welfare facilities are provided for workers. This includes access to clean drinking water, proper sanitation, solid and liquid waste management systems, and hygienic accommodation facilities. Regular health screenings, vaccination programmes, and awareness campaigns on disease prevention will be conducted. Collaboration with local health authorities is important to strengthen monitoring and response mechanisms in case of outbreaks. Strict codes of conduct for workers will be implemented, to reduce health risks and ensure that construction activities do not negatively affect the well-being of both the workers and the surrounding populations.

13.3.7 Domestic Wastewater Generation

During the infrastructure and construction works of the smart city development, domestic wastewater is generated primarily from the presence of workers on-site. Temporary camps and site offices typically produce wastewater from temporary toilet facilities, kitchens, and washing facilities. Domestic wastewater is high in organic matter, nutrients (nitrogen and phosphorus), suspended solids, and pathogens. If inadequately managed, it can infiltrate soil or be discharged into nearby drainage systems and watercourses, leading to contamination of surface and groundwater. This, in turn, poses risks of spreading waterborne diseases such as cholera, while also causing unpleasant odours and creating unhygienic conditions around the construction site. Additionally, untreated wastewater discharge can contribute to eutrophication in water bodies, negatively affecting aquatic ecosystems.

Mitigation Measures:

Appropriate sanitation facilities and wastewater management systems will be put in place during the infrastructure and construction phase. The wastewater from toilet facilities will be collected in septic tanks, which will then be carted away to WMA-approved sites by licensed wastewater carriers. Greywater from washing facilities will be collected and treated separately where possible. The promoter will ensure that disposal of wastewater follows national wastewater regulations and environmental standards. Awareness programmes on proper sanitation practices will also be provided to workers. Monitoring of wastewater quality and regular inspections of sanitation facilities will be done to ensure compliance and reduce health and environmental risks.

13.3.8 Domestic Solid Waste Generation

During the infrastructure and construction works of a smart city development, domestic solid waste is generated primarily from workers' daily activities in temporary camps and site offices. This waste includes food scraps, packaging materials, paper, cardboard, plastics, cans, and other non-hazardous materials. Improper management of solid waste can lead to littering

around the site, attraction of pests and rodents, unpleasant odours, and potential contamination of soil and water bodies. Accumulation of solid waste can also create fire hazards and reduce the overall hygiene and safety of the construction site, affecting both workers and nearby communities.

Mitigation Measures:

A comprehensive solid waste management plan will be implemented. This includes providing designated waste bins placed at strategic locations across the site, colour-coded bins for segregation of organic and recyclable waste, and regular collection and transportation of waste to the landfill or recycling facilities by licensed waste carriers. Composting of organic waste will be considered where feasible, while recyclables such as plastics, paper, and metals should be sent for recycling. The workers will be trained and encouraged to follow proper waste disposal practices, and regular monitoring will be conducted to ensure compliance.

13.3.9 Construction Waste Generation

Construction waste is generated from various on-site activities, including excavation, demolition, concrete pouring, bricklaying, steel fabrication, and packaging of construction materials. Construction waste typically includes soil, rubble, concrete, bricks, wood, metals, plastics, and packaging materials. Improper handling and disposal of construction waste result in soil and water contamination, blockage of drainage systems, visual pollution, and increased risk of accidents for workers and nearby communities. Accumulated waste can also attract pests and create fire hazards, while the transport of construction debris without proper containment may generate dust and emissions, further contributing to environmental pollution.

Mitigation Measures:

A structured construction waste management plan will be implemented. The construction waste management plan will include segregation of waste at source, reusing or recycling materials where feasible (e.g., crushed concrete for road base, metal scraps for recycling), and safe disposal of non-recyclable waste at the landfill. On-site storage areas for waste will be clearly demarcated, covered to prevent wind dispersal, and regularly cleaned. Training of workers will be done on proper handling and disposal practices. Monitoring waste generation, and ensuring compliance with local regulations and environmental standards are also essential.

13.3.10 Spills of Chemicals & Oils

During the infrastructure and construction phase, spills of chemicals and oils are a potential environmental and health risk due to the use, storage, and handling of fuels, lubricants, solvents, paints, and other hazardous materials on site. Accidental leaks or spills from construction machinery, storage tanks, or transfer operations can contaminate soil, surface

water, and groundwater. Such contamination is harmful to aquatic ecosystems, reduces soil fertility, and poses direct risks to workers and nearby communities through skin contact, inhalation of vapours, or ingestion of contaminated water. Spills can also pose fire and explosion hazards if flammable substances are involved.

Mitigation Measures:

Strict management and handling protocols will be implemented during the infrastructure works and construction phase. Hazardous materials will be stored in a designated area with secondary containment structures to capture any accidental spills or releases. A spill management plan will be put in place. Spill response kits, including absorbents, barriers, and neutralizing agents, will be made readily available. Training on proper handling and emergency response procedures will be provided to the workers. Routine inspection and maintenance of machinery and storage facilities will be done to prevent leaks. In case of chemical or oil spills, the spill will be immediately contained, cleaned, and disposed of in accordance with local environmental regulations.

13.3.11 Socio-economic & Socio-cultural Impacts

Socio-economic and socio-cultural impacts can arise during the construction phase due to changes in the local community, economy, and way of life. The influx of construction workers and the establishment of temporary camps may increase demand for local goods, services, and housing, potentially providing short-term economic opportunities for local businesses, labourers, and service providers. However, it can also lead to inflation of rental and commodity prices, straining household budgets and creating social tension. Construction activities may disrupt local livelihoods, particularly for informal traders, farmers, and small business owners, due to restricted access, dust, noise, or traffic congestion.

Socio-cultural impacts may include changes in community dynamics and traditional practices. The presence of a transient workforce can influence social behaviour, cultural norms, and community cohesion, and in some cases may lead to conflicts or increased risk of socially undesirable activities. Noise, dust, and visual intrusion from construction sites can reduce quality of life and affect community well-being. Access to public spaces, religious sites, and cultural heritage locations may be temporarily restricted, causing inconvenience or loss of cultural engagement.

Mitigation Measures:

A thorough stakeholder consultation was done by the promoter with the surrounding communities in the region of Flacq. Community engagement programmes will be done to inform residents about construction schedules, anticipated disruptions, and safety measures. The creation of local employment and procurement policies will maximize economic benefits

for the host community while reducing negative impacts. Proper site management, including traffic control, dust and noise mitigation, and clear signage, will be implemented to minimize disturbances. Open communication with community leaders will be maintained, and grievance mechanisms will be established to help address social concerns and to maintain trust.

13.3.12 Visual Impacts

During the infrastructure and construction works of the smart city, visual impacts will arise from the temporary and often disruptive nature of the construction activities. Site clearance, excavation, stockpiling of materials, and the presence of heavy machinery, scaffolding, and temporary structures can alter the visual character of the area, creating an unattractive or cluttered landscape. Dust plumes, construction lighting, and movement of vehicles can further contribute to visual disturbance, affecting the aesthetic quality of surrounding neighbourhoods, recreational areas, and culturally or historically significant sites. These impacts can reduce the enjoyment of local scenery, diminish property values, and generate community complaints.

Mitigation Measures:

Mitigation measures to reduce the visual impacts include:

- Careful site planning to minimize the visibility of stockpiles and machinery from public areas.
- Use of temporary screening, such as fences, hoardings, or green mesh barriers, and limiting the height of temporary structures where feasible.
- Dust control and regular cleaning of access roads and public spaces to maintain visual amenity.
- Construction lighting should be directed to minimize glare and light spill into surrounding areas,
- Aesthetic considerations should be included in the design of temporary structures.
- Engagement with local communities regarding the construction schedule and duration can further reduce perceived visual disruption.

13.4 Significance of Impacts and Mitigation Measures During Operation Phase

13.4.1 Energy Consumption

Energy consumption represents a major environmental and sustainability consideration during the operation phase of Constance Village smart city. The total electricity demand for the smart city is 73,320 kWh. Electrical energy is required to power buildings, street lighting, transportation systems, water supply and treatment, communication networks, and other urban infrastructure. This high energy demand can lead to increased greenhouse gas (GHG) emissions, particularly if the energy is sourced from fossil fuels, contributing to climate change. Excessive energy use will also strain local electricity grids, increase the risk of power outages, and require additional infrastructure investment. Inefficient energy consumption in buildings and public systems will result in higher operational costs and reduce the overall sustainability of the smart city [59].

Mitigation Measures:

Electricity for the smart city will be tapped off from existing spare capacity, and the FUEL CEB GIS station will be upgraded. Energy efficiency measures will also be implemented across all developments within the smart city. These include the adoption of energy-efficient building designs and materials, installation of LED lighting, smart metering systems, and automated energy management systems. Renewable energy sources will be used wherever feasible to reduce reliance on fossil fuels and associated emissions. Setting up of a PV farm with battery energy storage systems and flower wind turbines will be considered. Efficient public transportation systems and electric vehicle (EV) infrastructure will help reduce operational energy demand and environmental impacts. Additionally, continuous monitoring and optimization of energy use, combined with awareness programmes for residents and facility managers, will ensure sustainable energy consumption over the long term.

13.4.2 Water Consumption

Water is required for domestic use in residential and commercial buildings, public facilities, landscaping, irrigation, and industrial or service operations within the smart city. High water demand can put pressure on local water resources, reduce availability for surrounding communities and ecosystems, and increase the energy required for water treatment, pumping, and distribution. Inefficient water use can also lead to over-extraction from surface or groundwater sources, resulting in lowered water tables, degradation of aquatic habitats, and potential conflicts with other water users.

Mitigation Measures:

Upon full operation of the smart city in 2045, 2,109 m^3/day of potable water will be required. The proposed smart city will be self-sufficient in terms of water supply and will have an

independent water network connected to the CWA network. A new borehole will be drilled and will operate at an extraction rate of 43 m^3/hr and will be sufficient to cater for the water requirements of Phase 1 of the smart city project. For subsequent phases of the smart city, investment shall be made for a new borehole (New Borehole 2), pumping station, water tanks and water distribution infrastructure to the remaining plots of the smart city. Reservoirs will be built to cater for 2-days' storage. A combination of water conservation and efficiency measures will also be implemented. The smart city will also have centralized water storage and distribution by gravity and a smart metering system. Rainwater harvesting, greywater recycling, and wastewater reuse for landscaping or non-potable applications will be encouraged to reduce the demand on freshwater supplies. Landscaping will prioritize drought-resistant plants and efficient irrigation techniques, such as drip irrigation. Public awareness campaigns and incentive programmes will encourage residents and businesses to adopt water-saving practices.

13.4.3 Solid Waste Generation

Ongoing activities in residential, commercial, institutional, and public spaces of the smart city can generate large amounts of solid waste. It is estimated that 9.76 tonnes of waste will be generated each day upon full operation of the smart city by 2045. Sources of solid waste include household waste such as food scraps, packaging, plastics, paper, commercial and office waste, industrial or service sector waste, and public litter from parks, streets, and recreational areas. If not managed properly, accumulated waste can lead to soil and water contamination, foul odours, proliferation of pests and rodents, and negative visual impacts. Improper disposal or insufficient waste segregation can also hinder recycling efforts and increase reliance on landfills, contributing to greenhouse gas emissions and long-term environmental degradation.

Mitigation Measures:

A comprehensive solid waste management plan will be implemented. Constance Village Smart City will encourage selective waste collection to recover and recycle materials like paper, cardboard, glass, and plastic. Designated coloured bins will be strategically located to allow residents to dispose of the sorted waste. Waste collection will be optimized by the installation of Molok waste containers, which will be partially buried underground to reduce odour and save space. Composting of organic waste generated through biobin digesters will also be done to reduce the amount of waste going to the landfills. Public awareness campaigns and incentives for residents, businesses, and institutions can enhance participation in proper waste management practices.

13.4.4 Wastewater Generation

The amount of wastewater to be generated during the operation phase of the smart city, estimated at 80% of water demand, is approximately 1,687 m^3/day (by 2045). Wastewater generation will be generally from residential, commercial, institutional, and industrial activities within the smart city. The sources of wastewater are domestic sewage from toilets, kitchens, and showers, as well as greywater from washing, cleaning, and landscaping activities. If not properly managed, wastewater can contaminate surface and groundwater, degrade aquatic ecosystems, and pose risks to public health by transmitting waterborne diseases. Nutrient-rich wastewater can also contribute to eutrophication in water bodies, affecting biodiversity and water quality for downstream users.

Mitigation Measures:

The smart city will implement an integrated wastewater management system. Wastewater will be treated within each macro-plot through a Sewage Treatment Plant (STP). Treated effluent from the STP shall then be used for irrigation of green spaces within the micro-plot and excess treated effluent will be sent to soak aways/absorption pits on the plot. Adoption of water-saving fixtures and appliances will reduce wastewater volumes. Treated effluent will be analysed prior to being used for irrigation of green spaces. Water quality tests will ensure compliance with environmental standards and laws. Public awareness campaigns and incentives will be provided to encourage sustainable water use, thereby supporting effective wastewater management.

13.4.5 Traffic Congestion

Traffic impacts can become a major socio-environmental issue due to increased movement of residents, workers, and visitors within and around the smart city. Higher traffic volumes can further result in congestion, longer travel times, and increased emissions of greenhouse gases and air pollutants such as nitrogen oxides (NO_x), carbon monoxide (CO), and particulate matter (PM). This can contribute to deteriorating air quality, noise pollution, and adverse public health outcomes. Heavy traffic also elevates the risk of road accidents and pedestrian safety concerns, while the demand for parking spaces may increase pressure on urban land use. Furthermore, traffic congestion reduces overall efficiency and can negatively affect the smart city's economic productivity and liveability.

Mitigation Measures:

A traffic impact assessment was conducted to study the traffic impact with the evolution of the smart city development. New road layouts and networks have been designed for the smart city to reduce traffic congestion. New road networks, five new roundabouts, and dual carriageways will be constructed. Improvement of existing access roads has also been considered in the smart city's design. Non-motorised transport infrastructure, such as

pedestrian walkways and bicycle lanes, will be implemented, and smart traffic management systems will be put in place to optimize flow using sensors and real-time data. The use of electric vehicles (EVs) will be encouraged by providing adequate charging infrastructure at different places within the smart city development. Air quality monitoring will also be done to measure and reduce local air pollutants.

13.4.6 Visual Impacts

Visual impacts during the operation phase of the smart city mainly relate to the long-term alteration of the urban landscape and its compatibility with the surrounding environment. The design and layout of buildings, road networks, utility infrastructure, signage, and public spaces can significantly affect the aesthetic quality and visual harmony of the city. Poorly planned high-rise structures, excessive outdoor advertising, or inadequate landscaping may create visual clutter, while insufficient maintenance of public spaces, waste accumulation, or poorly designed infrastructure can diminish the city's attractiveness. Conversely, well-planned architecture, green spaces, and integration of cultural or historical elements can enhance the visual character and identity of the city.

Mitigation Measures:

The masterplan for Constance Village smart city has been designed around a list of sustainable objectives to help create liveable communities for people, in harmony with nature. The objectives of the smart city are to reduce air and noise pollution, minimise urban heat island effects and carbon emissions, and to promote active and healthy lifestyles. These objectives were taken into consideration when designing the masterplan under three main themes: (1) site, (2) activities, and (3) built environment. Each theme was linked to definitive actionable items to guide detailed planning and design of neighbourhoods, infrastructure, and buildings. Green parks and public spaces will be built to improve the smart city's visual appeal and to maintain harmony with nature. The green parks will also provide environmental benefits such as improved air quality and reduced heat island effects. Regular maintenance of the public spaces and green parks will be done, and proper management of solid waste will be implemented across the smart city. Cultural and historical features will be incorporated into the cityscape to preserve local identity and foster community pride.

13.4.7 Socio-economic & Cultural Environment

The socio-economic and cultural environment experiences significant transformation with the development of the smart city, both positive and potentially negative. On the socio-economic side, the development generates employment opportunities in administration, maintenance, technology services, retail, healthcare, education, and tourism, thereby boosting local and regional economies. Improved infrastructure, public services, and digital connectivity enhance

residents' quality of life, while smart governance and efficient resource management can reduce inequalities in service provision. However, challenges may include rising living costs, housing affordability issues, and the risk of economic exclusion for vulnerable groups if benefits are unevenly distributed.

Culturally, the smart city fosters innovation, inclusivity, and community engagement through digital platforms, cultural centres, and enhanced recreational spaces. Integration of smart technologies into heritage sites and cultural activities promotes preservation and accessibility of local traditions, while multicultural communities enrich social diversity. Nevertheless, rapid urbanisation and modern infrastructure may risk eroding traditional lifestyles, displacing cultural landmarks, or creating social tensions if local identity and heritage are not respected.

Mitigation Measures:

To balance these impacts, policies implemented within the smart city will focus on inclusive development by ensuring affordable housing, equitable access to services, and community participation in decision-making. The Constance Village smart city development will also include:

- Preservation of cultural heritage sites.
- Promotion of local arts and traditions.
- Design of public spaces that foster social interaction, which can strengthen cultural identity.

14.0 Socio-cultural and Socio-economic Impacts

A Social Impact Assessment was conducted for the Constance Smart City project. A designated catchment area was selected, and the overall socio-economic conditions prevailing in that area were ascertained, and project-affected persons were identified. Impacts, both positive as well as negative, that are likely to occur during the smart city project, have been assessed, and a mitigation plan was proposed.

A comprehensive series of public consultations was conducted within the project location. A total of 105 persons were contacted. The consultations involved interviews with key community members, including residents who live in the area and commuters who travel through it regularly. Different age groups were targeted to ensure the voices of youth, working-age adults, and seniors were heard, reflecting the varying needs and concerns across the population spectrum.

In addition to individual residents, a significant portion of the consultations focused on the business community, incorporating insights from business owners across different economic scales. Small and informal business operators were engaged, providing a glimpse into the challenges and opportunities faced by grassroots entrepreneurs. Simultaneously, medium-sized enterprises and large businesses participated, offering a broader view of the commercial environment and local market conditions.

Furthermore, community structures, such as local associations, grassroots organisations, and social groups, were consulted to understand the collective interests and concerns within the area. Local authorities, including representatives from village councils and other municipal bodies, were also key participants in the consultation process.

14.1 Positive Impacts of The Proposed Smart City

14.1.1 Quality of Life

- ***Proximity and Access to Services***

The proposed smart city development is anticipated to provide a wide array of amenities spanning various sectors, including education, residential living, commerce, culture, health and wellness. Many inhabitants believe that having easy access to these diverse services within proximity will simplify daily living and reduce the need for long commutes. In addition to benefiting the immediate inhabitants of the smart city, the development is expected to positively impact neighbouring villages and communities across Mauritius. The proposed north-south motorway is a key infrastructure project that will enhance connectivity between the smart city and other parts of the island, facilitating easier travel and access for residents outside the immediate area.

In order to effectively communicate the positive impact that the proposed smart city will have on the quality of life for both its immediate inhabitants and those in surrounding areas, the following measures have been proposed:

- Establish a Dedicated Communication Desk: To serve as a central hub for disseminating information about the smart city's progress, services, and benefits. This platform will be essential for informing the public and addressing any concerns or queries they may have.
- Advertise Available Services and Amenities: A strategic advertising campaign will ensure that the public is well-informed about the range of services and amenities available within the smart city. This includes promoting residential, commercial, healthcare, and educational facilities, as well as cultural and recreational spaces.
- Ensure Unrestricted Access to Amenities: It is crucial to guarantee that the amenities within the smart city, particularly retail and leisure facilities, are accessible to a broad spectrum of the population, not just the immediate residents or high-income individuals. This inclusivity will help foster a sense of belonging and ensure that all Mauritians feel welcome to take advantage of the new developments.
- Curate a Diverse Tenant Mix for Retail Facilities: When planning the retail components of the smart city, a thoughtful tenant mix should be curated to cater to varying levels of disposable income. By ensuring that retail facilities offer a wide range of products and services—from luxury to affordable options—the smart city can appeal to a broad demographic, fostering economic inclusivity.

14.1.2 Economic Impacts

- ***Rejuvenated Business Activities***

The proposed Constance Smart City is expected to bring a substantial influx of people during both the construction and operational phases, which will create a range of opportunities for local businesses, such as food, lodging, transportation, and entertainment. This influx of workers is anticipated to generate increased demand, which could provide a boost to existing businesses.

Once the smart city is fully operational, the business ecosystem in the surrounding area will continue to benefit from the presence of new residents, workers, students, and transit visitors who use the facilities within the smart city.

- ***Job Creation and Fostering Entrepreneurship***

During the construction stage, the demand for workers will be high, covering a wide range of skill levels, from engineers and architects to labourers and support staff. As the city transitions into its operational phase, employment opportunities will shift toward the maintenance of the city's infrastructure and the provision of services to residents and visitors. This will involve jobs

in sectors such as retail, hospitality, education, healthcare, and administration. The development of new facilities and infrastructure will lead to a direct increase in employment. More importantly, the smart city is expected to create employment opportunities that cater to various categories of workers, including those from vulnerable backgrounds. Low-skilled or inexperienced workers, such as housewives or youths from underprivileged communities, will have access to jobs that could help uplift their socioeconomic status.

In addition to direct employment opportunities, the development is also expected to foster entrepreneurship. The creation of new infrastructure and the influx of residents and visitors will generate demand for a variety of goods and services, which could incentivize local entrepreneurs to launch new ventures.

In the effort to support the materialization of the local inhabitants' expectations for direct and indirect job creation, as well as the revitalization of businesses, the following measures have been proposed:

- Utilizing the Communication Desk for Fair Recruitment and Entrepreneurial Support: A communication desk will be established to facilitate transparent communication about job opportunities and business prospects within the smart city. This platform will serve as a lobbying tool to ensure fair recruitment practices, particularly for workers from the surrounding communities. It will also provide information and resources to foster local entrepreneurship, encouraging individuals to participate in calls for projects or to propose new business ideas that can meet the needs of the smart city's residents and visitors.
- Advertising Lower-End Jobs Locally and Promoting Local Recruitment: To ensure that job opportunities, particularly for lower-end positions, are accessible to the inhabitants of the catchment area, a targeted advertising campaign will be conducted. This will include promoting vacancies in sectors such as retail, hospitality, and construction, with a focus on encouraging local residents to apply. Additionally, a notional bias will be introduced into the recruitment policy, prioritizing local candidates to ensure that the economic benefits of the smart city are felt directly by the surrounding communities.

14.1.3 Community Wellbeing and Social Inclusion

The creation of well-designed public spaces and recreational facilities will provide opportunities for social interaction, fostering a sense of belonging and community cohesion among residents.

The smart city will include parks, playgrounds, walking paths, sports centres, and other communal areas where people can gather and participate in a variety of activities. These spaces will be designed to accommodate a wide range of age groups and interests, ensuring

that both children and adults have access to outdoor activities that promote physical fitness and social engagement.

The following measures have been proposed to enhance social inclusion and foster a strong sense of community well-being among the inhabitants:

- Establish Inclusive Public Spaces: Ensure the design of parks, playgrounds, and recreational areas caters to different age groups and abilities. Make public spaces easily accessible to all, including those with disabilities.
- Promote Community Engagement Events: Organize regular community events (e.g., cultural festivals, sports competitions, and local markets) to foster interaction and cohesion. This will help residents build relationships and encourage a shared sense of belonging.
- Leverage Digital Infrastructure for Community Connectivity: Utilize smart city technologies (such as apps and online platforms) to keep residents informed about community events, social services, and opportunities for civic participation. This will ensure that everyone stays connected and has access to information about what's happening in their community.
- Foster Collaboration with Local Leaders: Work with local community leaders and social organizations to identify the needs and interests of residents, ensuring that public spaces and programmes are responsive to the unique social dynamics of the region.
- Foster Safe and Secure Environments: Enhance the sense of security in public spaces through effective lighting, security cameras, and patrols to ensure that residents feel safe while using communal areas. This will encourage more people to engage with their surroundings and each other.

14.1.4 Increased Walkability and Accessibility / Sustainable Transportation

At the heart of this approach is the implementation of the "10-minute neighbourhoods" concept, which strategically places essential amenities and services within a 400-metre radius of residential areas. This urban planning strategy facilitates easy access to daily necessities, including grocery stores, schools, healthcare facilities, and recreational spaces. By enabling residents to fulfill their needs without the dependence on motorised transportation, the design promotes a more active and engaged lifestyle. The emphasis on walkability and accessibility is anticipated to yield several environmental benefits as well. By reducing the reliance on cars, the design is likely to decrease traffic congestion, resulting in lower carbon emissions and improved air quality within the community. A pedestrian-centric environment can also contribute to noise reduction and create a more pleasant atmosphere for all residents.

In order to promote a vibrant, walkable community that enhances accessibility and encourages an active lifestyle while reducing environmental impacts, the following measures have been proposed:

- Design Comprehensive Walking and Cycling Infrastructure: Develop a network of safe, well-lit, and maintained sidewalks, bike lanes, and pedestrian crossings to facilitate ease of movement throughout the smart city. Ensure that these pathways are designed to accommodate individuals of all ages and abilities.
- Establish Frequent Public Transport Options: Implement efficient and reliable public transport services that connect key areas of the smart city and neighbouring regions. This will provide an alternative for residents who may need to travel beyond their immediate neighbourhood without relying solely on private vehicles.
- Enhance Connectivity to Key Destinations: Ensure that walking routes are clearly marked and well-connected to major landmarks such as schools, health centres, parks, and shopping areas. This can include the installation of signage that promotes these routes and highlights their accessibility.
- Monitor and Evaluate Walkability Metrics: Establish key performance indicators (KPIs) to assess the success of walkability initiatives, such as pedestrian traffic counts and resident satisfaction surveys. Regular evaluations can inform future improvements and adaptations to the infrastructure.

14.1.5 Communication

The company's legacy, which spans generations, has cultivated a sense of trust and respect among local communities. People feel a deep connection to Constance’s historical presence, particularly because of its impact on employment and local development through its previous agricultural and industrial activities. The group's successful ventures, including its hotels and other businesses, are seen as a testament to its ability to navigate economic shifts and maintain relevance over time. This positive perception of Constance lays a solid foundation for fostering goodwill and support for future projects, including the proposed smart city.

For the purpose of strengthening and maintaining the positive relationship between the Constance Group and the inhabitants of the region, the following measures have been proposed:

- Establishing an Effective Communication Channel: The creation of a dedicated communication desk will serve as a critical touchpoint between the Constance Group and local communities. This desk will act as both an information hub and a feedback channel, allowing the inhabitants to stay informed about the progress and developments of the smart city.

- Leveraging Constance's Historical Legacy: The Constance Group's rich history and significant contributions to the region can be utilised as a strategic asset to gain buy-in for the smart city project. By highlighting Constance's long-standing relationship with the localities, particularly its past involvement in the sugar industry and its ongoing investment in the region through tourism and other sectors, the group can build on the positive sentiments already in place. This will not only foster trust but also reinforce the perception of Constance as a key player in the region's ongoing development. Through targeted messaging and engagement efforts, Constance can emphasise the benefits of the new smart city project while showcasing its deep-rooted commitment to the well-being of local communities.

14.2 Negative Impacts of The Proposed Smart City

14.2.1 Risk of Gentrification

As property values increase due to the influx of investment and development, lower-income residents in the surrounding areas may find themselves at risk of being priced out of their neighbourhoods. This phenomenon, known as gentrification, can lead to significant social displacement, undermining the fabric of the local community and exacerbating economic inequalities.

Key factors contributing to gentrification risks include:

- *Rising Property Values:* The development of the smart city is likely to attract higher-income individuals and businesses, which can lead to increased demand for housing and services in the surrounding areas. As demand rises, property values may escalate, making it difficult for long-term residents to afford their homes.
- *Increased Cost of Living:* The introduction of upscale amenities and services can drive up the cost of living in the vicinity. As new restaurants, shops, and recreational facilities open, existing residents may struggle to afford necessities, leading to financial strain.

Mitigation Measures

- *Affordable Housing Initiatives:*
  Implement policies that mandate a percentage of new housing units within the smart city be designated as affordable. This could include mixed-income developments that provide housing options for various income levels, thereby ensuring that lower-income residents have access to quality housing.
- *Stakeholder participation:*
  Encourage stakeholders to participate by contributing their ideas on the project in strategically placed "boite à idées". This would enable to capture their feedback that could spark innovation, while providing them with a sense of ownership. Access to open parks

within the smart city would also encourage greater participation by additional interactions with the community.

- *Local Business Support Programmes:*
  Create programmes aimed at supporting existing local businesses to thrive amidst new competition from the smart city. This could involve providing grants, training, and resources to help local entrepreneurs enhance their services and remain viable.
- *Promoting Inclusive Economic Development:*
  Ensure that economic opportunities arising from the smart city are accessible to existing residents. This can be achieved by prioritizing local hiring in construction and operational jobs, as well as supporting workforce development programmes that equip residents with the necessary skills.

14.2.2 Loss of Agricultural Land

The proposed development of the Constance Smart City is situated on former sugar cane fields and land currently under pineapple plantation, an area that has historically been vital for local agriculture. The transformation of this land into a commercial and residential hub raises significant concerns regarding the loss of agricultural land, which could adversely affect local agricultural livelihoods and food production in the region.

Key issues related to loss of agricultural land and environmental implications are:

- The conversion of agricultural land into urban space can displace local farmers who rely on these fields for their livelihoods.
- The loss of land reduces the availability of space for crop production, impacting both income and food security for these communities.
- Agricultural lands contribute to biodiversity and ecological balance. The transition to urban development could disrupt local ecosystems, leading to potential biodiversity loss and altering the natural landscape.

Mitigation Measures

- *Supporting Local Farmers:*
  Develop programmes that provide support to local farmers affected by the development. This could include financial assistance, training in alternative agricultural practices, or assistance with transitioning to other forms of livelihood.
- *Community Agricultural Initiatives:*
  Establish community gardens or urban agriculture projects within the smart city framework. This approach promotes local food production and allows residents to engage in farming activities, thus preserving agricultural knowledge and practices.
- *Incorporation of Green Spaces:*

Design the smart city to include green spaces, parks, and community gardens that can serve as places for local food production and recreational areas. These spaces can help mitigate the loss of agricultural land and foster community engagement.

14.2.3 Environmental Disruption

The proposed development of the Constance Smart City, while emphasizing green initiatives and sustainable practices, will inevitably lead to some level of environmental disruption due to large-scale construction activities. This disruption can affect local ecosystems, biodiversity, and the overall health of the environment in the catchment area.

Key issues related to environmental disruption:

- *Soil Erosion and Degradation:* Construction activities can expose soil, making it susceptible to erosion. This can result in sediment runoff into nearby waterways, degrading water quality and affecting aquatic ecosystems.
- *Water Quality Impacts:* Construction can lead to increased runoff and pollution entering local water bodies. Contaminants from construction materials, machinery, and debris can negatively impact water quality, harming aquatic life and potentially affecting the water supply for local communities.
- *Air Quality Concerns:* Dust and emissions from construction vehicles and machinery can degrade air quality in the surrounding area. This can pose health risks to residents and wildlife and contribute to broader environmental issues.
- *Noise Pollution:* The construction process generates significant noise, which can disturb local wildlife and negatively affect the quality of life for nearby residents. Prolonged noise exposure can lead to stress and changes in behaviour for both humans and animals.

Mitigation Measures

- *Environmental Impact Assessments (EIAs):*

Conduct comprehensive EIAs before the start of construction to identify potential impacts on local ecosystems and biodiversity. This will provide a baseline for monitoring environmental conditions and help in formulating strategies to mitigate adverse effects.

- *Use of Sustainable Construction Practices:*

Implement sustainable construction techniques, such as using recycled materials, minimizing land disturbance, and reducing waste. This approach can help lessen the environmental footprint of the construction process.

- *Soil Erosion Control Measures:*

Implement erosion control practices during construction, such as silt fencing, sediment basins, and vegetation cover. These measures will help protect soil integrity and prevent sediment runoff into waterways.

- *Water Management Strategies:*

Develop a stormwater management plan that includes retention ponds, green roofs, and permeable surfaces to manage runoff and minimize water quality impacts. Regular monitoring of water quality should also be conducted to identify and address any pollution issues.

- *Air Quality Management:*

Implement measures to mitigate dust and emissions during construction. This can include using dust suppression techniques, maintaining equipment to reduce emissions, and scheduling construction activities during off-peak hours to minimize air quality impacts.

- *Noise Reduction Measures:*

Employ noise mitigation strategies, such as using noise barriers and scheduling high-noise activities during the day to minimize disturbances to local residents and wildlife.

14.2.4 Traffic Congestion

The development of the Constance Smart City is expected to significantly impact traffic patterns in the surrounding areas. While the master plan incorporates strategies to manage traffic flow, the large-scale construction and the eventual influx of residents, workers, and visitors could lead to increased congestion on local roads.

Key Issues Related to Traffic Congestion:

- *Increased Vehicle Volume:* The construction phase will bring a temporary influx of construction vehicles and workers, resulting in a surge of traffic on local roads. Following the completion of the project, the number of residents, commuters, and visitors is expected to increase substantially, further exacerbating congestion.
- *Infrastructure Strain:* The existing road network may not be equipped to handle the additional traffic volume, leading to bottlenecks and longer travel times. Critical intersections could become overwhelmed, affecting accessibility and safety.
- *Safety Concerns:* Increased congestion can lead to a higher risk of accidents, particularly at busy intersections. Pedestrians, cyclists, and motorists may face greater danger due to the unpredictable nature of traffic flow.
- *Impact on Public Transport:* Traffic congestion can negatively affect public transport services, leading to delays and longer wait times for users. This may discourage residents from using public transport options, further contributing to reliance on personal vehicles.

Mitigation Measures

- *Traffic Impact Assessments (TIAs):*

Conduct comprehensive TIAs before construction begins to identify potential congestion hotspots and traffic flow issues. This assessment will provide a basis for developing targeted mitigation strategies.

- *Road Infrastructure Improvements:*

Lobby with authorities to invest in upgrading existing road infrastructure to accommodate increased traffic volumes. This may include widening roads, adding turning lanes, and enhancing traffic signal systems to improve flow and safety. A key component of this is the completion of the proposed M4 motorway project.

- *Dedicated Construction Traffic Routes:*

Establish dedicated routes for construction vehicles to minimize disruptions on local roads. Signage and traffic control measures should be implemented to direct construction traffic away from residential areas.

- *Phased Construction Schedule:*

Implement a phased construction schedule to stagger construction activities and reduce the peak traffic impact. This approach can help mitigate congestion during critical construction periods.

14.2.5 Displacement of Private Households

The development of the Constance Smart City may result in the displacement of current residents, particularly those residing in rental properties near the factory area, whose leases will not be renewed by the promoter. A total of 6 household units are concerned. This situation can present some social, economic, and emotional implications for the affected individuals and families.

Key issues related to displacement:

- *Loss of Rental Housing:* Renters may be compelled to vacate their residences as the promoter opts not to renew leases to facilitate the new development. This loss of housing can lead to distress for individuals and families who have established their lives within these communities.
- *Economic Impact:* Displaced renters may face financial challenges, particularly if they struggle to identify affordable rental options in the vicinity. The costs associated with relocation can impose a significant burden.
- *Social Disruption:* Displacement has the potential to disrupt established social networks and community ties. Long-standing relationships with neighbours and local businesses may be severed, resulting in feelings of isolation and a loss of community identity.
- *Limited Access to Resources:* Displaced individuals may encounter challenges in accessing essential services and resources, such as educational institutions, healthcare facilities, and employment opportunities, if they are relocated to areas further from their previous residences.

Mitigation Measures

- *Comprehensive Communication Plan:*

Develop a clear and transparent communication plan to inform affected renters about the development timeline, the rationale for the non-renewal of leases, and the available support resources. Transparency is vital to help renters understand their options.

- *Community Engagement:*

Engage with affected renters throughout the planning and implementation processes. Organize public meetings and consultations to gather feedback, address concerns, and provide updates on the development.

14.2.6 Strain on Existing Infrastructure

The proposed development of the Constance Smart City is expected to attract a significant influx of new residents and businesses, potentially placing considerable strain on the existing infrastructure of the surrounding area. This strain could manifest in various forms, particularly affecting essential services such as water supply, electricity distribution, and waste management systems.

Key Issues Related to Infrastructure Strain:

- *Increased Demand on Water Supply:* The introduction of new households and commercial establishments will heighten the demand for potable water. If the current water supply infrastructure is not adequately scaled, it may struggle to meet the needs of the growing population, potentially leading to shortages and interruptions in service.
- *Electricity Consumption:* With increased residential and commercial energy use, existing electrical grids may experience overloads. This could result in power outages and reduced reliability of electricity services, causing inconvenience for both residents and businesses.
- *Waste Management Challenges:* The anticipated growth in population will lead to a rise in solid waste generation. Existing waste management systems may be insufficient to handle this increase, resulting in unsightly litter, health hazards, and negative environmental impacts.

Mitigation Measures

- *Infrastructure Assessment and Upgrade Plan:*

Conduct a comprehensive assessment of current infrastructure capacities for water, electricity, and waste management. Based on this assessment, develop an upgrade plan to enhance systems in anticipation of increased demand.

- *Investment in Water and Energy Infrastructure:*

Allocate funding for the expansion and modernization of water supply and electricity distribution systems. This may involve constructing new facilities, upgrading existing

infrastructure, and investing in sustainable technologies such as solar power and rainwater harvesting.

- *Waste Management Improvement:*

Develop a robust waste management strategy that includes expanding collection services, enhancing recycling initiatives, and launching community awareness campaigns on waste reduction.

- *Sustainable Practices:*

Integrate sustainable practices into infrastructure development, such as using eco-friendly materials and technologies. Promote water conservation and energy efficiency measures among residents and businesses.

- *Collaboration with Local Authorities:*

Work closely with local government and utility providers to align development plans with broader community infrastructure goals. This collaboration can facilitate resource sharing and coordinated efforts to enhance service delivery.

14.2.7 Communication

The concept of a smart city is often not fully understood by local communities. This lack of understanding can lead to misconceptions and resistance to new developments, particularly for large-scale projects like the proposed Constance Smart City. Residents may have concerns about the implications of such a transformation on their daily lives, local culture, and environment.

Key issues related to lack of information:

- *Misunderstanding the Smart City Concept:* Many residents may be unfamiliar with what a smart city entails, leading to confusion about its goals, technologies, and potential benefits. This can foster scepticism and resistance to change.
- *Concerns About Change:* Uncertainty about how the development will affect existing neighbourhoods, social structures, and local cultures may result in fears of gentrification, loss of identity, and displacement.
- *Limited Engagement Opportunities:* When community members lack access to timely and accurate information, they may feel excluded from the planning process, which can create feelings of disenfranchisement.
- *Perceived Lack of Transparency:* A lack of clear and open information can be perceived as a lack of transparency from the developers, potentially eroding trust between the community and the project's promoters.

Mitigation Measures

- *Information Campaign:*

Launch a targeted information campaign that clearly explains the smart city concept, its key features, and the anticipated benefits of the Constance Smart City project. Use diverse platforms such as social media, local newspapers, radio, and community bulletin boards to reach a broad audience.

- *Dedicated Project Website:*

Develop a user-friendly project website that serves as a central hub for all relevant information, about the Constance Smart City. This should include FAQs, project timelines, interactive maps, regular updates and contact information for community outreach personnel.

- *Collaboration with Local Leaders:*

Engage local leaders, community influencers, and organizations to act as trusted intermediaries between the project promoters and residents. Their involvement can help facilitate meaningful dialogue, address resident concerns, and build trust within the community.

15.0 Environmental Monitoring Plan and Management

The Environmental Monitoring and Management Plan (EMP) will provide a set of guidelines under which the developer and the appointed contractor shall carry out their activities, ensuring that proper attention is given to implementing the planned impact mitigation measures. It is the responsibility of the developer to ensure that the environment control measures outlined in this plan are followed by all parties under their authority and that all work proceeds in compliance with all relevant environmental regulations.

The main objectives of the EMP are to:

- Define the roles and responsibilities for implementation, including designated environmental liaison contacts for both the developer and the appointed contractor.
- Summarise the project specific activities and planned impact mitigation measures, in line with the SEA report and associated SEA License.
- Establish a standardized format for monitoring the environmental performance of the project.
- Provide regular status reports to the Director of Environment and other concerned authorities regarding the rate of progress on site.
- Report regularly on compliance with the conditions of the SEA License.
- Maintain a record of environmental complaints, incidents, and the actions taken in response.

Tables 13 and **14** present the environmental monitoring plans for the construction phase and the operation phase, respectively.

15.1 Environmental Monitoring Plan for Construction Phase

Table 13: Environmental Monitoring Plan for the Construction Phase

Environmental Aspects	Purpose	Parameter/ Indicator	Resource Implications	Frequency	Responsibility
Air Quality	To ensure dust and pollutants emissions.	PM10, PM2.5, Nox, dust deposition	Air monitoring stations/ sensors	Weekly	Contractor Environment consultant
Noise & Vibration	To protect nearby residents and workers from excessive noise and vibration	dB(A) levels	Noise monitoring apparatus	Weekly	Contractor Environment consultant
Water Quality	To prevent contamination of surface and groundwater	Turbidity, TSS, pH, oil/grease, heavy metals	Water tests	Weekly	Contractor Environment consultant
Soil & Sediment	To detect soil erosion or accidental contamination	Erosion, spills, contaminants	Visual inspections; lab tests if contamination suspected	Monthly	Contractor

Table 13: Environmental Monitoring Plan for the Construction Phase (Cont'd)

Environmental Aspects	Purpose	Parameter/ Indicator	Resource Implications	Frequency	Responsibility
Waste Management	To ensure safe handling, segregation, and disposal of all wastes.	Volume and type of construction, domestic and hazardous waste	Waste logs & on-site inspection	Weekly	Contractor
Biodiversity & Green Spaces	To minimise disturbance to existing flora and fauna	Tree removal, wildlife presence	Site inspection	Monthly	Contractor Biodiversity specialist
Traffic & Transport	To reduce congestion and accidents near the site.	Vehicle counts, traffic incidents	Traffic surveys, local reports	Weekly	Contactor
Health & Safety	To safeguard workers from dust, noise, and chemical exposure.	PPE usage, health records	Inspections	Daily	Contractor HSE officer

15.2 Environmental Monitoring Plan for Operation Phase

Table 14: Environmental Monitoring Plan for the Operation Phase

Environmental Aspects	Purpose	Parameter/ Indicator	Resource Implications	Frequency	Responsibility
Air Quality	To maintain healthy ambient air and meet national standards.	PM10, PM2.5, NOx, O_3	Air monitoring stations, IoT sensors	Monthly	Management team of the smart city
Noise	To ensure acceptable sound levels for residents and the smart city surroundings.	Ambient noise levels	Noise meters, IoT-based monitoring	Monthly	Management team of the smart city
Water Resources	To safeguard potable water, reduce losses, and control wastewater discharge.	Consumption, quality, wastewater parameters	Smart meters, lab testing	Monthly	Management team of the smart city
Waste Management	To promote high recycling rates and safe e-waste disposal.	Solid waste generation, recycling %, e-waste collection	Waste tracking systems, Waste logs	Monthly	Management team of the smart city

Table 14: Environmental Monitoring Plan for the Operation Phase (Cont'd)

Environmental Aspects	Purpose	Parameter/ Indicator	Resource Implications	Frequency	Responsibility
Energy	To track efficiency and renewable integration.	Total consumption, renewable share	Smart grid data, IoT sensors	Monthly	Management team of the smart city
Biodiversity and Green Spaces	To maintain and enhance urban green cover and biodiversity.	Vegetation cover, species counts	Field surveys	Quarterly	Landscaping officer
Climate & Resilience	To monitor climate-adaptation performance.	Temperature, flood events	Temperature sensors, flood gauges	Quarterly	Smart city environmental department
Transport & Mobility	Promote sustainable mobility and reduce congestion.	Public transport use, EV adoption, traffic volumes	Smart traffic monitoring, IoT sensors	Monthly	Management team of the smart city

16.0 Sustainability Aspects and Enhancement Opportunities

16.1 Sustainability Aspects

In the development of smart cities, sustainability is of paramount importance, serving as the cornerstone for creating resilient, efficient, and liveable urban environments. As urban populations continue to grow, balancing technological advancements with environmental stewardship becomes increasingly critical. Integrating sustainable practices into smart city projects, including agri urbanism, not only mitigates the environmental impact through energy efficiency, waste reduction, and resource conservation but also enriches the residents' quality of life, health, and food security.

This section outlines key strategies and proposed initiatives for achieving a sustainable, smart environment:

- Solar Street Lighting
- Solar PV System
- Wind Energy
- Rainwater Harvesting
- Heat Recovery System
- Agri Urbanism

16.1.1 Solar PV System

Achieving self-sufficiency through the use of green renewable energy is a major objective in the design of the Smart City electrical infrastructure. Accordingly, solar photovoltaic (PV) systems have been proposed to reduce both the electrical energy (kWh or MWh) required from the Central Electricity Board (CEB) and the overall demand (kW or MW) placed on the CEB grid.

By generating a substantial portion of its own electricity, the smart city aims to significantly reduce its dependence on the CEB grid. Combined with Battery Energy Storage Systems (BESS), this approach ensures a more stable and reliable energy supply, while also protecting against price volatility and potential disruptions. Solar PV systems generate electricity without emitting greenhouse gases, contributing to a significant reduction in the smart city's carbon footprint.

To maximise the integration of solar PV technology in the Smart City, all existing and future CEB Solar PV Schemes will be studied on a case-by-case basis, in line with plot development planning. The most suitable scheme will then be selected for implementation. The different options proposed by the promoter are illustrated in **Figure 49**.

Figure 49: Proposed Solar PV Systems for the Smart City

The percentage of energy met by PV was calculated using the weather file and the annual global radiation of the Smart City location. The results are tabulated below as **Table 15**.

Table 15: Projected Electricity Generation from PV Panels

Annual Electricity	Energy [kWh]
Consumption	37,701,002
Production	31,578,711
Percentage of Total Electrical Energy met by PV Panels	84%

16.1.2 Solar Lighting

Standalone solar PV streetlights offer significant environmental benefits and installation cost savings, despite their higher initial costs and their need for ongoing battery maintenance. These systems are particularly well-suited for remote or off-grid areas.

One of the core goals of a sustainable smart city is to maximize energy efficiency. Solar PV streetlights contribute to this objective by harnessing renewable energy and reducing

dependence on non-renewable resources. The use of standalone solar PV streetlights results in substantial energy savings. According to the state-of-the-art analysis, the Constance Smart City project could save 47,260 kWh of electricity annually, leading to a significant reduction in demand on the national grid and easing the load on existing infrastructure.

16.1.3 Wind Energy

Another sustainable method for electricity generation is the use of wind energy. An analysis was conducted to assess the wind power potential in the area, revealing a maximum wind speed of 13.90 m/s and an average wind speed of 4.18 m/s. The high maximum wind speed recorded indicates favourable conditions for the operation of wind turbines.

Flower turbines, as shown in **Figure 50,** represent a new type of wind turbines capable of operating in very light winds, as low as 0.7 m/s. They are versatile and suitable for small, medium and large-scale applications. For smaller-scale projects, they can be installed on rooftops or at ground level; for larger-scale installations, they are typically ground-mounted.

These turbines enable renewable energy generation even in low-wind conditions, advancing the transition to cleaner power sources. Additionally, flower turbines can be installed in a “bouquet effect” configuration, which enhances overall system performance by improving the output of neighbouring turbines through aerodynamic synergy.

Figure 50: Flower Wind Turbines

Flower wind turbines can be easily incorporated into the green spaces of the smart city due to their aesthetic appeal. Their unique design allows them to blend harmoniously with the natural environment, enhancing the overall visual quality of parks, gardens and other landscaped, green areas.

16.1.4 Rainwater Harvesting

Rainwater collected from the rooftop of each building will be stored in dedicated tanks and used for toilet flushing, cleaning purposes and irrigation. This system will act as a supplementary water supply, reducing reliance on potable water sources and helping to conserve freshwater resources. It will also alleviate strain on wastewater treatment systems by minimizing rainwater runoff from impermeable hard surfaces that would otherwise seep into the sewage treatment systems.

Calculations and analysis indicate that rainwater harvesting would be beneficial, meeting the full water demand for toilet flushing and providing a substantial quantity for irrigation purposes. As such, it is recommended that the capture, treatment and use of rainwater be included in the specification document for all the plots. Further details regarding the potential rainwater yield is provided in the MEP report attached as **Annex 27**.

Rainwater could be stored in traditional above ground tanks, either custom built or bought off the shelf. However, innovative technologies such as the **ACO Stormbrixx** system can also be employed. ACO Stormbrixx is a modular, plastic geocellular management system made from recyclable polypropylene. It is proposed as an alternative to conventional tanks for rainwater harvesting.

The system consists of modular units that can be assembled in various configurations to suit different site requirements. Typically installed underground, the system can be:

- Surrounded by a geotextile membrane (when used as a soakaway) to prevent soil particles from entering the system while allowing water to pass through.
- Lined with impermeable sheets to form a sealed underground rainwater collection tank.

Figure 51 shows the ACO Stormbrixx.

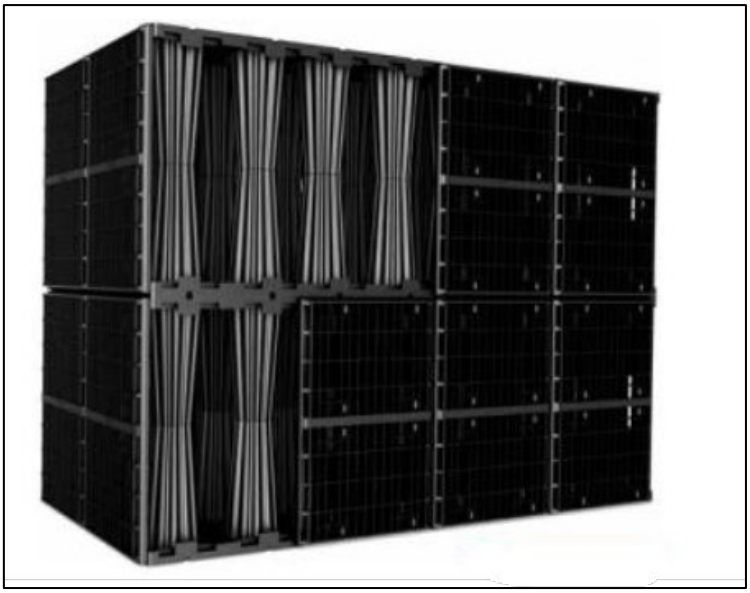


Figure 51: ACO Stormbrixx

16.1.5 Heat Recovery System

16.1.5.1 Liquid Cooling Energy

A liquid cooling system uses a liquid medium to dissipate the heat generated by batteries through convective heat exchange. The structure of this system typically includes one or more curved water pipes embedded within the casing. During operation, the inlet and outlet of these pipes are connected to an external circulating water system. This system delivers cold water to the embedded pipes. As the cold-water travels along the pipes, it absorbs heat from the walls, which is emitted by the batteries. Consequently, the cold water warms up, and the heated water returns to the circulating water system from the pipe outlet.

The liquid cooling energy system is proposed as a potential heat recovery solution, producing hot water that can be distributed to residential buildings. By utilising the waste heat generated by energy storage components, this approach enhances the overall energy efficiency of the system and contributes to reducing electricity consumption. A schematic of the liquid cooling system is provided in **Figure 52**.

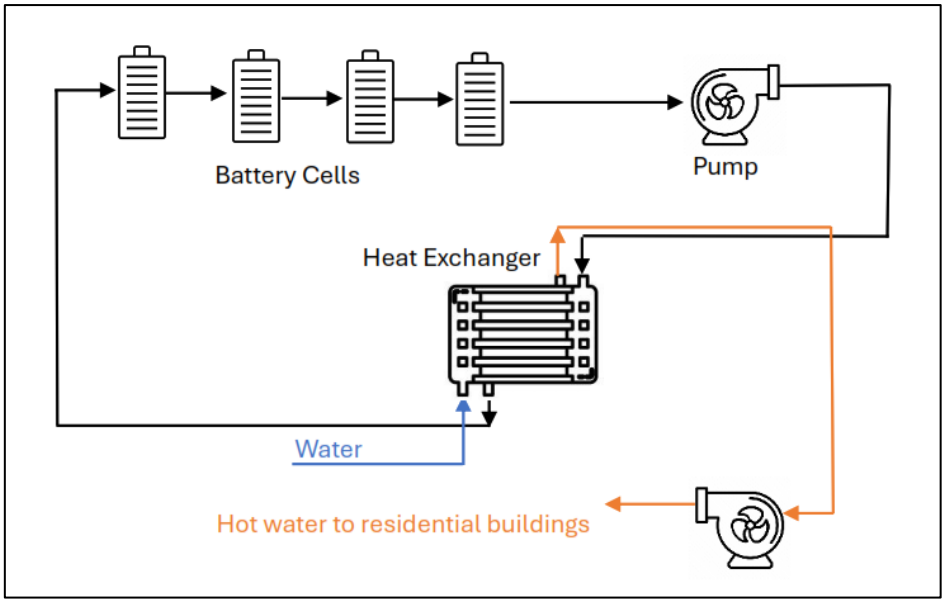


Figure 52: Liquid Cooling System

16.1.5.2 Heat Recovery from Chiller

In a heat recovery system, a heat exchanger is integrated into the chiller's cooling loop. This exchanger captures the heat rejected by the chiller's condenser. The captured heat is then transferred to a secondary loop that circulates through a water heating system. The heat transferred to the secondary loop is used to warm water in a storage tank. This process can be either direct, where the recovered heat directly warms the water, or indirect, where a heat exchanger in the tank transfers heat from the secondary loop to the water. The heater water is then stored in insulated tanks for later use. It is proposed to implement this heat recovery system to produce hot water for distribution to residential buildings. A schematic for heat recovery system from the chiller is provided in **Figure 53**.

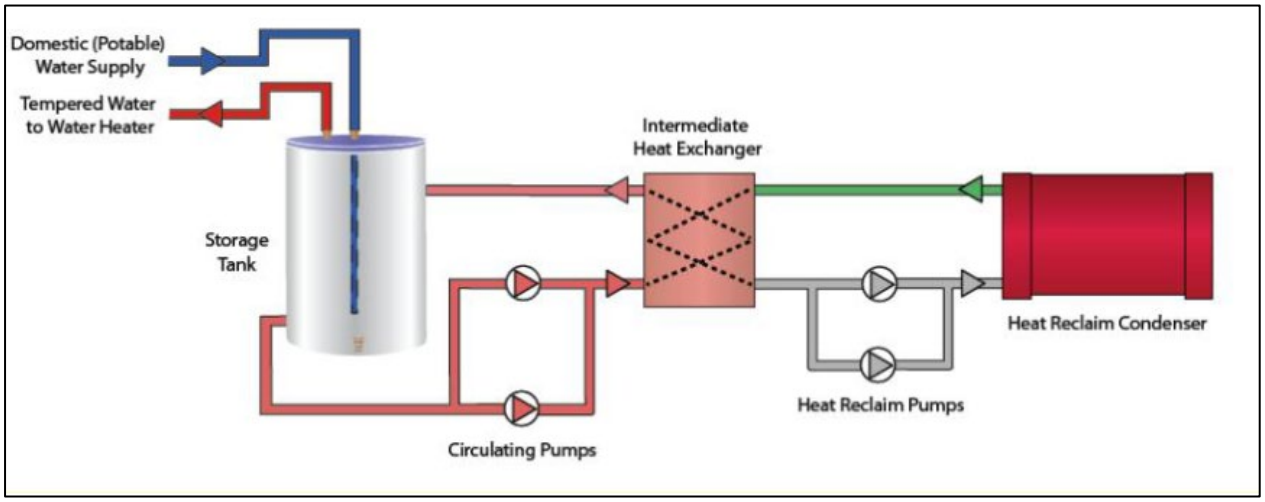


Figure 53: Heat Recovery System

16.1.6 Agri Urbanism

The Smart City's masterplan is based on the principle of Agri-Urbanism with nearly 30% of the land area dedicated to green spaces. An Agri Park will be established within certain sections of these buffer zones. This initiative will not only enhance the environmental and recreational value of the area but will also serve as a productive landscape, promoting sustainable land use while maintaining the floodplain's core function.

Incorporating an agri-urbanism aspect into this project will help to integrate agricultural practices into the urban landscape, creating sustainable and resilient communities. Urban farms, community gardens, and green corridors throughout the development would enhance food security, reduce carbon footprint, improve air quality, and foster social cohesion through shared green spaces. Adoption of smart technologies would help to optimize resource efficiency, while offering educational opportunities that would promote and cultivate environmental stewardship among residents. This innovative model addresses food security and climate challenges while enriching quality of life, creating vibrant neighbourhoods where productivity and liveability coexist harmoniously.

16.2 Enhancement Opportunities

Constance Village Smart City presents numerous enhancement opportunities for Flacq, a region experiencing growing urbanisation and economic potential. Upgrading the smart city's infrastructure with Internet of Things (IoT) sensors will enable real-time monitoring of roads, water systems, and utilities – facilitating predictive maintenance and reducing service disruptions. Smart transportation systems such as intelligent traffic management, traffic monitoring, and integration of electric vehicle (EV) infrastructure will help alleviate congestion and reduce carbon emissions, particularly during peak tourism seasons and market days. Sustainable energy initiatives, such as the installation of smart meters, support for rooftop solar panels, and the transition to a smart grid, will enhance energy efficiency and resilience. The water and waste management systems will be modernized using real-time water monitoring and billing, leak detection sensors, automated irrigation for public spaces, and optimised garbage collection, coupled with community recycling incentives. These IoT measures will be implemented in a phased approach once a critical mass of inhabitants is reached.

Enhanced urban governance can be achieved through digital platforms that allow residents to access public services, submit feedback, and participate in decision-making. The smart city will also improve healthcare access in the region of Flacq with the implementation of new healthcare facilities such as private clinics. Similarly, the education system in the region will be enhanced by upgraded infrastructure and services supported by the development of the smart city initiative.

From an economic standpoint, the Constance Village Smart City will not only serve specific demographics but will also encourage local businesses to thrive, thereby contributing to local development. Environmentally, the smart city will deploy smart air and water quality sensors, manage green spaces and mitigate urban heat island effects with increased tree cover. Overall, the development of the smart city will follow a holistic approach, balancing innovation, sustainability, inclusiveness, and participatory governance, thereby creating a vibrant, resilient, and liveable urban environment for both residents and visitors.

17.0 Project Alternatives

The principal alternatives in the context of the project are:

- The ‘Do Nothing’ option
- Alternative location
- Alternative Project

17.1 “Do Nothing” Option

The first and most fundamental alternative considered is the "Do Nothing" scenario, which involves maintaining the site in its current state. While this alternative would avoid any environmental disruption and preserve the natural landscape, it would also mean forgoing opportunities for economic revitalization, infrastructure development, and improvements in the quality of life for the local population.

17.2 Alternative Location

The second alternative involves identifying a different site for the smart city development. The proposed site for the Constance Village Smart City is owned by Constance La Gaiete Company Ltd. The proponent is a wholly owned subsidiary of Constance La Gaiete Company Ltd. The site has been strategically selected due to its prime location in a dynamic area, nestled between pristine beaches and luxury hotels of the east and the vibrant, authentic and ever-expanding town of Flacq. Relocating the project would undermine the strategic advantages of the current Flacq site, including its central location in the eastern region, proximity to existing road infrastructure, and potential for integration with surrounding communities.

17.3 Alternative Project

Another alternative explored is the alternative land use scenario, where the site could be repurposed for different developments, such as an agro-processing hub, ecotourism facility, or recreational green zone. While these uses could offer environmental advantages through lower-intensity development, they may not fully meet the long-term regional demand for residential, commercial, and technological infrastructure that the smart city aims to provide.

18.0 Public and Stakeholder Consultation

18.1 Public Consultation

A public and stakeholder consultation was held on Monday 7th April 2025 at Le Comptoir Café, Constance (see **Figure 54**) to present an overview of the project, outline potential social and environmental impacts and discuss the proposed mitigation measures.

Figure 54: Public Consultation

A notice of the public and stakeholder consultation was published in the daily newspaper, L'Express' on 31st March 2025. Invitation cards were sent to 70 residents of Centre de Flacq, Poste de Flacq and Pont Blanc. In addition, invitations were extended to local NGOs, the Eastern Police Division, Flacq Police Station, the Mauritius Fire and Rescue Service of Flacq and managers of nearby schools.

The consultation began with welcome address by the Chief Executive Officer (CEO) of Constance Group who gave a brief introduction of the project. This was followed by a detailed presentation of the smart city project by the head of property who gave a thorough explanation about (1) the aim and objectives of the project (2) the vision of the promoter for the region and (3) the different aspects of the project. SRM Ltd then presented the potential environmental

and social impacts that may arise during the different phases of the project, along with the proposed mitigation measures to address these issues.

A summary of the questions and answers from the public consultation is provided in **Table 16** below.

Table 16: Q&A During Public Consultation

Questions	Answers
1) With such a big project, I believe that traffic congestion will increase. As you are aware nowadays traffic congestion is a major problem in the region. What are the measures that will be taken to reduce traffic congestion?	Indeed, traffic congestion is a major problem in the area. However, it is to be noted that the planning and design of this project has been done in consultation with concerned authorities. A traffic impact assessment was carried out to assess the impact of different phases of the project on the traffic. We are coming up with improvements at the different junctions and safety measures will be implemented. We are studying the project area to come up with solutions that will be to the satisfaction of the authorities. One of the advantages of such a development is the improvement of infrastructure, for example, some existing T-junctions will be changed to roundabouts. Dual carriageways will also be built. We are well aware of the current situation, and we have specialized traffic consultants working with us. We cannot go ahead with any project without the approval of authorities. We also want to ensure mobility and accessibility; we do not want people to travel long distances to buy their commodities but to rather have everything accessible within close proximity.
2) Who will be responsible for the maintenance of the smart city in the long run? Will Constance ensure maintenance of the smart city?	The project will be done under the Smart City Scheme. The advantage of the smart city scheme is that we will have governance in this region. There will be different neighbourhoods with different associations. There will be different owners, especially in the residential area. There will be a syndic. For example, if there is a morcellement in the project, the syndic will be elected by the owners and will be responsible for the maintenance. The advantage is that we will have various such syndics in apartments, commercial spaces and residential areas. All these will form part of the 'Cahier des Charges'. There will be a syndic fee based on the cost of maintenance for all these spaces. The most interesting part is that the owners will be responsible for everything. Constance will keep part of the area, for example, the offices, sports amenities, commercial development, etc. and there will be associations that will be in charge of the area. There will be a budget for all maintenance as the 'Cahier des Charges' drafted by a notary. Solid waste management and others will be part of it.

Table 16: Q&A During Public Consultation (Cont'd)

Questions	Answers
3) Is it project meant for the Mauritians or for foreign people?	This project is being done for Mauritians. It is important to develop the region in a good way. The planning and management of the project is important.

In general, the attendees welcomed the proposed development and expressed interest in the positive impacts and benefits the project is expected to bring to the region. The notes of meeting of the public consultation are provided in **Annex 29**.

18.2 Stakeholder Consultation

During the planning stage of the smart city project, the promoter held several consultations with different authorities to ensure the project aligns with government regulations. A summary of the meetings conducted is presented in **Table 17** below.

Table 17: Meetings and Permit Applications from Authorities

Date	Authority	Purpose
29/06/2023	LDA	Masterplan presentation
29/06/2023	RDA	Masterplan presentation
29/06/2023	TMRSU	Masterplan presentation
27/09/2023	Flacq representatives	Masterplan presentation
27/12/2023	EDB	Application Letter of Comfort Submitted for Constance Village project
12/01/2024	EDB	Additional information submitted to EDB for Constance Village project
19/01/2024	EDB and Technical Committee	Site Visit held with authorities for Constance Village project
24/01/2024	EDB and Technical Committee	EDB technical committee for Constance Village project
16/02/2024	LDA	LDA Technical committee to present drainage strategy for Constance Village project
19/03/2024	TMRSU-LDA	Traffic and drainage strategy presentation for Constance Village project
25/06/2024	EDB	Presentation to EDB Constance Village Project
10/07/2024	EDB	Letter of Comfort received (dated 06.06.24)
17/07/2024	TMRSU-RDA	Road Network Masterplan and Validation of TIA assumptions for Constance Village project
15/11/2024	EDB	Application Letter of Intent for Constance Village project
26/12/2024	MOE	Application submitted for PER for new Poultry Farms in upper Constance
16/01/2025	EDB and Technical Committee	Presentation to all authorities of Constance Village project
28/01/2025	MOA	Presentation of Constance Masterplan for the region 2025-2030
04/02/2025	LDA	Drainage Masterplan and DIA (Drainage Impact Assessment) report presentation
04/02/2025	MOA	Land Conversion Application submitted for Commercial and Recreational Development

Table 17: Timeline of Meetings Conducted with Authorities (Cont'd)

Date	Authority	Purpose
19/02/2025	Flacq representatives	Presentation of Constance Masterplan for the region 2025-2030
20/02/2025	TMRSU	Road Network Masterplan and TIA report presentation for Constance Village project
07/03/2025	RDA-TMRSU	Road Network Masterplan and TIA report presentation for Constance Village project
03/04/2025	TMRSU	Road Network Masterplan and TIA report presentation for Constance Village project
07/04/2025	Stakeholders & General Public	Presentation to Public and Region Stakeholders of Constance Village project & Commercial and Recreational Development
08/04/2025	LDA	Drainage Masterplan and DIA (Drainage Impact Assessment) report presentation for Constance Village project
17/04/2025	MOE	SEA Application submitted for Constance Village project
25/04/2025	MOE	EIA Application submitted for Commercial & Recreational Development
06/05/2025	CWA	Water Network Strategy Presentation for Constance Village project
15/05/2025	FDC	Presentation of Constance Village project
21/05/2025	CEB	Electricity Network Strategy Presentation for Constance Village project
21/05/2025	CWA	Water Network Strategy Presentation for Constance Village project
23/05/2025	RDA	Road Network Masterplan and TIA report presentation for Constance Village project
26/05/2025	MOA	Land Conversion Application for Residential Project (Behind Commercial)
27/05/2025	FDC	Presentation of Constance Village project
02/06/2025	MOE	Presentation to MOE and all authorities of Constance Village project
06/06/2025	MOE	Site Visit held with authorities for Commercial and Recreational Development

Table 17: Timeline of Meetings Conducted with Authorities (Cont'd)

Date	Authority	Purpose
18/06/2025	Police-Emtel-MT	Site visit in relation to Mall offsite works
23/06/2025	MT	Site visit in relation to Mall offsite works
23/06/2025	FDC	Application submitted for BLUP demolition poultry
08/07/2025	CWA	Site visit with CWA in relation to mall project water supply
10/07/2025	FDC	BLUP demolition poultry that is onsite received
15/07/2025	CWA	Site visit with CWA in relation to mall project water supply
22/07/25	MOA	Land Conversion Application for poultry farms
07/08/2025	FDC	LCP Application for Residential projects near La Maison 1794 submitted
29/08/2025	EDB	Letter of Intent for Smart City received
17/10/25	MOE	EIA Licence received for Commercial & Recreational Development
23/10/25	MOE	PER Licence received for new poultry farms

19.0 Decommissioning

The decommissioning principle refers to the process of safely and effectively dismantling and disposing of a system or asset that has reached the end of its useful life or is no longer needed. This process typically involves several key steps, including:

- Developing a comprehensive decommissioning plan.
- Assessing potential environmental and health risks
- Safely removing and disposing of hazardous materials
- Ensuring compliance with all relevant regulations and guidelines throughout the process.

Effective decommissioning requires careful planning, collaboration among stakeholders, and a thorough understanding of potential risks and challenges associated with dismantling and disposing of large-scale systems and infrastructure.

It is neither likely nor anticipated that the smart city will require full decommissioning. The purchase of land and the construction of built infrastructure represent major long-term investments, intended to be maintained and sustained well into the future. No foreseeable conditions suggest that decommissioning the smart city or its associated structures would be economically viable or necessary.

Some parts of the infrastructure may, however, in time, require replacement rather than repair – particularly equipment located within office spaces and the industrial segment of the smart city. Should this become necessary, the smart city management will need to ensure that appropriate measures are implemented to recycle as much as possible of the materials and dispose of any waste in a responsible manner, according to applicable regulations.

Particular care must be taken when removing or replacing STP components. All wastewater and residues must be managed and disposed of by a licensed waste operator. Additionally, soil and groundwater monitoring will be essential during and after any decommissioning activities, especially in industrial or high-activity areas of the smart city, to assess potential contamination risks. The disposal of hazardous materials - including electronic waste, batteries, solar panels, and any contaminated construction materials – will follow national environmental standards and international best practices.

Any future decommissioning will fully comply with the regulations in force at the time. The end-goal of the decommissioning principle is to return the land to a condition equal to or better than it was pre-development.

20.0 Conclusion

The Strategic Environmental Assessment (SEA) for the proposed Constance Village Smart City has demonstrated that, when implemented in accordance with the proposed mitigation and management measures, this initiative can be developed in an environmentally sustainable and socially responsible manner. The study has evaluated the potential environmental, social, and economic impacts associated with the smart city and outlined strategies to minimize adverse effects while enhancing positive outcomes.

The smart city is envisioned as a sustainable urban development that integrates environmental stewardship, technological innovation, and social inclusivity. Through careful planning and design, the project will optimize land use efficiency, protect natural resources, and promote the transition towards a low-carbon and climate-resilient future. Key features – such as renewable energy generation, green infrastructure, efficient water and waste management systems, and biodiversity conservation initiatives – form the backbone of the city's sustainability strategy.

From a socio-economic perspective, the project is expected to significantly contribute to the regional development of Flacq by creating employment opportunities, attracting investment, and improving quality of life through enhanced infrastructure, public services, and recreational spaces. The participatory consultation process has ensured that the views and expectations of local communities have been meaningfully incorporated into the project's vision and implementation framework.

With the integration of smart technologies, sustainable mobility systems, and resilient urban planning principles, the Constance Village Smart City will serve as a model for future urban developments in Mauritius. The project aligns with the objectives of the Smart City Scheme and Vision 2030, fostering economic growth while maintaining harmony with the environment.

The findings of the SEA support the implementation of Constance Village Smart City, subject to ongoing environmental monitoring, adaptive management, and full compliance with all relevant regulatory frameworks. With these measures in place, the development is expected to deliver lasting environmental, social, and economic benefits for the eastern region and for Mauritius as a whole.

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