SAINT VINCENT AND THE GRENADINES

GROUNDWATER SOURCES AT HIGHER ELEVATIONS TO BE CONNECTED TO SANDY BAY AND OWIA SYSTEMS

REPORT 4 -Vol 3:

Environmental and Social Impact Assessment of Overland, Fancy and Perseverance interventions

V05 **18/01/2024**

THE GOVERNMENT OF ST. VINCENT AND THE GRENADINES

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SAINT VINCENT AND THE GRENADINES

VEEP
VOLCANIC ERUPTION EMERGENCY PROJECT

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Groundwater sources at higher elevations to be connected to Sandy Bay and Owia systems

PROJECT REFERENCE: SVG-VEEP-CS-QCBS-

REPORT 4-VOL 3:

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V05

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Table of Contents

List of Tables

List of Figures

ABBREVIATIONS

AWWA	American Water Works Association
bgl	Below ground level
BH	Borehole
BRAGSA	Buildings Roads and General Services Authority
CHMP	Cultural Heritage Management Plan
Coc	Code of conduct
CWSA	Central Water and Sewerage Authority
DTH	Down-the-hole-hammer
ESIA	Environmental and Social Impact Plan
ESCP	Environment and Social Commitment Plan
mamsl	Meters above mean sea level
MoFEP	Ministry of Finance, Economic Planning and Information Technology
NOAA	National Oceanic and Atmospheric Administration
PAP	Project Affected Persons
PIU	Project Implementing Unit
PV	Photovoltaic
RAP	Resettlement Action Plan
RDM	Redress Mechanism
SEA	Sexual Exploitation and Abuse
SDS	Safety Data Sheet
SEP	Stakeholder Engagement Plan
SH	Sexual Harassment
SVG	Saint Vincent and the Grenadines
SWL	Static Water Level
UTM	Universal Transverse Mercator
VEEP	Volcanic Eruption Emergency Project
WB	World Bank
WSS	Water Supply System

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1 EXECUTIVE SUMMARY

This Environmental and Social Impact Assessment (ESIA) represents part of the third report under scope of works of the lumpsum contract between the Government of Saint Vincent and the Grenadines and CES. The contract involves a number of specific tasks which also include design and supervision, of water supply improvement works to assist recovery efforts under the Volcanic Eruption Emergency Project (VEEP) following the eruption of the La Soufriere Volcano between December 2020 and April 2021.

The intakes and treatment system of the existing water supply systems of Fancy, Owia and Sandy Bay, which are supplied from surface (river) water sources situated on the slopes of the La Soufriere volcano, were damaged by the eruption. During moderate to heavy rainfall events, the thick layers of ash and pyroclastic material that were deposited on the slopes of the volcano are periodically washed into the supply river channels in the form of mudflows resulting in the blockages of intakes, high turbidity in the water supply from these sources, and closures of the system by CWSA.

The damage and destruction of many homes and industries situated along the river channels emanating from the summit of the La Soufriere volcano required the mandatory relocation of many residents and some industries to much less vulnerable areas at Orange Hill and Waterloo which are supplied by the Perseverance source. The existing surface water Perseverance system is supplied by intake, treatment and storage structures on the slopes of Morne Garu, situated to the South of the La Soufriere volcano and while considered much less vulnerable to mudflows, presently experiences new and repeated shutdowns due to heavy rainfall and high turbidity. This is coupled with the new increased demand from housing development and the relocated Arrowroot and other Agriculture industries. These recent developments will require significant improvements in both the quality and quantity of water available for consistent transmission and distribution.

CWSA's intention is to address these issues and ensure stable and sustainable supply to its consumers in the face of these operational challenges.

A separate ESIA and an ESMP, Volumes 1 and 2 respectively, were submitted for borehole construction and testing exercise at Overland to determine the potential of ground water sources in the face of the challenges experienced with surface water sources. The additional works on the wider system will be captured in this present Volume 3 the ESIA, and Volume 4, the ESMP.

It is noted that under the World Bank's Environmental and Social Framework (ESF), these additional works are considered of moderate significance with their potential impacts being able to be managed by the application of the relevant practical mitigative measures.

2 INTRODUCTION AND PROJECT BACKGROUND

On the 27th December, 2020 the La Soufriere volcano, located in the north of Saint Vincent and the Grenadines began an effusive eruption which on the 9th April of the next year 2021, became an explosive eruption. This continued until 22nd April after which volcanic activities remained low through to 27th April 2022

The northern half of the island (red hazard zone) was the most significantly affected and an evacuation order issued for all residents within the affected zone. The lahar flows from the volcano and subsequent heavily turbid and sedimented flows during heavy rainfall afterwards damaged the water catchment, treatment and distribution facilities in the area. This caused an interruption in the water supply for the area for a few months before a "makeshift" restoration could be accomplished between June and September 2021(CES Inception report 2023)

The Government of Saint Vincent and the Grenadines (GoSVG) received financing from the International Development Association (IDA, The World Bank) towards a Volcanic Eruption Emergency Project (VEEP) to support the recovery effort. The Project Development objective of the VEEP is to:

• provide short-term income support,

• improve the capacity of the government to prepare for and respond to emergencies, and

• build back better critical services in the aftermath of the La Soufriere volcano eruption.

The present project the "Groundwater Sources at Higher Elevations to be Connected to Sandy Bay and Owia Systems" is a subproject under the VEEP umbrella and includes:

1) the development of a water supply system using ground water source at Overland to connect to the existing surface water systems at Sandy Bay and Owia,

2) the improvement of water purification on the Perseverance water supply system

3) the improvement of the existing Fancy water supply system.

2.1 Overall Objectives of the Lump Sum Contract for the Design of VEEP Water Component

The Overall objective of this lump sum contract for the VEEP water project component has been highlighted in the inception Report and is as follows:

- Assessment, testing and design of well field at Overland to meet the required demand considering more than one well if necessary, using solar power system and their associated facilities.
- Review hydraulic design of the pump main and all distribution pipelines and storage.

- Design of a water treatment facility at Perseverance to increase capacity from 35 m3/h to a minimum of 70 m3/h and the proposed distribution extensions.
- Design of a new surface water intake structure at Fancy and water treatment facility with minimum capacity of 5 m3/h.
- Prepare Environmental and Social Impact Assessments (ESIAs), Environmental and Social Management Plans (ESMPs) and if needed, Resettlement Action Plans (RAPs), for all proposed facilities in accordance with Environmental and Social Management Framework (ESMF).
- Preparation of tender documents for procurement of works, services, material and equipment, as well provide technical support (for example evaluation of all bids, contract negotiations) to CWSA during the procurement process.
- Ensure that tender documents for procurement of works, duly incorporate and take into consideration the requirements (as applicable) of the Environmental and Social Standards (ESS) of the Environmental and Social Framework (ESF) of the Bank-this includes the provisions of the ESMF, Labor Management Procedures (LMP), RPF, SEP, and the Environmental and Social Commitment Plan (ESCP).
- Review, and ensure sure that relevant aspects of the ESCP and ESS documents are incorporated into the Environmental Social Health and Safety (ESHS) specifications of the procurement documents. Support with monitoring, to ensure that the consultants/contractors comply with the ESHS specifications of their respective contracts.
- Supervision of construction of the works contract.

2.2 Justification for Project Interventions

The following provides the justification for the proposed works to improve the water supply systems within the Fancy, Owia, Sandy Bay and Perseverance areas.

2.2.1 Fancy, Owia and Sandy Bay Water Supply Systems

Currently the three (3) existing water supply systems of Fancy, Owia and Sandy Bay are supplied from surface (river) water sources situated on the slopes of the La Soufriere volcano that recently erupted explosively in April 2021. These eruptions resulted in the destruction of intake and treatment structures in the rivers. The deposition of thick layers of ash and pyroclastic material that now sit on the slopes of the volcano covered the vegetation and soils, preventing percolation, with every moderate to heavy rainfall event, are periodically washed into the supply river channels in the form of mudflows. The consequence of every moderate to heavy rainfall event with the resulting mudflows is therefore an interruption of the water supply from these sources due to high turbidity, blockages, and closures. This situation presents operational challenges for the CWSA with its engineering department being on constant alert for heavy mudflows, and having to finance and manage repeated cycles of damage and restoration.

2.2.2 Perseverance Water Supply System

One of the major impacts of the recent volcanic eruptions was extensive damage and destruction to many homes and industries situated along the river channels emanating from the summit of the La Soufriere volcano. This resulted in the mandatory relocation of many residents and some industries to much less

vulnerable areas at Orange Hill and Waterloo, both situated just North of the Rabacca River and presently supplied by the Perseverance source. The existing surface water Perseverance system is supplied by intake, treatment and storage structures on the slopes of a separate mountain, Morne Garu, situated to the South of the La Soufriere volcano. Although this system is considered much less vulnerable to mudflows, it presently experiences new and repeated shutdowns due to heavy rainfall and high turbidity. Of equal importance is the new and increased demand now being placed on this system due to new residential housing and the relocation of the Arrowroot and other Agriculture industries. These recent developments will require significant improvements in both the quality and quantity of water available for consistent transmission and distribution.

CWSA's intention is to address these issues and ensure stable and sustainable supply to its consumers.

Figure 1 below provides a simple pictorial of the water infrastructure that was affected after the Volcanic Eruption for refence.

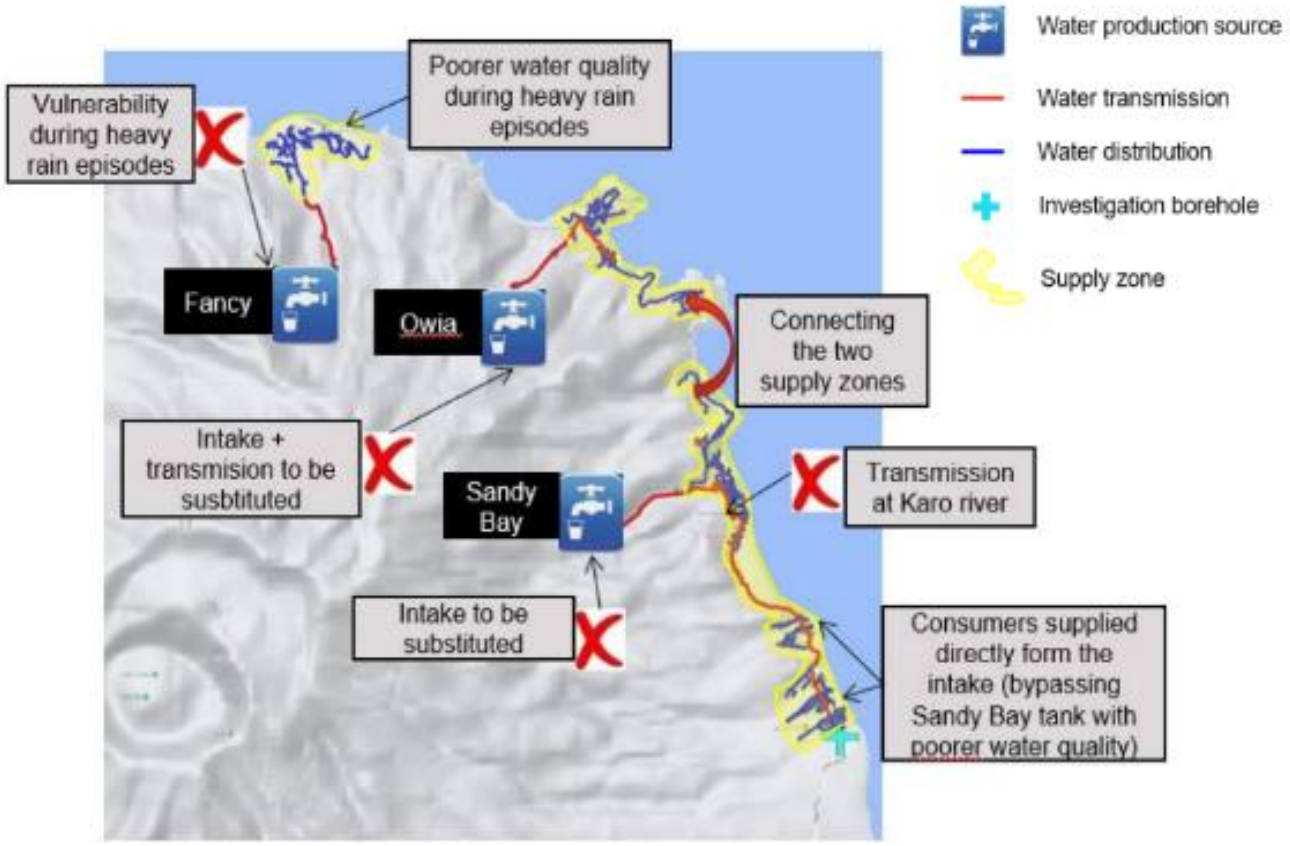

Figure 1 Affected Water Infrastructure after the Volcanic Eruption.

2.3 Scope of Works

The general scope of interventions represented by the additional works are indicated below.

2.3.1 The Specific Scope of the Water Supply System Interventions

Intervention in Perseverance water supply system

• Review and amend CWSA's hydraulic model of distribution system improvements in the Waterloo and Orange Hill areas.
• Prepare designs for rehabilitation or reinforcement of appropriate resilient river crossings.
• Prepare designs to increase water treatment capacity in Perseverance WTP.
• Preparation of tender documents for procurement of works, services, material and equipment for the implementation of the above-mentioned improvements in Perseverance water supply system.

Interventions in Fancy water supply system

• Designs for appropriate surface water intake and water treatment facility with a minimum capacity of 5 m3/h
• Preparation of tender documents for procurement of works, material and equipment for the implementation of the improvements in Fancy water supply system

CES's Report 1, which was an investigative and assessment report of the existing situation, including Overland, summarized the results of the assessment of the existing infrastructure, the field investigations, and the documentation review, for the entire project area. This report provided an overview of the works within the interventions identified above that were necessary to be undertaken.

2.4 Impact of Other Key Projects on this Project

This project involves attention to ensuring proper and secure river crossings by water mains including crossings that run along bridges to accomplish this purpose. During consultation with the VEEP team it was highlighted that another project, the Design of the Permanent Bridges at London, Noel and Overland project where temporary Bailey bridges are located, might have an impact on this project being presently undertaken (Meeting with VEEP staff 12 July 2023, and Research). Trintoplan Consultants Limited of Trinidad and Tobago has been awarded the design contract for the permanent bridges at Noel, Overland and London and are expected to be the supervising firm once the construction of these structures commences. The design phase may last up to 12 months and the cost of each bridge may be more than EC$4 million.[1]

This project's scope involves the laying and crossing of pipelines where Trintoplan's bridge projects are to be constructed and as such to the need for both projects to coordinate and address potential cost, schedule and implementation implications for both projects. There must be an understanding of the

[1] Local Newpapers highlighted this upcoming project. (https://www.**stvincenttimes**.com/trinidad-firm-to-design-3-new-permanent-bridges-for-north-windward/); (https://**thevincentian**.com/temporary-bridges-opened-p26365-1.htm)

designs under both projects in order to minimize potential delays or escalation of associated cost as a result of any conflicts in either projects construction works.

An introductory discussion was held with representatives of the company and its sub consultants, and it was strongly agreed and supported that the project managers and designers for this project and the Trintoplan designers and project managers must liaise to have a clear understanding of each other's project design, scopes, implications for timelines, and implementation[2]. This would assist in avoiding the cost of remediation or duplication of efforts where, for example, placing of a water pipeline along the baily bridges, would later have to be removed to accommodate the construction of the new bridge and the reinstallation of a pipeline in the appropriate location. This all requires careful planning and a joint approach as the designing of the new bridges may actually affect the design and the timeline for the implementation of the CES's project deliverables because of the period of the Trintoplan design phase and consideration of the priority of CES's design works.

2.5 Methodology

The general methodology used to prepare this ESIA included literature review of pertinent documentation, site visits, direct interviews and consultation with key stakeholders such as the design consultants, the Central Water Authority, key officials, and farmers on site. Potential environmental impacts and possible mitigative measures were determined from scoping exercises and a rapid assessment during the visits to the specific project sites. The site visits were conducted on the 6th and 13th of July and consultations between the 6th and 21st of July 2023.

This ESIA report has been guided by the requirements of the World Bank and documentation provided by the VEEP. These guiding documents are the World Bank Environmental and Social Standards (ESS) as well as the VEEP Environment and Social Commitment Plan (ESCP), Stakeholder Engagement Plan.

There was a heavy reliance on the review of secondary resources and consultations, particularly for the social impact assessment. Although some data sources were dated, this did not significantly affect the data collection or analysis as this was complemented with the relevant stakeholder consultations. Additionally, data collected by the Design Consultant during fieldwork for preparation of the preliminary and final designs provided vital assistance.

A separate Environmental and Social Management Plan (ESMP) will present measures to guide the contracted works and which are to be monitored to ensure compliance.

The site photos during this exercise are presented in Annex 3 Site Photos for reference.

[2] Introductory online meeting was held with representatives of Trintoplan the engineering design company, EcoEngineering and Kairi the environmental and the social consulting firms respectively, do discuss introductoru scopes and progress. A formal detailed meeting is to be held at some point between CES's and Trintoplan's Project leaders.

2.6 Reporting

The Environmental and Social impact Assessments (ESIAs) and Environmental and Social Management Plans (ESMPs) represent the fourth deliverable report for the lump-sum contract between the Government of St Vincent and The Grenadines and CES Consulting Engineers Salzgitter GmbH under the Volcanic Eruption Emergency Project (VEEP) - Design and Supervision Consultancy for the North Winward Water Supply (Saint Vincent).

This Volume 3 of Report 4 is the ESIA focusing on the other works to be undertaken and will be followed by a Volume 4 representing the ESMP for the same. Volume 1 of this fourth report represented the ESIA and Volume 2 the ESMP for the Overland well field component.

3 POLICY, LEGISLATIVE AND INSTITUTIONAL FRAMEWORK

It is expected that the contractor and or any sub-contractor employed on the project shall avail themselves and comply with all current relevant legislation and regulations, including environmental legislation of St Vincent and the Grenadines. Ensuring knowledge of the laws must be undertaken prior to commencement of the project works.

3.1 Agencies, Legislation and Responsibilities

Table 1 below provides a matrix outlining the main agencies, guiding legislation, and their responsibilities within the context of this project.

Table 1 Matrix of Agencies, Legislation and Responsibilities

Agency	Legislation	Responsibility
CWSA- The Central Water and Sewerage Authority	Central Water and Sewerage Authority Act No. 17 of 1991 as amended last by Act No. 38 of 2007. . Central Water and Sewerage Authority (Water Supply) Regulations, 1991 (S.R O No. 29 of 1991). 1991-11-22 . Central Water and Sewerage Authority (Sewerage) Regulations, 1991 (S.R O No. 30 of 1991). 1991-11-22	The CWSA has a broad-based management responsibility for the management of water resources within Saint Vincent. It manages the island's water catchments on mainland St Vincent and is responsible for the provision, operation, and maintenance of the island's water catchment, treatment, and distribution networks. The company ensures that water quality is in compliance with the World Health Organization drinking water quality standards.
Ministry of Transport, Works, Lands and Surveys, and Physical Planning	Roads Act Cap 357 of 1956 Town and Country Planning Act (No.45 of 1992)	The Ministry is the chief technical Ministry and has responsibility for all public works within the country. It has the mandate to develop and maintain national road infrastructure in SVG. Oversees the major programmes of rehabilitation, re-building and construction of roads, bridges, and associated drains. The Town and Country Planning Act (No.45, 1992) guides orderly development and planning in SVG. Under this act, Physical Planning has the legal authority to grant approvals to applications for development, and for environmental management in general, including the evaluation of the need for, request for, and level of EIA required.

BRAGSA - The Building, Roads, and General Services Authority	The Saint Vincent and the Grenadines Roads Buildings and General Services Act No.23 of 2008	This agency has responsibility for the maintenance and upkeep of all public infrastructure within SVG.
Ministry of Agriculture, Forestry, Fisheries, Rural Transformation, Industry & Labour	Fisheries Act (No.8, 1986), & later amendments (No.32, 1986, and No.25, 1989) Forest Resource Conservation Act (No.47, 1992 Marine Parks Authority Act1997(No.33, 2002) Natural Forest Resource Act (1947) Wildlife Protection Act (No.16, 1987) & later amendments (1988, 1991) Wildlife Conservation Act (1991)	This Ministry is responsible for all agricultural and related matters in SVG. It promotes and manages national agricultural activities, fisheries, forestry and attendant matters. It provides for the conservation, management and proper use of the forest and watersheds, declaration of forest reserves, cooperative forest and conservation areas, the protection of wildlife, the establishment of Marine Parks and related matters related to fisheries.
Solid Waste Management Unit under the Solid Waste Management Authority	Waste Management Act. No.31 of 2000 Litter Act No.15 of 1991	The SWMU initially established in November, 1999 to execute the activities under the "Organization of Eastern Caribbean States (OECS) Solid and Ship-generated Waste Management Project" is run under the CWSA who is also the Solid Waste Management Authority. It is responsible for the collection and disposal of solid waste, the development of waste management facilities, collection and disposal of residential, commercial, industrial and institutional garbage in SVG.
Ministry of Health, Wellness and the Environment	Environmental Health Services Act (No.14, 1991) · Environmental Impact Assessment Regulations (Draft, 2009) · Environmental Management Act (Draft, 2009)	The Ministry makes provision for the conservation and maintenance of the environment in the interest of health generally, and in particularly in relation to places frequented by the public.
Department of Labour	·The Factories Act Chapter 335 of 1955 (amended 1987) ·Accidents and Occupational Diseases (Notification) Act, 1952 ·Wages Councils Act, 1953:	The Department of Labour resides under the Ministry of Agriculture, Forestry, Fisheries, Rural Transformation, Industry & Labour. This Department has responsibility for ensuring the health and safety measures for workers in SVG and addressing such matters working hours,

	·Trade Unions Act, 1950: ·Trade Disputes (Arbitration and Inquiry) Act, 1940: ·The Equal Pay Act of 1994 ·The Employment of Women, Young Persons and Children Act of 1990 ·St. Vincent and the Grenadines Occupational Safety and Health Act, 2017 (not ratified)	working conditions, investigating complaints and payment of arrears, enforcement of wages regulation orders and all associated issues, employment of women, young persons and children, occupational injuries due to all types of occupational accidents, occupational health and safety inspections and reporting.
National Emergency Management Organization (NEMO)	National Emergency Management Organization Act 2006	The National Emergency Management Organization is responsible for the management of all disaster-related activities in the country. NEMO under their Act governs the prevention, preparedness, response, mitigation and recovery regarding hazards, disasters and emergencies.
Saint Vincent and the Grenadines National Trust	Saint Vincent and the Grenadines National Trust Act, 1969 (Cap.329)	The Trust has the general responsibility for national patrimony, to manage certain protected areas, provide public education related to natural and historical assets, conserve areas of natural beauty, buildings and other assets of archeological, architectural, artistic, historic, scientific, or cultural interest
St. Vincent and the Grenadines Electricity Services Limited (VINLEC)	The Electricity Supply Act 1973	The St. Vincent and the Grenadines Electricity Services Limited, VINLEC has the exclusive license for the national electricity supply.
Govt of SVG	National Energy Policy 2009	the National Energy Policy 2009 promotes and adopts the sustainable use, management and conservation of energy at the national level. It provides the principles for reducing the national dependency on imported fossil fuels, stabilizing and reducing the per capita energy consumption, and assessing alternative energy sources in the medium and long term. It also manages the expanded exploitation of indigenous resources to reduce the dependence on imported energy and improve the national energy efficiency and conservation of energy use.

The Ministry of Transport, Works, Lands and Surveys, and Physical Planning has the legislated responsibility for all public road infrastructure within Saint Vincent and the Grenadines. The Ministry itself manages or oversees the major programs of rehabilitation, re-building and construction of roads, bridges, and associated drains, which are actually executed by private contractors.

The Building, Roads, and General Services Authority (BRAGSA) is the state agency responsible for maintenance of roads which includes carrying out basic road repairs and road-cleaning, as well as limited construction through contractors when required. Road repairs, rehabilitation, or construction is effectuated principally though the Ministry of Transport and Works with that Ministry providing technical supervision of construction works.

While the Ministry of Transport, Works, Lands and Surveys, and Physical Planning, is responsible for granting approval or planning permission for development within the country, the fact remains that capital projects such as the water supply pipeline system does not go before the Planning Board but is executed by CWSA in the national interest.

The Physical Planning is also the legal authority for environmental management and determines if an Environmental Impact Assessment (Section 29) is required for the proposed development. An Environmental Impact Assessment Regulation, presently in draft, is supposed to further support the Act, stipulating the need for an Environmental Impact Assessment (EIA) based on the project's planning application review outcome. The Regulation is to also outline the Terms of Reference to guide the process based on the screening exercise results.

While the Physical Planning under the planning Act may require the production of EIAs, projects such as the water supply projects generally tend to be constructed without such consideration unless it is a donor agency requirement or there is a directive from the Planning Board. This should not preclude the Physical Planning Department from reviewing such works even while providing an acknowledgement that permits/reviews for such are not required.

The Ministry of Health, Wellness and the Environment, under the Environmental Health Services Act, No. 14 of 1991, governs the conservation and maintenance of the environment in the interest of general public health and highlights the responsibility of such to belong to the Ministry of Health and the Environment. The Act stipulates the responsibility of the Ministry for the regulation, monitoring and controlling of present and likely environmental pollution along with the investigation, prevention, and remediation of environmental pollution.

While CWSA will be undertaking their water works, such as this borehole exercise and does not require approval from Planning or the Ministry of Transport, it is expected that their contractor will abide by all planning, public health and environmental requirements. The public health officers within the zones where the works will be occurring, as part of their routine zonal monitoring can intervene and enforce the regulations or requirements where there may be a breach by the ongoing works.

3.2 World Bank Requirements

The VEEP and its subprojects are World Bank funded projects. These projects are guided by the World Bank Environmental and Social Framework (ESF) which are designed to ensure that the projects are economically, financially, socially, and environmentally sound.[3]

3.2.1 World Bank Environmental and Social Framework Performance Standards

World Bank Environmental and Social Framework Performance standards have been established within the World Bank Environmental and Social Framework (ESF) regarding the evaluation and management of the environmental and social impacts of the projects they finance. To better manage the environmental and social risks of the projects, the World Bank has determined the following Environmental and Social Standards (ESS) to guide this project. Refer to table 2 below.

Table 2 Performance Standards to Guide Project Environmental and Social Standards (ESS) Description and Objectives

Environmental and Social Standards (ESS)	Description and Objectives
ESS1 - Assessment and Management of Environmental and Social Risks and Impacts	ESS1 sets out responsibilities to assess, manage and monitor environmental and social risks and impacts associated with each project phase.
ESS2 - Labour and Working Conditions	ESS2 describes the importance of creating employment and income for comprehensive financial development and poverty reduction. It promotes safety and health at work, fair treatment and non-discrimination of project workers and the prevention of forced and child labour.
ESS3 - Resource Efficiency and Pollution Prevention and Management	ESS3 refers to resource efficiency, pollution prevention and pollution management requirements, it promotes the sustainable use of resources, including energy, water and raw materials and the avoidance or minimizing of the adverse impacts of pollution from project activities and pesticide use.
ESS4 - Community Health and Safety	ESS4 addresses the health, safety, and security risks and impacts on project-affected communities, with particular attention to people who may be vulnerable. ESS5 - Land Acquisition, Restrictions on Land Use and Involuntary Resettlement
ESS5 - Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	ESS5 addresses land acquisition, restrictions on land use and involuntary resettlement to avoid forced eviction; mitigate and compensate for unavoidable adverse social and economic impacts from land acquisition or restrictions on

[3] World Bank Environmental and Social Framework- ESFFramework (2).pdf
- https://www.worldbank.org/en/projects-operations/environmental-and-social-framework
https://thedocs.worldbank.org/en/doc/837721522762050108-0290022018/original/ESFFramework.pdf
World Bank Environmental and Social Standards- https://www.worldbank.org/en/projects-operations/environmental-and-social-framework/brief/environmental-and-social-standards

	land; and compensation or assistance to improve or restore the standards of living or livelihoods for project affected parties (PAPs) impacted by the loss of assets including crops and trees.
ESS6 - Biodiversity Conservation and Sustainable Management of Living Natural Resources	ESS6 requires the conservation and preservation of natural resources. It promotes the sustainable management of living natural resources and supports the livelihood of local communities and inclusive economic development by adopting practices that integrate conservation needs and development priorities.
ESS8 - Cultural Heritage	ESS8 sets out general provisions on risks and impacts on cultural heritage from project activities. To protect cultural heritage from the adverse impacts of project activities and support its preservation. ESS8 also addresses the procedure for chance finds.
ESS10 - Stakeholder Engagement and Information Disclosure.	ESS10 emphasizes the importance of open and transparent participation between the client and stakeholders throughout the project life-cycle. It ensures that appropriate project information on environmental and social risks and impacts is disclosed to stakeholders in a timely, understandable, accessible and appropriate manner and format. ESS10 also ensures that project-affected parties (PAPs) have accessibility and inclusive means to raise issues and grievances and allow the client to respond to and manage such grievances through the Grievance Redress Mechanism (GRM).

Under the world Bank's ESF, the environmental and social impacts of these additional works are to be considered moderate with their impacts being able to be managed by the application of the relevant practical mitigative measures.

3.3 CWSA Institutional Relationship and Prerogative

CWSA will be undertaking the various works under this project and would likely engage a contractor to do so. While general construction and ancillary works would require approval from the Saint Vincent Physical Planning Department, and road and drainage works be implemented and supervised by the statutory body BRAGSA (Buildings Roads and General Services Authority) or designed, supervised, and implemented by the Ministry of Transport, Works, Lands and Physical Planning, this is not the case with the works to be undertaken by CWSA. There will be excavation and then repair of roadways or works along crossings and bridges to facilitate pipe laying and rehabilitation, but this will be undertaken by CWSA itself. These civil works will follow CWSA's internal strict engineering and construction best practices and standards which are consistent with those of the Ministry of Transport Works, Lands and Physical Planning. This is to ensure all works are properly supervised and implemented, and that proper motorable road conditions are reinstated upon completion.

Physical Planning is responsible for the implementation of the Town and Country Planning Act and its various regulations. All construction is required to comply with the Town and Country Planning Act, No.45, 1992 which governs and regulates the systematic land use and development within Saint Vincent and the Grenadines. Physical Planning has noted that their codes and requirements pertain largely to the typical range of residential to industrial development but not to the type of infrastructural development normally undertaken by CWSA. They do not receive applications for review and approval from CWSA nor are they required to under Planning Legislation. However, it was noted that while CWSA might undertake its works, the Planning and Building Code and Guidelines does speak to occupational health safety requirements on any project and so a planning officer undertaking routine zonal inspection may stop works if there is a contravention of those requirement until it is addressed. (Consultation with Senior Building Officers, Physical Planning Dept Mon 17 July 2023, Planner Phillip on Tue 18 July 2023)

In the case of this project, CWSA must formally notify the Ministry of Transport of the works to be undertaken and the locations, as it will impact the national roads. Generally, CWSA does not seek or require permission from other authorities or Ministries to execute its work. However, any works that will affect the existing roads must have the review and approval of the Ministry of Transport which has the purview to inspect these works if and when they so wish to ensure the works on the road and especially the repairs or reinstatement, is to the Ministry's standards and satisfaction. Where there may be road crossings, the Ministry is willing to assist by placing sleeves through which the pipes may run. Ideally the Ministry would prefer minimal damage to the roadways as possible after CWSA's pipeline works and have sought to engage with CWSA in that regard. Appreciating that there are no specific reserves along the side of the roads and access paths specifically designated for pipeline reserves, works would have to take place within sides or across roads and this would need to be done expeditiously to minimize potential impacts on vehicular and pedestrian traffic along those routes. In designing and executing the works, the routing of the water system mains must prioritize the shortest distances and abide by the Ministry of Transport's requirements as well as other relevant local authorities and statutory bodies that relate to safety, and proper environmental and social management.

While there was an initial gentleman's agreement that roads would not be broken up or 'disturbed" for 5 years after the road works and installations of pipelines were completed, the Ministry will now be seeking to extend this period to 20 years. This will now speak to a coordinated effort between the two agencies and a very focused forward planning effort by the CWSA. (Consultation with Chief Engineer Min. of Transport Mon 17 July 2023. Consultation with CWSA technical staff throughout).

Of note, BRAGSA as a statutory body is involved in construction and road repairs but in this case, CWSA will be undertaking all repairs, which will be factored within the project's budget. Incidentally, in cases where CWSA is aware of an impending road project and they have works to be undertaken on those particular roads, they would attempt to coordinate with that particular lead agency, go in and undertake the pipe works ahead of time, and so have the road rehabilitation undertaken under that project and its works. This would obviously minimize the level of nuisance and dissatisfaction within a community where a damaged road may be left unattended affecting traffic flow for an extended period of time (Consultation with CWSA technical staff throughout).

3.4 Standards and Guidelines

The following Standards and Guidelines are to be Followed for the project:

3.4.1 Environmental and Social

The overarching environmental and social standards for the project will be guided by the World Bank Environmental and Social Standards (ESS).

The following documents will also provide guidance on the environmental and social requirements of the project works and interactions:

1.Environmental and Social Management Framework

2.Environment and Social Commitment Plan (ESCP)

3. Stakeholder Engagement Plan (SEP)

4. Environmental, Health, and Safety Guidelines[4]

3.4.2 General Work Standards

The following will guide the general design and construction of related project works:

The design and construction of all main structures in reinforced concrete and all concrete works will be guided by the BS EN 1992 (Eurocode2) -1,2&3 (The Structural use of Concrete) Concrete works, and BS EN 1992 (EC2). The ACI 318- 95 Building Code Requirements for Structural Concrete and other American standards will also be permitted provided that the conditions of high environmental aggressiveness for "corrosion protection of reinforcement" for a useful life of 50 (fifty) years are obeyed. (TORs section 4 pg. 89)

According to the Terms of Reference guiding these proposed project works, all materials, components and accessories to be utilized must comply with the latest revisions to the standards mentioned below, as applicable. Other standards will be accepted if they are internationally recognized and previously approved by the CWSA. As alternatives to the BS EN 1992 and AWWA Standards, the standards of the following entities will be considered (TORS Section 4, pg. 89):

- DIN Deutsche Institut für Normung
- AISC American Institute of Steel Construction
- AWS American Welding Society
- AISE Association of Iron and Steel Engineers
- ANSI American National Standards Institute
- AISE Association of Iron and Steel Engineers
- ASME American Society of Mechanical Engineers

[4] World Bank Environmental, Health, and Safety Guidelines cover general areas such as Environmental, Occupational Health and Safety, Community Health and Safety, Construction and Decommissioning. These Guidelines guide local project EHSGs and can be found at https://www.ifc.org/en/insights-reports/2000/general-environmental-health-and-safety-guidelines)'

- JIS Japanese Industrial Standard
- FEM Fédération Européenne de la Maintenance
- AGMA American Gear Manufacturers Association
- NEMA National Electrical Manufacturers Association NEC National Electrical Code
- EEI Edison Electric Institute.
- ISA The Instrumentation, System and Automation Society

3.4.3 Additional Standards and Guidelines

All applicable local standards or legislated regulations or any permitting conditions will apply and guide the project works. In Section 4 of CES's Inception Report general design criteria and parameters have been defined to guide the design work.

4 PROJECT WORKS / INTERVENTIONS

4.1 Sub Project Details

The following are the proposed works or interventions to be undertaken.

4.2 Site Specifics

4.2.1 Tourama Tank

This site is located approximately 1.4 km uphill from Overland Village with an existing concrete access road bordering on its south. The proposal is to construct the Tourama water tank at the 450 ft (137.16 m) base elevation. The plot surface to accommodate the 220,000-gal (1,000 m3) water tank, inlet and outlet piping, control building, parking and auxiliary facilities is estimated at approximately 2,000 m2. Refer to Appendix Photos, for photos of the site.

Access: Via existing concrete access road to farmlands further upland within the hinterland.

Topography: is small level area with steep to moderate sloping area to the east.

Existing Land use: secondary growth with some subsistence agriculture and coconut trees.

Surrounding Land Use: largely agricultural with coconut and some peanut and sweet potato.

Vegetative cover: Secondary growth

Flora and Fauna: There were no endemics identified.

Considerations: There is the potential to remove vegetation and some agricultural crops. Any removal of crops and impediment to access by farmers will be dealt with under the social impacts section and in the ESMP. The physical condition of the site warrants designs that speak to possible cut and fill and the erection of appropriate designed retaining structures. Impacts of soil slippage and erosion are raised here. There will be some noise and dust impacts. Improper solid and liquid waste disposal can lead to pollution of the adjacent lands during and after works if not properly managed.

4.2.2 Point Village Tank

The tank site is at Point in the north of the island on an area above an existing residence at the end of a residential access road. The Preliminary Design calls for the construction of the Point Village water tank at the base elevation of 400 ft (121.92 m). The elevation selected is based on the location of Point Village's highest customers at 387 ft (118 m), which will be supplied from the water reservoir, and the fact that there is an intermediate high point on the transmission profile following the road between Point Village and Owia. If future expansion of Point Village to higher elevations is planned, the reservoir will need to be moved to a higher elevation. On the other hand, the highest area of the Owia supply zone is 249 feet (76m). The area of the plot to house the 40,000-gal (180 m3) water tank, inlet and outlet pipes, control building, parking and ancillary facilities is estimated to be about 300 m2. The plot should be as small as possible to accommodate all the facilities and minimize the impact on the privately owned plot. (Refer to Figure 3 for location and ANNEX Photos for site photos)

Figure 2 Location of Proposed Point Tank site.

Access: Access is via an existing residential access road from the main Pointe Road up through a small residential area where the road ends and becomes a short dirt access path.

Topography: The site is elevated and gently sloping.

Land use: the land use on the site is subsistence agricultural with some banana and plantain trees.

Surrounding land use: The immediate land use is residential to the north and east with existing residences.

Flora and Fauna: No endemics were observed.

Consideration:

The close proximity of the tank construction to existing residences raises the issues of noise, dust, and air pollution. The need to ensure proper management of the construction site to minimize potential dust and noise impacts on the adjoining two neighbors' and ensure runoff is properly managed and collected. The social issues will be dealt with in the social section.

4.2.3 Fancy Tank and River Site

The Fancy storage tank is located on the lower slope of the la Soufriere Volcano in the very north of the island. This tank site is located approximately 2 to 300 meters above the Julie River running to the east. This tank is a settling tank with some drip disinfection system on top of it. The proposal is to construct an intake shaft with possibly a gravel filter on the bank of the Julie River and then run a pipe up to the tank where the water will be filtered and then distributed from there. An additional large capacity tank may be constructed at some point in the future to increase the existing capacity and amount of water supplied.

Access: Via an existing residential road off the main Fancy Road then through a residential area road then up into the hinterland following a dirt track up the lower slope of the volcano.

Topography: The site has been leveled out of a moderately sloping landscape to accommodate an existing leveled tank area. The wider topography is sloping being the lower slope of the volcano.

Surrounding Land use: the land uses below the tank area and largely to its north is composed of agricultural use with subsistence cropping such as potato and cucumber.

Land use: the site is established as an existing CWSA tank facility with security fencing.

Flora and Fauna: There is predominant secondary forest vegetation with fruit trees such as mango and papaya. Areas have been cleared to facilitate subsistence agriculture and no endemic fora was indicated. It was indicated that Parrots have been observed in the area but tend to remain hidden only exposing themselves in the very early morning or late evening for feeding purposes.

Considerations: While the access from the main Fancy road into the existing residential area is motorable, beyond that, the access is an undulating dirt track, crossing a seasonal stream at one point, up to the tank site. This path is impassable during heavy rainfall and other areas of the path are also subject to channeling during those conditions. The transportation of material will be a manual process and so it will be critical to ensure a proper walking path is created as an occupational Safety and Health measure down to the river and to the tank.

Potential issues: Limited noise and dust impacts on lower residences as material are carried through that area. On the way to the site there is potential for some dust on agricultural crop but negligible expected. No heavy equipment will be allowed to track up to the site. Materials and equipment will have to be brought up manually and construction work done on site. The management measures must be ensured so that no cement bags or unused construction material is left behind to blow away in the wind or slide down into the river or the agricultural areas or contribute to any pollution of the environment. Indiscriminate disposal of food waste must be managed. In the proposed river works, apart from the potential impact issues identified above, there is the potential for increased turbidity from works in the river. This must be minimized as best as possible using turbidity curtains and controlled excavation and access into the bed. No waste construction materials must be allowed to remain in or along the river. The weather conditions must be monitored to ensure work men and materials are not exposed to prolonged unfavorable weather on either the tank or river works. Heavy rainfall tends to increase river flow making it dangerous for any works or workmen present at the time.

4.2.4 Orange Hill Tank

The proposed tank is to be located on an existing site at the Rabacca Livestock Breeding and Multiplication Centre at Orange Hill. This facility was damaged by the volcanic eruption along with the tank that existed there. The tank has been reconstructed and has been experiencing low pressure for some time now which affects its operations. The plan is to establish a 40,000-gallon tank on the site of the previous tank to also assist with supporting this facility. Refer to ANNEX 3 Photo for pictures of the site.

Access: Via an existing narrow road in poor condition of the Highway to the facility.

Topography: The site is flat to very gently sloping.

Surrounding Land use: the land uses surrounding the site are largely agricultural farming to the east, and the remainder some agriculture and also secondary growth.

Land use: the site is an established agricultural farm facility.

Flora and Fauna: No endemic species were observed.

.**Potential Issues**: the potential issues are largely noise, dust, and some traffic management for any users above the facility if construction materials are blocking the road. However there appears to be enough unused space to accommodate and an internal laydown area on the site.

4.2.5 Perseverance Water Treatment Facility

The CWSA Perseverance Water Treatment Facility is an approximately 3-acre site where the raw water is treated and distributed from there (see Photo Annex). The proposed works here is to include the addition of 2 more filters, flocculation/ coagulation chamber, clarifier (sediment chamber), and upgrading existing 4" distribution pipe to possibly 8" diameter. This site is pristine and cool and is adjacent to the forest reserve with no farming activity above it.

While adequate space appears present for the proposed laydown and works, care must be taken to ensure that no present equipment is damaged, or that stored and treated water is contaminated by any waste or material.

Potential Impacts: Indiscriminate solid and liquid wastes, noise, dust, possible contamination from loose fines, dirt, or materials, limited removal of vegetation which is largely grass., cutting of timber from Forest for construction material. There are no adjacent residences so social impact in that regard or the need for additional lands is not perceived as an issue.

4.3 River Crossings

There are a number of river crossings that exist as part of the water supply systems (WSS) within the project area. CES's Report 1 identified three types of crossings as follows:

- Pipe is laid above the top slab of the bridge and embedded or supported in concrete.
- Pipe is fixed to one side of the bridge – upstream or downstream.
- Pipe is buried and embedded in concrete in the riverbed.
- Pipe is laid on the riverbed and exposed to the watercourse.

These crossings have been highlighted in CES's Report 1 and are reflected below in Figure 3 for reference.

Figure 3 River Crossing in Overland, Sandy Bay and Owia WSS where 18.2 km of new pipeline will be laid

However, of those, there were several vulnerable crossings identified. These were identified in CES's Report 1 and highlighted below in Figure 4 for reference.

The river crossings are represented by existing water distribution pipelines that are across the rivers from bank to bank, under the riverbed, or along existing concrete bridge crossings (Refer to ANNEX Photos). These structures as they presently exist are vulnerable by reason of their location, some sagging across the riverbed, or within the river, and need to be properly secured to ensure security of the water supply to the various communities. Because crossings are treated as general consideration, but specific ones are highlighted where potential issues apart from the rest might occur.

Access to most of these crossings are limited and via narrow footpaths. The space to undertake any required construction work is also very limited and consideration needs to be given to this fact. In regard to both access and laydown/ area for construction, consideration needs to be given to future maintenance and the establishment of clear access with appropriate widths and areas around both the pipelines for works on both banks of the rivers.

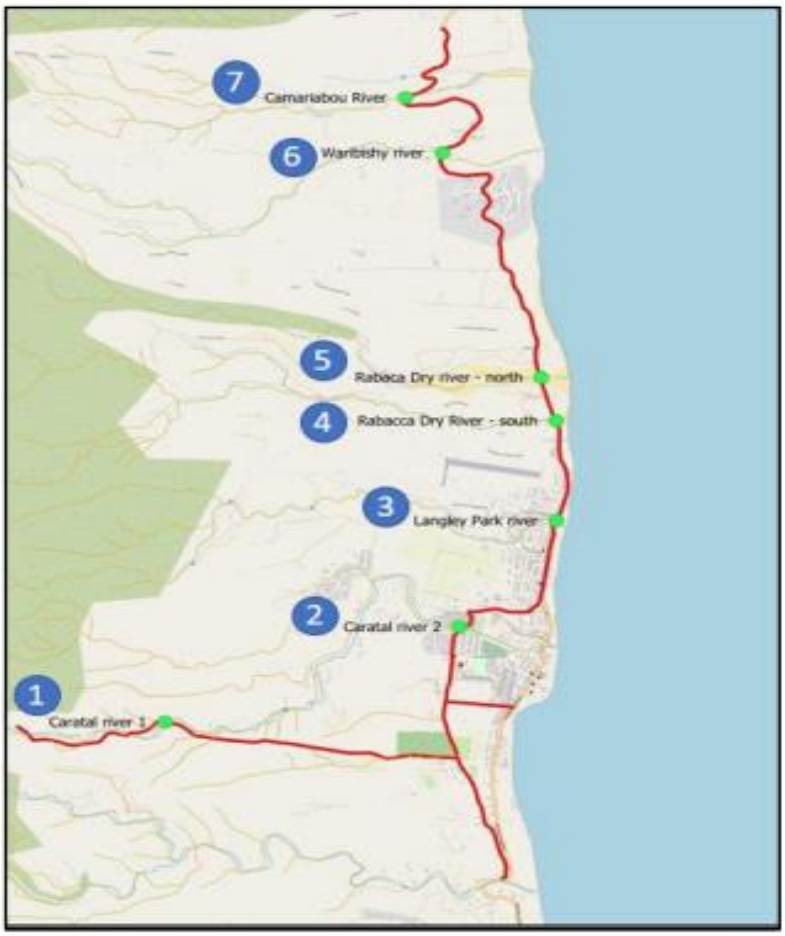

Figure 4 Vulnerable River crossings in the Perseverance Pipeline WSS where 2.3 km of new pipeline will be laid

The pipelines, depending on their size and length over the rivers are also given to sagging increasing the stress on these structures and with no support, increases the possibility of collapse. Consideration is given to an engineering design that might encompass concrete support columns on either bank with cabling secured and spanning between the two, and the pipeline, with appropriate elbows and connections raised and supported across by the cabling in a secure manner. This increases height above the river and reduces vulnerability for any flood damage from high water levels.

While discussions were held on site in regard to potentially placing the crossing under the riverbed, there would be the need for washouts as well as the fact that maintenance or just accessing various sections of the pipe would prove to be a challenge.

Certain crossings are highlighted for illustration because of their particular nature or circumstance.

Potential Impacts: The matter of potential acquisition for widening to allow access and working areas on both banks will be dealt with in the social Impacts Section. Potential indiscriminate disposal of construction wastes within the riverbed and along the banks can occur. Materials such as empty cement bags may be transported by the wind into adjacent properties. There is the potential for noise and dust

impacts on adjacent residences and business during the transportation of materials and during works. Fines such as sand or cement dust can be blown into residences or onto adjacent properties. Careless mis-management of materials can result in materials falling into the riverbeds or onto neighboring properties during construction, contributing to pollution. There were particular endemic flora or species observed at only one of the crossing sites.

Traffic impacts, both pedestrian and vehicular, may be an issue with narrow roads where cars may park, or pedestrians may traverse. Suitable accesses may need to be determined and acquired for future maintenance purposes. All of these sites will need to be dealt with on an individual basis and the situations encountered carefully addressed and environmental and social impacts properly managed.

4.4. Pipeline Works along and within the Roadways

The total length of the pipeline to be installed under the project will be 20.5 Km. Of this total, 18.2 km will be for Overland water supply system, and 2.3 km for the Perseverance water supply system. In regard to the sizes of the new pipes, there will be 12.9 Km of HDPE and Ductile iron pipe with diameters equal to or greater than 4". These will range from 4" (100mm), 6" (150mm) to 8" (200mmdia). There will be 7.6 Km of distribution pipes with a diameter of less than 4". The old pipes will not be removed, remaining buried, except for a minor part of pipes of small diameter) which will be removed and stored at CWSA's premises. It must be noted that none of the exiting pipes have asbestos containing material.

All pipes that will be used for the project will be stored at the Ministry of Agriculture, Forestry, Fisheries, Rural Transformation, Industry and Labour's Langley Park Palletizing Plant in George Town during the project, but CWSA will explore the possibility of temporary storage areas closer to the actual project works to facilitate more timely logistical access to the materials and delivery to the work sites.

Most of the project is new pipeline, especially the mains. Sections of the old transmission pipeline in Sandy Bay that are in good condition will remain buried, even if new pipelines are to be installed. The pipelines that are to be removed will be smaller galvanized distribution lines with size equal to or less than 2" (50mm) diameter which are above ground.

CWSA has indicated that any pipes removed, for example from river crossings or pipes that are above ground, will be carefully examined with the intention of reusing them where possible. These will be stored at the CWSA's Belair Compound. Any replaced corroded pipes that need to be disposed of will be collected and then transported via truck at the end of the day to the Diamond landfill facility which is managed by the Solid Waste Management Unit. These materials will be properly disposed of as per that agency's waste management procedures in an environmentally sound manner.

There are no pipeline reserves along roads according to the Ministry of Planning and so pipelines run alongside or in road reserves (Interview with Planners Mon 17th July 2023) See Photo Appendix). CWSA's practice has been to trench the roads where it is necessary to run lines and then recover the area with minimal consultation with Min Transport or Chief engineer's office.

The Ministry of Transport wants minimal damage to existing roads and would like to coordinate such work with CWSA and requires that they be informed in advance of the scheduling of such works. If the pipeline works are clearly defined and if lines are to cross roadways, the Chief Engineer's office/ Ministry of Transport is prepared to place sleeve ducts in the road to facilitate such placements and to minimize damage. Ideally, pipelines should be run along the side of the road where the main population of the community is and so minimize crossings and damage to roadways. It is expected that all requisite engineering standards and practice would be adhered to.

Work on the rehabilitation of the distribution pipelines along the sides of the main road which will require replacement of existing or placement of pipelines will require careful consideration regarding traffic management and disturbance to residences.

Potential Impacts: Traffic management implications with disturbance to flows, especially during peak traffic hours along with the attendant occupational health and safety issues for both workers and travelers. Dust, noise, inconvenience to adjacent residences and businesses will be issues that need to be addressed.

5 ENVIRONMENTAL IMPACTS

5.1 Potential Environmental Impacts

The following environmental impacts were determined based largely on the scoping exercise during the site visits, research, the various consultations including CES and CWSA technical leads, and consideration of the proposed design. In the event that there are any additions or revisions to the designs that raise any additional impacts, these will be considered and appropriate mitigative measures outlined. The impacts identified below are not considered long term and are considered manageable.

5.1.1 Loss of Vegetation Cover

The practice of grubbing or removal of vegetation for exploratory and for site preparation and construction works can mean the removal of deep-rooted vegetation that assist with soil and slope stabilization. Care must be exercised. The removal of the roots and canopy cover that protects exposed soils, especially those of a sandier nature as exist within the sites, can lead to land slippage, erosion, and contribute to sedimentation of the river when it is flowing. The increased sedimentation can lead to increased turbidity levels within the rivers and along the coastline, impacting aquatic communities during heavy rainfall. A heavy blockage of the river mouth, which is a low probability from this project, may contribute to increased downstream flood potential. The existing secondary growth vegetation also plays an important part in maintaining soil moisture content and overall health of the ecosystem along the river. The removal of the vegetative cover also has the potential to lead to the loss of habitat for any endemic flora and fauna as well as a loss of biodiversity who depend on the vegetation for food, shelter, and procreation. Particular care must be exercised to minimize any unnecessary removal of vegetation, particularly of any mature trees on slopes or near the cliff edges or riverbanks during works. It must be noted here that the pipeline runs largely through urbanized areas and secondary vegetation. The other works are within secondary growth or areas near subsistence farmland. It is not perceived that any of works within these areas will contribute to adverse loss of vegetative cover and flora biodiversity.

5.1.2 Biodiversity/ Species Disturbance and Loss

The vegetation within the proposed sites, especially at Tourama site or the Perseverance treatment area site, particularly the fruit trees serve as food sources and nesting habitats for any species rearing, and their protection. During the site visit the presence of any special terrestrial flora or fauna were not observed on the sites. The present vegetative cover was generally of secondary growth.

None the less, it must be noted that the generation of noise from the construction activities and drilling operation can disturb any existing fauna species, temporarily causing disorientation and temporary vacation of what has been a safe and accommodating habitat. This is particularly significant during the nesting and rearing periods of the year and care will need to be exercised in that respect. Similarly, any fumes from any machinery, or the burning of waste material on site will also be disruptive. However, upon decommissioning and restoration of the sites, it is expected that both flora and fauna will re-habitate the areas.

The preservation of all avifauna within or within the vicinity of the proposed works is important for species and habitat sustainability. It is very important that measures be implemented to ensure that any Parrot habitats that may be in the vicinity, possible flight paths, and feeding areas are impacted as little as possible by any of the work activities. Measures such as liaising with the Forestry Department and in particular the range officers who undertake Parrot Monitoring prior to any works in areas where parrots might have been seen to obtain approval for any tree felling proposed or during rehabilitation of sites, minimizing tree cover and corridor loss and maintain crown cover, educating workers on proper site practices that reduce impacts on the parrots and other avifauna and their habitats, and liaising with the Forestry Department Range Officers in the event of any endemic siting are very important. Rehabilitation of any disturbed sites is also critical for species survival and conducting site visits with the Forestry Department/ Range Officers at the end of the project works to facilitate the identification and implementation of any rehabilitation works required which may involve the identification and marking of key areas and trees/vegetation for replanting or enhancement must be undertaken where necessary.

5.1.3 Poor Soil and Water Quality

There is the potential for the proposed works to negatively impact the existing soil and water quality increased sedimentation generated during the site preparation, general construction works. Any loose or disturbed soil as a result of the construction activities, if not appropriately managed may end up in the rivers and contribute to sedimentation and poor water quality during a heavy rainfall event. This would include works involved in site clearing, stripping and stockpiling of the topsoil/organic layer, loose construction material such as cement and fines, excavation, backfilling operations to modify to existing slopes and grades to accommodate access and work areas. Materials such as concrete with sand and cement being handled within close proximity and can leach directly into the river or riverbed. The indiscriminate disposal of construction waste materials which would include cement bags, or other materials such as damaged formwork, can contribute to pollution unless properly contained. Improper solid and liquid waste is a key factor. However, with heavy rainfall, waters will already be very turbid with little scope for use and so the impact on the river itself may not be considered significant.

The indiscriminate and improperly managed use and disposal of oils, lubricants, or chemicals in contravention to their manufacture or (safety data sheet) SDS instructions, machinery, for any servicing, and in the construction process, can contribute to both soil and surface water pollution. During rainfall events chemicals can mix or be carried with runoff and create liquid wastes that coat and impact the soils affecting agricultural potential, water quality in running rivers, as well as impacting the marine environment. The management of any wastewater, and in particular the possible disposal human waste on or near the site is very critical to ensuring a healthy working environment and reducing the risk of fecal contamination of the immediate or nearby surrounding environment. The possible lack of adequate toilet facilities within such an environment would be a concern. Appropriate measures such as monitoring and the implementation of catch basins or silt traps, proper solid and liquid waste and chemical use management is critical.

Additionally, the pipeline works will include hydrostatic testing and discharge of water that can cause erosion if poorly controlled. Similarly open trenches, which are a hazard and can contribute to accidents, can also contribute to erosion of the landscape when unprotected trenches are left open during rain events and act as channels for runoff. It is critical that runoff diversion and other temporary erosion control measures are implemented to assist in mitigation of the negative impacts from such work

activities. It must be noted that that in the project design, provision has been made for the installation of section valves, wash-out valves and wash-out pipes at the lower points of the distribution network. Manholes containing wash-out valves with much lower diameter than the mains act as energy dissipators. Wash-out pipes, also of small diameter, will conduct the wash-out water to river beds where the design has made provision of riprap construction were necessary to prevent the corrosion of the flanks of the river bed.

5.1.4 Increased Noise and Vibration Levels

Increased noise and vibration levels through construction activities such as the movement of heavy construction and supply trucks into and out of the site, and the operation of machinery such as excavators can have negative impacts on the existing terrestrial and smaller on the distant marine environments, particularly within this generally quiet, low-lying area. In secluded or heavily vegetated riverbanks, fauna habitats can be disturbed causing creatures as birds and amphibians to flee their homes and nesting areas.

Similarly, increased noise levels from activities adjacent to or within the communities such as the movement of equipment or large trucks transporting materials, or the excavation of trenches in the roadways adjacent to homes and businesses may be deemed as an unnecessary and unwanted nuisance affecting day to day activities. Associated vibrations from the use of heavy equipment such as rollers or excavators can negatively impact surrounding communities by causing nuisances through the shaking of households and household items, and possibly affecting the stability of these structures if they were not properly constructed. Similarly, for biological communities, mating seasons may be affected depending on the time of year that the project activities commence.

It is anticipated that noise impacts will derive largely from any excavation works along the existing road to widen that access, and from large trucks and equipment, transporting construction and equipment and parts. The residents along the roadside where works are being done are expected to experience a higher noise and vibration nuisance that the works in the higher mountain or interior sites. The intensities will be dependent on the construction activity being undertaken and duration.

The most directly impacted would be the works and equipment operators who must be provided with the appropriate PPE and breaks to manage those impacts and all pertinent local and international occupational health and safety requirements and regulations must be applied.

However, while it is expected by the consultant that noise and vibration levels are expected to be and manageable, care must be taken in the judicious usage of any form of heavy noise and vibration generating equipment.

5.1.5 Poor Air Quality / Pollution

Poor air quality can originate from a number of sources related to the project and can be a potential nuisance to the community and to motorists. The potential exists for impacts on the communities through which the construction vehicles pass through and especially for motorists and their passengers or pedestrians who will be directly affected by the project works.

The vehicles and machinery being utilized for the project can produce noxious fumes such as carbon monoxide, diesel fumes, as well as burnt oil fumes with hydrocarbon and other substances. There is also the increased potential for air pollution to emanate from the operation of older or improperly service vehicles and machinery as well. This can directly affect the health of onsite workers over the short to long term, as well as any adjacent community on a shorter term. The direction of the wind and where it would transport such fumes is also an important consideration.

Dust also arises from cleared land that has been exposed to the sun, is dried, and the wind carries this material to nearby residences as well as onto adjacent farm crops. Similarly, uncovered fines such as sands or even cement can be light enough to be blown by the wind either when being transported or being stored on site. This can be a nuisance to the community and to motorists.

The mishandling of particularly noxious chemicals such as solvents or chemical washes, greases, that produce fumes or odours, as well as the burning of solid wastes on the construction site, especially used and empty chemical containers, can lead to air pollution and negative resultant health impacts especially for onsite workers. The fumes from burnt chemical containers have a high potential to be carcinogenic by reason of their content.

5.1.6 Potential Worker/Occupational Health and Safety Related Impacts

Safety must always be a priority for all workers on this project as well as that of motorists and the residents of the adjacent community. Any mishandling of equipment, improper storage and usage of various chemicals and construction materials, high levels of continuous noise and fumes from generators, excavators, haul vehicles as examples, as well as inadequate safety equipment, poor workplace practices, can contribute to both short- and long-term adverse health effects. These effects of continued exposure to these situations can include various degrees of injury and also accidental death.

There are also risks associated with the loading, transportation, and unloading of materials such as pipelines if not undertaken properly. Improperly or overloaded vehicles have less stability when transporting and with such unequal distribution of weight can negatively affect the maneuverability of the vehicle placing the driver and passengers at risk. Loose or the improper type of strapping can cause loads to fall off the vehicle injuring loaders or unloaders, or in driving, passengers of other vehicles. With loading and unloading there is the high possibility from improperly loaded material with poor securing, that such loads can fall on the persons loading or unloading and cause severe injury or death. Proper Occupational Health and safety training and the use of PPE such as hard hats, gloves and safety boots along with safety measures/ standard operating procedures are key to reducing such hazards and saving lives.

Serious injury means down time for the workers and the project as it may have to cease operation depending on the severity of the situation. Operating machinery without the proper instruction, personal protective equipment, or safety signage is also a critical issue. The improper usage or management of chemical substances not conforming properly with storage, intended usage, or proper disposal poses a health risk.

Improper food waste management will tend to increase the potential for vector infestation and possible transference of diseases. The management of wastewater, and in particular human wastes generated by

the work force on site is very critical to ensure a healthy working environment and reduce the risk of faecal contamination. Possible contamination by human waste due to lack of adequate toilet facilities is always a concern and more so within the river which leads to the coastal area.

There is also the risk associated with weather events such as rainfall which provides for wet and slippery conditions increasing the potential for falls as well as accidents with heavy equipment. Soils become saturated and loose contributing to the unsafe working environment. The adjacent river will naturally increase in volume during heavy rainfall or storm events providing for increased potential for loss of parts of the site, materials, and equipment. No work should be occurring during any adverse weather occurrences.

The contractor will need to conduct a risk assessment of the site and job activities to develop their occupational health and safety management plan and the emergency response plan and minimize the risk of injury by conducting various job activities related to the project. Proper training of all staff and the wearing of the requisite safety gear or PPE is a critical safety factor for all workers on the project

5.1.7 Traffic, Public and Community Safety Impacts

The existing Windward Highway is a key link between the north and south of the island, and the internal access roads are key routes for farmers to access their farmland in the hinterland area. There is the possibility of increased construction-related traffic, albeit for a temporary period of time, for such civil works along the highway and the internal access road, both of which require proper traffic management plans with clear procedures. The potential for vehicular/vehicular and pedestrian/vehicular conflict increases as the scale of construction increases if proper traffic management procedures are not implemented. This can lead to very tempered negative response from the nearby residents, the community, and vehicle operators affected. The matter of safety also becomes a great concern in relation to the speed of the project related vehicles as well as the alertness of the drivers as they traverse the road into and out of the site. Combined with this may be inadequate instruction of project vehicle drivers, lack of warning signs, and on ground manoeuvring directions during the period of the project construction. This speaks to the need for a Traffic Management Plan to be prepared by the contractor to address these potential traffic conflict issues.

Lack of information within the community through lack of adequate communication by the contractor and project proponents on the specific or extra working hours if required, can mean the unpreparedness of residents who tend to walk the road at certain times for the presence of construction traffic, especially in the later evenings. This become particularly hazardous if there are children within the vicinity from the community. This can also prove a major threat for motorist along the highway or through any diversion routes if there are inadequate traffic management measures that include road signage, unbarricaded areas, and lack of signal staff along the roads. Such factors must be considered in the planning and execution of the works. Road users would need to be vigilant.

Even after the workday, there is always the possibility for curious persons, including children, visiting the sites unsupervised and increasing the risk for personal injury. All security measures must be put in place.

The breakdown of a construction vehicle causing the blockage of the public road at or before the site on the Highway and possibly hindering access to and from the various communities, especially during the

morning rush hour, can escalate tensions. This is especially so if such an event contributes to loss of travel time to work, school, or returning home for persons. In the case of the sites where the road accesses existing farmland beyond the sites, farmers who access their lands by vehicle or through walking, will be negatively impacted in regard to their ability to tend their crops within the time that they have allocated to do so.

This can also occur with the spillage of large quantities of construction material. Similarly, blockage of any bypass route would similarly impact road users and the communities. Associated with the movement of vehicles, there is always the additional impacts of dust, fumes, noise, and vibrations as highlighted above.

5.1.8 Loss of Arable Agricultural Lands

The proposed works, particular the clearing of site for tanks and laydown areas e.g. the Tourama tank, widening of the existing narrow access roads, and the creation of the access might require the removal of agricultural lands. This and the impact on livelihoods will be addressed in the Social Impacts Section.

5.2 Climate Change

Climate change as a result of global warming is a phenomenon affecting small island states (SIDS) such as Saint Vincent and the Grenadines because of the small spatial area and sensitive environments. The impacts are noticeable and can be significant over time and are reflected in:

- Warming temperatures and more extreme weather.
- Retreating of fish into deeper and cooler waters,
- Saltwater intrusion into their groundwater supplies[5]

The National Adaptation Plan for SVG under the UN Framework Convention on Climate Change projected rainfall and temperature for SVG through the end of the century highlighted the following climate change factors that will affect the Caribbean and Saint Vincent and the Grenadines derived from climate modelling:

- An increase mean temperature by 0.15 °C per decade over the next century with a similar warming trend projected for seasonal changes.
- An increase in the frequency of hot days and nights by the end of the century while cold days and nights will show significant decline, almost reaching nonexistence by the 2060s.
- A reduction in rainfall, with negative median values ranging from 10 % to 22 % annually by the 2090s drying in the wet season from June to November, with the greatest seasonal change seen in the summer months (7.1 % per decade).
- A reduction in the rainy season that will significantly affect water availability.
- More intense future north tropical Atlantic hurricanes with higher peak wind speeds and heavier near-storm precipitation.

[5] https://www.adaptation-undp.org/projects/saint-vincent-and-gernadines-second-national-communication-progress

- Increases in Caribbean Sea level rise to be near the global mean of 0.5 m to 0.6 m in the range of 2018 to 2100 when compared to 1986 to 2005.

The country's coastal areas are particularly vulnerable to the effects of sea level rise as 85% of the population and 90% of the country's infrastructure inhabit a narrow coastal strip that is less than five meters above sea level and under five kilometers from the high-water mark. The local economy and the nation's water resources remains vulnerable to the impacts of variable precipitation, extreme weather events and increased evapotranspiration.[6]

What this means is the designs under this water project must be climate sensitive and responsive to ensure that they fulfill the need to be climate resilient to ensure long term reliability and service to the communities. These climate change related factors and must apply throughout the whole life cycle of the project from design, construction, to full operation and routine maintenance procedures.

The Atlantic hurricane season within the Caribbean runs from the 1st of June to the 30th of November. The National Oceanic and Atmospheric Administration (NOAA) has predicted that the Atlantic and Caribbean region may experience "near-normal" hurricane activity this year with a predicted range of a 40% chance of a near-normal season, a 30% chance of an above-normal season and a 30% chance of a below-normal season. NOAA has a 70% confidence in these ranges and has predicted the chance of 12 to 17 total named storms with wind speeds of 39 mph or higher) and of those, 5 to 9 could become hurricanes (winds of 74 mph or higher), including 1 to 4 major hurricanes (category 3, 4 or 5) with winds of 111 mph or higher). This could be the result of a high potential for the El Nino phenomenon to develop this summer, which could suppress Atlantic hurricane activity following three hurricane seasons with La Nina present.[7]

Appreciating these factors, it becomes necessary that all requisite preparations and precautions must be taken to reduce potential risk when an impending tropical storm or hurricane is announced by regional and local official sources.

In this context the detailed design and the final implementation of the water supply systems must be cognizant of these climate change related factors. The inclusion of means and methods to ensure aspects of climate resilience and the concept of building back better is fundamental for such an infrastructural project.

The contractor who is engaged for the project works must ensure that an appropriate Adverse Weather Response plan is prepared and adhered to in the event of an announcement to ensure the safety of all workers and reduce the risk to life. This plan is to clearly outline the actions to be taken on each construction site prior to the arrival of a storm, during, and post, and must comply with all requisite national emergency management requirements.

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[6] (https://www4.unfccc.int/sites/NAPC/Documents/Parties/FINAL%20NAP_SVG_Approved.pdf)
(https://www.adaptation-undp.org/projects/saint-vincent-and-gernadines-second-national-communication-progress)

[7] https://www.noaa.gov/news-release/2023-atlantic-hurricane-season-outlook#:~:text=NOAA's%20outlook%20for%20the%202023,of%2039%20mph%20or%20higher).

5.3 Addressing Failure of Tanks During Operations.

The tanks to be constructed to serve the community are to be managed by CWSA and must be constructed and operated to ensure longevity and safety. The design engineers are tasked with ensuring that the tanks are properly designed to international construction and operation codes and guidelines. Consideration must be given to seismic impacts, poor construction material and practices, lack of adequate monitoring and maintenance as factors to consider and mitigate against in design and operation. In both design and construction, consideration must be given to avoiding water damage to adjacent properties as best as possible by the installation of appropriate drainage system that assists in diverting water to an acceptable release point such as a nearby ravine or river minimizing impacts on adjacent properties and residents. The failure of any large volume storage tank on an elevated plan poses the risk of danger to human life and damage to property by the sudden release of water resulting in downslope erosion, land slippage, loss of crops, damage to foundations and residential structures, washing away of roads and pathways.

During the procurement process, the design drawings and engineering and construction specifications must be provided to ensure that the information is not only made available but to also guide potential bidders/ contractors as to what the design and construction requirements are that are required of them. This, coupled with rigorous review by the supervising engineers and the client, would assist in shortlisting bidders who can demonstrate proven knowledge and experience in tank construction.

During all construction phases, the selected contractor must be constantly monitored by the client and supervising engineers to ensure the tanks are constructed to the specifications provided by the design engineers. During operation, there must be a weekly schedule of monitoring along with a determined schedule of routine maintenance by CWSA.

CWSA must also develop a response plan that addresses the failure of any tank. This plan must include measures to notify impacted residents downstream of the tank failure, undertake an assessment of all damage to the tank and to adjacent properties, and methods of redress to any affected resident who might have lost property or crops.

An assessment of the damage to the tank and properties must be undertaken as soon as possible after the occurrence. The reason for the failure of the tank must be determined through careful engineering investigation and a determination as to how the failed structure is to be addressed. This may involve some level of repairs, or complete demolishing and reconstruction.

6 SOCIAL IMPACT ASSESSMENT

6.1 Socio-Economic Profile / Baseline socio-economic conditions of the Project Area(s)

This section provides a brief description of the project area(s) focusing on the relevant human environment/area of influence to the project and the existing socio-economic conditions including social trends, livelihood profiles, social organization, gender construction, area demography, social services and labor requirement and availability. The methodology for elaborating the area baseline information and descriptions involved researching secondary sources. In addition, review of various reports on agricultural developments, education, poverty assessments, and livelihood projects in Saint Vincent and the Grenadines was undertaken. Information obtained from these secondary sources was organized and collated with primary information from the various stakeholders' consultative engagements in which participants provided key characteristics of livelihoods and set out salient socio-economic characteristics of their respective areas, as well as information gathered through observation during site visits to the communities.

6.1.1 Saint Vincent- Location and Geography

Saint Vincent and the Grenadines is composed of 30 islands, islets and cays that extend from Saint Vincent, the largest, southward toward Carriacou in the Grenadines of Grenada. The islands are part of the Lesser Antilles Island arc, a region of active volcanism caused by subduction of the North American and/or South American Plate beneath the Caribbean Plate. Saint Vincent is located between latitude and 13° 15' N and longitude 61° and 15' W, about 34 km southwest of Saint Lucia 100 miles west of Barbados, 68 miles north of Grenada and about 190 miles north of Trinidad. The island is roughly oval and has an area of 344 sq. km. It is approximately 29 km long and 17.5 km wide. Saint Vincent is relatively young (oldest rocks about 3 million years) and consists of a central axial range of mountains starting from La Soufrière (1,178m), in the north, to Mount St Andrew (736m) to the south. This range of volcanic mountains divides the island almost equally between a gently sloping eastern or windward side and a deeply dissected and rugged western or leeward side. Volcanic materials that make up the island have been severely affected by erosion and are deeply weathered due to the tropical climate. The geological history of the island consists of the development and northward migration of a series of volcanic centers (Robertson, 2003).

6.1.2 Location – Project Area

Fancy is the northernmost settlement on the island. It is located in Charlotte Parish, on the coast close to the country's northernmost point. Owia is a Village in the most Northern part of Saint Vincent and the Grenadines. Owia is partly a coastal community on the northern side of the islands that is accessible by sea and land. It is approximately 8 miles from Georgetown. The community is one of farming and fishing. The original village was located in the area now known as Bottom town, where almost half of the Owia population still resides. Owia consists of three adjacent settlements, namely Point, Barracks, and Sandy Bay. Owia was one of the main areas where the war between the British and the Black Carib (Garifuna) was fought during the period 1769 – 1775.

6.1.3 Natural Resources, Agriculture and Food Security

A Community Profile and Livelihood Baseline Assessment on the eastern side of the island explains that the natural resources found within all of the communities on mainland Saint Vincent are in some way or the other linked to the watersheds they are located in. On mainland Saint Vincent, there are sixteen (16) watersheds with forests that protect them. These forests are important to protecting terrestrial biodiversity and marine biodiversity through reduced soil erosion. Four (4) of these watersheds are considered to be the key ones as a result of the contribution they make to the socio-economic development of the country.

The eastern side of the island possesses rich fertile soil, nourished by the elements of the La Soufriere Volcano, and many large rivers. The rainfall is higher in this more rugged and mountainous portion of the island and the average temperatures are slightly cooler. All of these factors contribute to making the project area the agricultural belt of the country. The fertile soils in the communities but particularly in the Fancy area is used for the cultivation of several root crops and vegetables, including sweet potatoes, cassava, dasheen, cucumbers, eggplants, and peppers. The farmers interviewed indicated that the volcanic eruption had dealt them a severe blow by not only destroying their crops but because they incurred major expenses to restore the lands which were covered with ash to a usable condition. Many farmers stated that they are only now recovering from this impact and are currently harvesting their first crop post eruption. Others indicated that they lacked the financial resources to restore the land and instead have given up agriculture.

Figure 5 Cucumbers harvested by a female farmer at Fancy for sale to the supermarkets.

A cacao plantation and processing plant is located in Perseverance and the government funded Rabacca Livestock Station is located at Orange Hill. A fish landing facility is located in Owia, although the fishers in the community indicated that presently there are a number of longstanding issues which need to be addressed to return the facility to a level of efficiency.

The rivers are a place of recreation as well as livelihood, as it was observed during field visits that in most of the project areas, large groups of adolescent boys, who were on school vacation, were not only recreating at the river but also fishing for crawfish/crayfish.

Figure 6 Young males river fishing in Georgetown.

Additionally, men practice spear fishing and deep-sea fishing in the Atlantic Ocean as a means of providing for themselves and their families. Although the presence of Sargassum Seaweed, now poses a challenge to the fishers particularly in Owia, where fishers face challenges steering their boats in and out of the pond. The photo below taken of the Owia fisheries facility shows evidence of the problem at Owia.

Figure 7 The Owia Fishing Facility.

6.1.4 Economic and Social Wellbeing

The major beneficiaries of this project will be the residents, industries and businesses of the North Eastern section of the island (from Grand Sable in the South to Fancy in the North) that were severely impacted by the explosive eruptions of the La Soufriere volcano in April of 2021.

The agriculture sector has historically been one of the major pillars of the economy of Saint Vincent and the Grenadines. In the years past, banana and root crops were predominant, resulting in agriculture accounting for about 20% of the total GDP. However, with the advance in globalization and the country's loss of its banana preferential market in the European Union, there has been a significant decline in foreign earnings. Today, agriculture contributes just over 10% of the GDP but still remains the largest source of employment in the country. Banana is still the country's chief crop, accounting for over 60% of the labor force and 50% of the total export. There has also been increased planting of root crops. Saint Vincent and the Grenadines is the world's top producer of arrowroots

The Northern Eastern side of Saint Vincent has been blessed with a hilly landscape which is predominantly used for farming. The community is most known as the one that produces arrowroot. Besides banana and arrowroot, there is also the planting of other crops for economic gains, including sweet potatoes, cassava bread fruit, pepper, squash, mango, papaya, star fruit, peanuts and ginger.

There is a small manufacturing sector, represented by the Fisheries at Owia not yet recovered from the economic impact produced by the constraints associated to the Covid period, a factory in Georgetown that produces the Rum with the world's highest alcohol content and a factory for arrowroot processing which is actually in the process of moving from Owia to a new site in Orange Hill.

The tourism industry which plays a critical role in the growth of the economy of Saint Vincent, is still in a very preliminary stage of development in the Northern Eastern side of Saint Vincent ant at present represents an insignificant contribution to the economy of the area.

Some other professions in the community were listed as teachers, police officers, nurses, trades men such as carpenters, masons and mechanics. There are also a few businesses, owners of shops and bars, barbers and hairdressers.

Unemployment rate remains very high and is one of the community's most urgent issues that need attention.

6.1.5 Nature of Community (Culture, Traditions)

All the communities in the project area are primarily agricultural communities. Owia is traditionally known for its cultivation of sweet potatoes and arrowroot. The by-product of arrowroot; starch is mainly exported. The waste product of the starch – Madungo is used to make a gluten free flat bread, called Madungo bakes. It is also used to make fungi, dumplings and a stiffening agent or starch for fabric. Madungo bakes are very popular during the Month of March, as March 14th is celebrated locally as National Heroes Day and October 27th Independence Day. During the Christmas season, Owia Point comes

alive with many Christmas activities and events such as “Nine Mornings”, as well as decorative street lighting activities.

Sports are a major part of the community recreational activities specifically cricket, netball, football and soccer. The main religion is Christianity. The people are warm and friendly and are of African descent and Garifuna.

6.1.6 Community Resources

New Sandy Bay and Owia have Primary Schools and preschools with the closest secondary school in Sandy Bay, but students of secondary age based on matriculation can attend any of the 20 plus schools in the island. Health Centers / Clinics are located within Sandy Bay, and Owia. Owia has a factory which processes arrowroot starch, although plans are progressing to relocate the plant to Orange Hill, and a recreational pond that the residents visit for picnics and other family based fun activities. There is a fishery in Owia, which is grossly under-utilized and fishermen who were consulted are eager to see a revival of activities at the facility. Under the VEEP there is separate activity to address this issue.

The Officers also identified learning resource centers, playing fields and hard courts in most communities as valuable resources. In the absence of government owned community resource centers, churches were identified as the main public buildings where meetings and other community-based activities are held, and faith-based groups as the most common in the region. Other community groups present in the project areas include the Owia Disaster Risk Management Group, Sandy Bay Disaster Risk Management Group, North Leeward Community Colonaire Sea Turtle Monitors, National Fisherfolk Organization, the Sandy Bay Emergency Satellite Warehouse. Parent Teachers Associations (PTAs) are present in the communities and are a potential medium for disseminating project information to the communities. The existing community group spirit is a significant indicator of social cohesion and social well-being.

Local government councils / organizations are not present in any of the communities, although Georgetown has a Town Clerk, and a number of residents who are recognized as community leaders were identified by the officers of the Ministry of Community Development and the Department of Youth.

6.1.7 Population

The communities of Owia and Fancy fall within the Sandy Bay Census Division The population of the Census Division according to the Population and Housing Census done in 2012 was Two Thousand, five hundred and seventy-six (2,576) persons comprising of one thousand, three hundred and seventy-four (1,374) males and one thousand, two hundred and thirty-two (1,232) females. The population in Owia is one thousand, one hundred and forty-one (1141), six hundred and five males (605) and five hundred and thirty-six females (536). Fancy had a total population of four hundred and ninety (490) two hundred and fifty-five (255) males and two hundred and thirty-five (235) females.

Approximately 42.15 percent of the population was 24 years and under, and children (0-14 years) accounted for 27.24%, while adolescents in the age group (10-14) has the highest percentage in the population that is 10.30%. The elderly population, above 65 years of age, was 9.93% and the percentage of the working age persons (15-64 years) was 62.82%.

6.1.8 Household Size

The average number of persons per households in the administrative division of Sandy Bay of which Owia and Fancy are part, has been estimated in 3.9 persons per household, which is comparable to the national average of 3.0 persons per household. (CDB 2022)

6.1.9 Educational Attainment

The 2006 Education Act regulates all education levels from pre-primary to tertiary education and includes 'public schools,' 'private assisted schools,' and 'private schools' as educational providers within Saint Vincent and the Grenadines. Education is compulsory in Saint Vincent and the Grenadines, meaning that children must be enrolled in school between the ages of five years to 15 years.

6.1.10 Health Care Institutions

There is a health clinic in Owia staffed with a resident staff nurse, a nursing assistant, and a community health aid, while the District Medical Officer visit the clinic once per week. Sandy Bay also has a clinic. The closest hospital is the newly built Modern Medical Diagnostic Complex, which is approximately (26 Km) or about 50 minutes' drive from Fancy which is furthest to the north.

6.1.11 Sanitation

Garbage collection is once per week within the area with little to no haphazard garbage dumping. The Vector Control Unit within the Ministry of Health patrols the area routinely for vectors.

6.2 Social Impacts

The following social impacts were determined based largely on the scoping exercise during the site visits, research, the various consultations including CES and CWSA technical leads, and consideration of the proposed design. In the event that there are any additions or revisions to the design that raise any additional social impacts, then these will be considered and appropriate mitigative measures outlined.

The impacts identified below are not considered long term and are considered manageable with continued consultation with key stakeholders and affected parties.

6.2.1 Land Use and Land Acquisition Impacts

The two most significant risks are the impact on land tenure of private landowners, and the impact on land use, mainly the loss of livelihoods caused by the loss of arable lands, where government owned lands are leased to citizens. Only a privately owned site, has been identified and it is for locating the water tank at Point Village. The size of the land required to build this water tank is approximately 2,250 squared feet. To ensure transparency, consultations have begun with the private landowner of that site in preparation for the process of land acquisition. Any encroachment on private land, whether temporary or permanent, needs to be agreed in writing (including any compensation) prior to commencement of any project activity. Government lands form the bulk of the land that will be utilized as the designs were prepared with these considerations in mind.

The pipe routing of the water mains will prioritize the shortest distances, but always preferably following the existing public roads. In the case of private properties, the PIU in collaboration with CWSA will consult stakeholders for approval. When crossing the highway, the requirements of the relevant local authorities and statutory bodies including the Ministry of Transport and Works, will be implemented in the design.

A resettlement plan is prepared to address potential impacts on land and/or assets due if there is the need for use of private land. The resettlement plan is based on the resettlement policy framework (RPF) prepared for the Project. The resettlement plan will be prepared commensurate with the nature of the impacts and will be updated based on detailed measurement surveys following final designs

All necessary land acquisition will be based on meaningful consultations with landowners and other project affected persons (PAPs). Land acquired will be appropriately compensated based on current market value. This framework sets out the consultation processes, laws, a system for addressing grievances, and other institutional arrangements that will apply.

Landowners will be compensated for any impacts resulting from provisions for temporary access to construction sites and should land be temporarily used for contractor field office/shelters and for parking machinery.

6.2.2 Site clearance and Crop Damage impacts

To minimize the effects of land clearance, tree clearing will be marked on the survey plan of the property to be utilized, and removal will be restricted to the identified trees/vegetation. Owners of all trees or agricultural crops that are affected on private lands will be compensated in accordance with legislation and the processes outlined in the ARAP(s). Owners will be consulted before the trees are cleared in order to determine compensation arrangements. The Ministry of Agriculture sends officers to do an assessment and valuation of the tress and crops that are affected by the works, and has a pricing list for all tree crops and other plants to be cleared. This will need to be taken into consideration during the consultation process. As soon as the required lands are identified the owners will be notified of the intent to utilize the land for the purpose of the development project. Following notification to the owner and with the owner's consent the area will be demarcated.

When areas of public land that are required and are occupied by leaseholders, the leaseholders must also be consulted in accordance with the Crown Lands (Rent) Regulations 1983, and must be compensated for any crops, trees, and structures as per the Regulations and the WB ESS5.

6.2.3 Social Conflict Impacts

Social conflict between expatriate and local workers could arise due to cultural differences. To minimize this risk, it is essential that expatriates are provided with information on Saint Vincentian culture, including dressing code, and acceptable forms of interaction with the communities. Sensitization on sexual harassment (SH) sexual exploitation and abuse (SEA) must be provided to the workforce. Sessions on sexually transmitted diseases, and other essential social factors should also be provided. The VEEP's code of conduct (CoC) it already established and the Contractor(s) will sign the CoC. Contractors will be responsible for ensuring that all employees, including subcontractors, are sensitized on the CoC, and that they sign the code before commencing work on site. The CoC will be applied at all times.

6.2.4 Labour Management Impacts

Construction work is classified as highly labour intensive. No children will be employed and the mitigative measure is the identification card and NIS number

6.2.5 Impacts on Sensitive Receptors

A number of sensitive receptors have been identified in the project area(s) including the Owia Fisheries Facility, the Owia Arrowroot Processing Plant, the Rabacca Livestock Station, Primary Schools in New Sandy Bay and Owia and a secondary school in Sandy Bay. There are health clinics, a police station and several churches located throughout the project area(s).

Extended water shortages during construction could potentially impact the operations of the establishments particularly resulting in the closure of schools and loss of instructional hours. The clinics may shorten their operating hours, possibly hindering the client's ability to access services. The influx of labour may also place an additional burden on the services of the health clinics, particularly in cases of a work-related emergency. The nearest hospital is roughly 26 km or a 50-minute drive from Fancy which is the farthest project area.

The Owia Fisheries utilizes approximately 2500 gallons per day, any shortfall in water production and availability can result in challenges for the operations of the facility and result in lost income for the fishers. The operations of the arrowroot processing plant and other commercial entities which depend heavily on water for production, may suffer losses if lack of water affects their productive capacity. Continuous, communication with the establishments prior to water interruptions, which will allow the collection and storing of water, and the trucking of water to the various establishments are measures that can be used to reduce the impact of potential water interruptions.

6.2.6 Social and Community Dynamics

An increase in traffic volumes is expected during the construction phase, particularly of construction equipment and heavy trucks. This may cause traffic congestion, since the main highway and feeder roads are quite narrow and this may result in an increase in road accidents. The change of routes or detours may significantly increase travelling time for commuters. The increase in traffic congestion and delays can lead to increasing rates of road rage and possibly harassment of workers.

The households in the community may also be impacted by water interruptions during the construction, and this may result in an increase in women's workload and their reproductive and productive labour. However, improvement in the project area would save the household time in the performance of household chores. Improvements in the water supply will also reduce the incidence of illness among family members.

While there is no heavy reliance on pipe-borne water for irrigation, as indicated by farmers in the project areas, there are instances when farmers, specifically vegetable farmers resort to using pipe borne water for irrigation. Thus, if construction is undertaken during the dry season, where rainfall is significantly

lower, and there are extended interruptions in the water supply, this could potentially result in farmers not having access to water for irrigation and the loss of crops.

There could be a potential threat to overall public health if pipe-borne water is unavailable to clean and maintain public facilities.

6.2.7 Impact on Cultural Heritage

Although the specific project sites are not known areas of high cultural significance, construction of the water infrastructure may necessitate soil excavations that could be deep enough to dig up/or uncover archaeological artefacts hidden from view, especially since the project area is part of the area which was originally occupied by the Garifuna. The ESMP will provide guidance in the Chance Finds Procedure to ensure that project activities do not alter or cause destruction or degradation of any areas of cultural significance.

The ESMP will include: (i) a Chance Finds Procedures for all construction works requiring civil contractors to take proper protective measures in case cultural heritage sites are discovered, including to stop construction activities if cultural property sites are encountered during construction; and (ii) provisions for a Cultural Heritage Management Plan (CHMP) if required for civil works outlining mitigation measures to be considered avoid or reduce impacts on community cultural heritage sites directly affected by the project.

7 MITIGATION MEASURES

7.1 Environmental Measures

The proposed mitigation or mitigative measures address the potential impacts of the project works and attempt to reduce or avoid any negative impact on the environment over the short to long term. While these impacts are not expected to be major, the careful implementation of mitigative measures will allow for the reduction or avoidance of any adverse effects.

A number of general impacts have been identified above and the following in the table 3 below is a list of the potential mitigative measures. The measures are presented in a manner that makes them easily incorporated into the ESMP that is to be prepared, as well as within the contract clauses for the contractor who will undertake this work. This also allows for ease of monitoring by the client and key agencies.

Table 3 Environmental Impacts, Mitigative Measures, Monitoring, & Responsibilities.

Environmental Impacts	Activities	Mitigation Measure	Monitoring Responsibility	Frequency
Removal of trees and vegetation loss	-Excavation -Preparation of site -Construction of access roads	The contractor shall arrange the works to minimize the amount of vegetation that needs to be cleared (for the permanent and temporary works) as agreed with the Supervising Engineer, and mark this area clearly on site. -The contractor shall not clear vegetation from outside the marked area to ensure no unnecessary clearing of vegetation and minimal impact on flora and fauna in the area. - The contractor shall not use herbicides, chemicals or pesticides during the work. - The contractor will ensure the work area and activities do not enter, include, damage, or exploit any recognized natural habitats, wetlands and protected areas in the immediate vicinity of the activity. These must be protected from damage or exploitation. - The contractor shall ensure that all staff are strictly prohibited from hunting, foraging, logging or engaging in other damaging activities within or outside of the demarcated work site. - The contractor under supervision of the supervising engineer will not undertake any unlicensed borrow pits, quarries or waste dumps within or outside of the demarcated work area. - The contractor shall ensure all green wastes are immediately removed from the work area upon completion of works and properly disposed of as per local regulations or provided to nearby farmers who may wish to utilize such, - The contractor will replant any fruit trees that have been removed from the work area during the rehabilitation of the site upon completion of works. In regard to protection of endemic avifauna, he contractor undertake the following measures:	Contractor & Staff CWSA Supervising engineer Ministry Agriculture/Forestry Department VEEP	Daily Daily Daily During land clearing and later rehabilitation exercise Weekly

		1. Liaise with the Forestry Department prior to any works in areas where parrots might have been seen to obtain approval for any tree felling proposed, 2.Arrange with the Forestry Department/ the Parrot Monitoring Range Officers to conduct briefing session(s) with all works staff on wildlife to watch out for, especially the Parrot, and ways to reduce any potential negative impacts prior to and during works 3. Conduct site visits with the Forestry Department/ Range Officers prior to commencement of works to identify and mark out key areas and trees/vegetation that should be maintained as best as possible to assist with avifauna / Parrot sustainability. 4.Maintain large trees that exist within or adjacent to the work area as much as possible 5. Undertake the pruning, instead of cutting, large trees and other overhead vegetation that may become an issue for construction, except in cases where this is absolutely necessary. 6. Maintain areas along the roads where crowns of trees from both sides of the road overhang and touch each other wherever possible. These will form private and secure corridors and feeding areas for birds and other wildlife. 7. Inform the Forestry Department or the Parrot Monitoring Range Oficers immediately if any endemic species is observed. 8. Conduct site visit(s), with the Forestry Department/ Range Officers at the end of the project works to facilitate any rehabilitation works required which will involve the identification and marking of key areas and trees/vegetation for replanting or enhancement.		
Soil Erosion and Slippage	-Excavation -Construction of access	The contractor under the supervision of the Supervising Engineers shall undertake the following measures to ensure erosion within and outside of the work area is prevented, and to prevent run-off from the from spreading beyond the marked area: - install a proper drainage system which will include energy dissipator (catchment pits) at locations guided by the supervising engineer and marked on a map to reduce the velocity of water discharged during Hydraulic testing. - Any drain clogged by construction material or sediment will be unclogged as soon as possible to prevent overflow and flooding. -Hoarding of excavation for foundations or channels for the laying of pipes to prevent any collapse. The contractor shall, under the guidance of the Supervising engineer ensure that no undue erosion occurs on or outside of the demarcated site by reason of the works undertaken by undertaking the following: - implementing appropriate erosion control measures such as Proper site drainage which	Contractor & Staff CWSA Supervising engineer Ministry Agriculture Min Infrastructure, Transport, Work, etc VEEP	Daily Daily Daily Weekly or upon the occurrence of a complaint or event Upon the occurrence of a complaint or event that blocks or affects a roadway Weekly

		includes piping or cut drains, energy dissipators, and silt fences, or any other measures determined by the Supervising engineer. - ensuring no unnecessary removal of mature deep-rooted trees -ensuring the angle of the slope of any excavation undertaken is kept within the limits of soil type. - ensuring the angle of repose of any loose material delivered to site is kept at 45 degrees or less to ensure stability. - ensuring the covering of any loose materials as necessary to protect it against rainfall and wind. -balance cut and fill to limit the steepness of slopes. - use of bio-engineering methods where necessary as a measure to reduce erosion and land slippage. - the monitoring of all piled material, slopes, and excavated areas must for movement. The contractor shall implement appropriate barriers such as erosion or silt curtains to assist in retaining soil or loose materials and mitigating pollution to exiting water bodies. The contractor shall ensure that energy dissipators or catch pits are in place to reduce the velocity of water discharged during hydrostatic testing or emptying pipeline operations. The contractor shall ensure that open trenches are constructed with run off diversions to prevent accidents as well as erosion when unprotected trenches are left open during rainy days. The contractor shall ensure that measures such as silt curtains, geotextile blankets and riprap are in place during the discharge of water to reduce erosion and damage to riverbanks and slopes. The contractor shall upon completion of works on the site utilize retaining structures and the planting of deep-rooted grasses where and if necessary to retain soil and stabilize the site where it has been determined in conjunction with the Supervising Engineer.		
Increase and vibration and noise levels	-Excavation -Construction operation	The contractor shall develop and implement a public notification and noise management plan under the supervision of the Supervising Engineer to assist in managing the potential impacts noise and vibration impacts on the community. This plan will facilitate the receipt of complaints from residents and actions to be implemented. The contractor under supervision of the Supervising Engineers shall undertake the following: -ensure all construction/work activities are conducted between the hours of 7:00 a.m. and 5:00 p.m. on weekdays.	Contractor & Staff CWSA Supervising engineer Ministry Health Labour Dept VEEP	Daily Daily Daily Weekly Upon the occurrence of a complaint or event by worker Weekly

		- inform the affected community/public in advance via all available media of any work activities that are to occur outside of normal working hours or on weekends. - ensure that the work site area is hoarded to assist in sound mitigation. - ensure that the engine covers of generators, air compressors and other powered mechanical equipment shall be closed, and equipment placed as far away from residential areas as possible during the operations of the drill rigs. - ensure that no excessive idling of construction vehicles and equipment is allowed at the sites. - ensure that noise suppression equipment or systems supplied by the manufacturer are utilized on vehicles or equipment where necessary. - Ensure all vehicles and equipment are properly serviced.		
Dust Nuisance	-Excavation. -Mobilization -Delivery of equipment and materials. -Construction operation	The contractor shall undertake to reduce and manage all potential dust nuisances by undertaking the following measures: -Provide and apply water to dampen access roads and the working area when there is high dry and dusty conditions to minimize impacts on adjacent community. -ensure that any materials which are observed to be causing fugitive dust emissions are covered or dampened down. - ensure all vehicles transporting materials such as dry dirt, cement, sand or other fines, or construction waste material and debris are fully covered until they reach their drop-off point -ensure no unnecessary speeding by transportation vehicles will be allowed on the dusty roads into the site	Contractor & Staff CWSA Supervising engineer Labour Dept Ministry Health VEEP	Daily Daily Daily Upon the occurrence of a complaint or event by worker Weekly or upon the occurrence of a complaint or event Weekly
Air pollution	-Excavation -Construction operations	The contractor shall undertake the implementation of the following measures to reduce any potential air pollution during the works: - Ensure that all dry dirt or construction materials such as sand, cement, or other fines are kept properly covered. - Cement must be stored within a shed or container. - The sand and fines must be kept moistened with sprays of water while uncovered. - Compacted and then wet periodically wet unpaved, dusty construction accessways - undertake water spraying and/or installing dust screen enclosures at the site to suppress dust during drilling - no open burning of dry vegetation or waste material will be allowed at the site. - no excessive idling of construction vehicles or equipment will be allowed at sites.	Contractor & Staff CWSA Supervising engineer Ministry Health Labour Dept VEEP	Daily Daily Daily Weekly or upon the occurrence of a complaint or event Upon the occurrence of a complaint or event by worker Weekly
Contamination of soil and water	-Excavation -Mobilization and Construction operation	The contractor shall ensure the following measures to reduce the potential for soil and land contamination during the works: -proper waste disposal bins will be placed on site and emptied at the end of each working day.	Contractor & Staff CWSA Staff Supervising Engineer Ministry of the Health	Daily Daily Daily

		-Runoff and construction liquid waste, especially with chemicals will be minimized as much as is reasonably possible. - Runoff water must be channeled to a settling pond or chamber with restrictions to access by unauthorized personnel and untethered animals. -This pond or chamber area must be cleaned at the end of construction or when filled and the waste transported to an authorized solid waste facility. - The washing of equipment should be done in a designated area that will allow waste produced to be captured in a settling pond. - Machinery and construction equipment are to be maintained in good working condition, to prevent oil leaks. - An area shall be clearly defined within the working site with the supervising engineer where all refueling and replacing of hydraulic or brakes fluid or other lubricants in equipment and plant must be undertaken to prevent oil and grease from polluting the environment. Moreover, an area shall be clearly defined and prepared to ensure that is fit for the purpose intended and all spill management measures are installed or available. -Oil absorbent sheets as well as buckets of sand shall be kept within the area to be placed on any spills as part of containment and clean up procedures. -All empty or partially used chemicals shall be properly stored and disposed of properly, and not allowed to pollute land or waterbodies. - All liquid materials shall be kept covered at all times, and drip trays are to be used when tanks are filled. - all users are familiar with the SDS sheet information for various chemicals that may be used to ensure safe handling - In the event of spillage, the Contractor must immediately notify the monitoring officer and in their presence, unless otherwise indicated, remove all contaminated material from the site, store it in the appropriate container and disposed of at the authorized waste disposal facility (Proof of disposal must be provided to the Supervising Engineer, and kept on the ESMP Environmental Monitoring File). The contractor shall implement appropriate barriers such as erosion or silt curtains to assist in retaining soil or loose materials and mitigating pollution to exiting water bodies.	Fisheries Dept	Routine inspection or upon any occurrence of soil pollution Upon any occurrence in the coastal area from runoff
Solid and liquid waste (General)	-Excavation -Construction Operation	The contractor shall develop and implement a waste management plan in consultation with the national solid waste management authority. The plan must include practices and procedures that shall ensure the contractor abides by all relevant waste management and public health laws. The contractor shall identify waste collection and disposal pathways and sites for all major waste	Contractor & Staff Supervising Engineer Solid Waste Management Agency Ministry of the Health	Daily Daily Routine collection daily or on the occurrence of an event

		types expected from the construction and borehole activities. The contractor shall ensure that: - All construction and demolition waste will be stored appropriately in designated areas on site agreed with the Supervising engineer including all plans for disposal and the frequency of such. - All Liquid and chemical waste shall be stored in appropriate labeled and sealable containers and separated from the general refuse in designated areas on site agreed with the Supervising engineer including all plans for disposal and the frequency of such. - All waste will be collected, placed in appropriate waste bins or sealable plastic bags and disposed of regularly at the approved landfills by licensed collectors. - The contractor shall ensure that records of waste disposal will be maintained and made readily available for inspection. - the contractor shall reuse and recycle appropriate and viable materials (except asbestos or other hazardous material whenever feasible). - The contractor shall ensure no construction or drilling related liquid wastes is allowed to accumulate on or off the site, flow over or from the site in an uncontrolled manner or cause a nuisance or health risk due to its contents. - The contractor shall actively undertake efforts to minimize any construction waste and reuse where possible by following the agreed plans or in consultation with the supervising engineer.	 VEEP	Weekly or upon the occurrence of a complaint or event Weekly
Solid and Liquid waste (Hazardous)	-Excavation -Construction Operation	The contractor shall develop and implement a waste management plan in consultation with the national solid waste management authority. The contractor shall undertake measures in agreement with the Supervising Engineer to reduce and manage any potential impacts for the use or storage of hazardous solid and liquid waste by undertaking the following measures: -provide a designated area on site agreed with the Supervising engineer for the temporary storage on site for all hazardous or toxic substances in safe leak proof containers labelled with details of composition, properties and handling information to prevent unauthorized access, spillage and leaching. -the plans for disposal and the frequency of such disposal shall be agreed with the Supervising engineer. - ensure that all waste be transported by specially licensed carriers and disposed of at a licensed waste facility as per local legislation. Ensure any lead-based paints or paints with toxic ingredients or solvents are not used. - ensure no banned chemicals are utilized. - If termite treatment/pest control is to be utilized, appropriate chemical management measures will be implemented to prevent contamination of surrounding areas and use only licensed and registered pest control professionals	Contractor & Staff Supervising Engineer Solid Waste Management Agency Ministry of the Health	Daily Daily Routine collection daily or on the occurrence of an event Routine inspection monthly or on the occurrence of an event

		with training and knowledge of proper application methods and techniques.		
Natural Disaster (Meteorological Event) Adverse Weather	Excavation Construction Operation	The Contractor shall prepare a Disaster Preparedness Management Plan which would also include measures to be implemented during adverse weather. This plan will include all emergency contacts, procedures to be implemented, responsibilities, and follow-up activities following the event to ensure the safety of all workers and equipment.	Contractor & key Staff CWSA Supervising Engineer VEEP	Upon pre, during, and after event. Pre and post event Pre and post event Post Event

7.2 Social Impact Measures

The Social Impact mitigative measures outlined below are aimed at preventing the identified adverse project impacts to society and to maintain and promote social cohesion throughout the project cycle. It highlights all aspects of planning, design and project operation relevant to society in addition to identifying project specific activities likely to trigger adverse social impacts. Appropriate mitigation measures ae proposed to prevent or minimize the potential negative social impacts that might occur. Table 4 below outlines the impacts, and the measures.

Table 4 Social Impacts and Mitigative Measures

Social Impacts	Activity	Mitigative Measure	Monitoring Responsibility	Frequency
Occupational Health and Safety Issues	Excavation Construction of access Construction Operation	- The contractor shall ensure that an Occupational Health and Safety Plan is prepared and implemented to guide work activities and provide a safe environment for workers. This plan shall include but not be limited to the following: - the risk assessment to inform the development of the required method statements and the MSRAs ; -details of the equipment, materials and approaches the contractor will adopt to comply with the contract requirements and deliver the works in accordance with the *Construction Phase Health and Safety Plan* described in the ESMP; - the minimum PPE that is required to undertake the required works, and what additional PPE will be provided as a last resort to reduce the severity of any potential injuries; -the medical and first aid equipment on site and the personnel who will be present and provide aid during works; an emergency response plan; -the training to be provided to workers, including a general induction that at a minimum accord with the World Bank's General Induction for Construction Workers.[8] - The Contractor will select a suitably qualified employee to serve as the H&S Officer. - The contractor's H&S Officer and Supervising Engineers /Consultant will ensure that all relevant Labour and Occupational Health and Safety regulations are adhered to, to ensure worker	PIU, Supervising Consultant Team, Environmental Health Unit, Labour Department	Prior to signing of contract and throughout construction.

[8] (Training for Construction Workers - General Induction: Safety, Health, and the Environment | Korea Green Growth Trust Fund (wbgkggtf.org)).

		safety and any infringement is recorded, reported to the Supervising Engineers / Consultant, and relevant authorities. -The contractor shall provide the necessary equipment as well as protective gear as per their specific tasks such as hard hats, overalls, gloves, goggles, boots, etc to all workers and the H&S Officer will ensure that employees utilize the PPE. -The contractor shall provide Sanitary facilities for all workers on site. -The contractor shall ensure that basic medical supplies are available on-site which includes a first aid kit and staff trained in basic first aid. -The contractor must conduct an OHS briefing to all employees prior to the commencement of work, and to any employees joining the work staff after the official commencement of works. - H&S periodic briefings / training including appropriate use of PPE, with all employees must be documented and the employees must sign off to acknowledge receiving the training. - Posting of appropriate information within the site must be done to inform workers of key rules and regulations to follow. The measures should be reinforced at toolbox meetings. The Contractor must adhere to the Labour Management Procedures (LMP) The contractor must sign and follow the Health and Safety Guidelines presented in the ESMP.		
Increased road safety hazards and inconvenience to road users and the general public caused by the construction traffic/works interfering with normal traffic flow.	Mobilization -Delivery of equipment and materials. Construction Operation	- Contractor shall at all times take care to protect the public and facilitate the uninterrupted flow of traffic during his operation and use of public roads, thus the Contractor must ensure that: -Workers shall obey all traffic laws in order to minimize the risks to pedestrians - The contractor shall develop and implement a traffic management plan -Contractor shall erect appropriate (approved) signage along the access road to alert other road users to possibility of slow construction traffic/heavy equipment crossing lanes etc. -Construction vehicles must be licensed in accordance with local laws and regulation. - The Contractor will utilize signalers to direct traffic when required. - The Contractor will inform the police in advance of activities that are likely to interrupt traffic flow and seek assistance with traffic management. -The Contractor shall consult the relevant agencies /departments early for approval and advice if there is likely to be any traffic disruption.	Supervising Consultant Team, PIU, BRAGSA	Throughout construction
Hazards associated with roadside storage of construction materials and parking of plant and vehicles.	Material and Equipment Storage Construction Operation	- The Contractor shall not park or stockpile materials along the public roadway. - No materials shall be stored so that they encroach on, or in any way adversely affect operation of, sections of roadway which are in use by the public or result in siltation or blockage of drains. - Contractor must plan for the temporary storage of construction materials and wastes, and the parking of construction plant within the worksite only. This will be part of the Site Management Plan. - The Contractor shall ensure that parking areas for employees' private vehicles are located within the worksite only, in approved areas.	Supervising Consultant Team, BRAGSA	At the start of works and throughout construction
Hazards associated with loading, transportation , and unloading of	Material and Equipment Storage Construction Operation	- The Contractor shall ensure that loading and unloading areas are clear of any materials, vehicles, obstructions, or unnecessary workers, is flat, and stable. . The contractor shall ensure all persons engaged in loading or unloading materials have appropriate PPE including lower back securing lifting bels, hard hats, safety glasses, safety boots and high-	Supervising Consultant Team, PIU	Through out pre to final construction

construction materials		visibility vests, .and are trained in the safe way to undertake these tasks manually or with equipment. - The Contractor shall communicate with drivers and have them ensure that materials to be transported are secured properly and that transportation vehicles ae not overloaded. - The contractor shall ensure that all loading and unloading must be properly supervised - The contractor shall ensure that If storing pipes on the ground, that they are properly laced together, tied, behind posts, or properly secured to prevent sliding or rolling		
Interference with traffic due to disposal of construction wastes, and other wastes.	Excavation, Construction Operation	- Contractor shall abide by all solid waste regulations in the disposal of demolition waste. - The Contractor must ensure that public roads are kept free and clear of wastes. - The Contractor shall ensure that all operations are carried out so as not to interfere unnecessarily or improperly with the convenience of the public, or access to and use and occupation of public roads, footpaths, and properties. - The Contractor shall inform neighboring users in advance of any activity that has the potential to impede access to their properties or other public spaces. If needed, the Contractor will create alternative access routes.	Supervising Consultant Team, PIU Solid Waste Management Authority	
Impedance of access to/from lands adjacent to the worksite.	Excavation General construction activities	The Contractor shall ensure that all operations are carried out so as not to interfere unnecessarily or improperly with the convenience of the public, or access to and use of public roads, footpaths, and properties. - The Contractor shall inform neighboring users in advance of any activity that has the potential to impede access to their properties or other public spaces. If needed, the Contractor will create alternative access routes.	Supervising Consultant Team Supervising Consultant Team BRAGSA	Throughout construction When required
Crop damage	Site clearance Excavation Construction Operation	-The Contractor shall consult owners before any crops are damaged. -The owners shall be adequately compensated for crop damage -The Contractor will follow the procedures outlined in the ARAP. -The GRM must be publicized.	Supervising Consultant Team, PIU PIU, Supervising Consultant Team	When required When required
Land Acquisition	General construction	-All land acquisition shall be handled in keeping with the relevant legislation and the Project's ARAP -Owners shall be consulted. -The GRM must be publicized.	PIU, Supervising Consultant Team PIU	When required Throughout construction
Encroachment onto private property	Storage of construction materials,	-The Contractor shall consult and seek written approval from landowners for access when intrusion on to private properties is inevitable; and Contractor shall work with client's lawyer and shall	PIU, Supervising Consultant Team	Throughout construction

	Construction Operation	formulate lease agreements in cases where the encroachment will be for long periods and the sites are not owned by Government. -The Contractor will follow the guidelines presented in the ARAP. The GRM must be publicized	Extension Services of the Ministry of Agriculture	
Chance finds, protected sites, and Cultural Heritage	Excavation Construction	- Contractor shall not damage archaeological sites, protected areas and cultural heritage. If items of cultural or historical significance are unearthed or discovered, works must stop immediately, and the Supervision team must be informed. The Contractor will also notify the National Trust Department and other relevant agencies upon encountering any artefacts, remains or other notable objects immediately. - The Contractor shall follow the Chance Find Procedures and ensure that training is provided to all project workers on the Chance Find Procedures. -If human remains are unearthed, the work must stop immediately, the area protected and the Contractor must call the Police, then the Supervising Consultant and the PIU. The site will remain closed until an investigation is conducted and the all clear is given to resume work.	Supervising Consultant Team, National Trust Department Supervising Consultant Team, PIU, The Police Force	Throughout construction Throughout Construction At the start of works and anytime the contractor hires new employees.
Creation of construction employment opportunities for local residents.	General construction activities	- Contractors shall make maximum use of local labor. -Contractors shall maximize use of labor-intensive construction methods rather than machinery-intensive. -Contractors shall maximize the participation of local suppliers of materials, services and equipment, and sub-contractors.	PIU, Supervising Consultant PIU, Supervising Consultant Team	Throughout construction Throughout Construction
Use of Child Labour	General construction	--The Contractor shall follow the Labour Code and all other relevant legislation including the: - Protection of Employment Act, 2003 -Equal Pay Act, 1994 - Employment of Women, Young Persons and Children Act, 1935 and Amendments - The contractor shall ensure that all suppliers and subcontractors are complying with labour laws and regulations and that no persons under the age of 18 are being exploited in their operation. The Contractor must ensure that no person under the age of 18 is employed or volunteers on site. - Additionally, the Contractor must ensure that no person under the age of 18 is allowed on site without written permission from the PIU. - the contractor shall practice ethical and responsible business practices and adhere to the LMP.	PIU, Supervising Consultant Team, Labour Department	Throughout construction
Development of social friction between the contractor's	Construction Operation	- The Contractor will utilize the established project grievance redress mechanism (GRM) which can be found in the Stakeholder Engagement Plan and the Labour Management Procedures, and shall assign responsibility for dealing with complaints from the general public and workers to the site foreman, whose name and contact details must be shown on the project signboard.	PIU, Supervising Consultant	Throughout construction

workforce and the public.		- Reports will be accepted during consultations with stakeholders and the wider public. The Contractor must take appropriate measures to ensure that the site is well-secured in order to protect assets on site. - The Contractor shall maintain the project's code of conduct (CoC) for all personnel, including sub-contractors for site activities. The Code of Conduct will form part of the workers' and sub-contractor contracts and all personnel must sign the CoC. - The Contractor must ensure that worker training shall include sensitization on the CoC and interactions with the general public. - All grievances will be routed to the PIU for management.		Before the start of works and on hiring new employees.
Problems arising from potential Labour Influx	Geneal construction activities	- The Contractor shall provide a level of cultural sensitization to foreign workers. - The Contractor must ensure that workers sign the CoC and receive training on SH and SEA.	PIU, Supervising Consultant Team PIU, Supervising Consultant Team	At the start of construction and when required At the start of works and anytime the contractor hires new employees.
Incidents of sexual harassment (SH) sexual exploitation and abuse (SEA)	Construction Operation	-Contractor shall maintain and enforce the code of conduct (CoC) for all personnel, including sub-contractors for site activities. The Code of Conduct will form part of the workers' and sub-contractor contracts. - The Contractor must ensure that worker training shall include sensitization on SH and SEA.	PIU, Supervising Consultant	Throughout construction
Labour Management Impacts	General construction activities	- The Contractor shall not engage in discriminatory hiring practices. - The Contractor must follow all labour and OHS legislation and guidelines. - The Contractor will adhere to the LMP.	PIU, Labour Department, Supervising Consultant	Throughout construction
Cumulative Social Impacts resulting from the implementation of other VEEP project activities in the project area	General construction activities	- The Contractor shall consult and liaise with the Supervising Consultant and Contractor for the other activities to where possible to synchronize their work schedules with the aim of reducing the cumulative impacts of the projects on the public.	PIU, Supervising Consultant	When required

7.3 Additional Measures

In addition to the mitigative measures stipulated above, the following, in conjunction with any other provided by any Statutory agencies, are provided to guide the contractor during the works. The ESMP will also provide guidance to the contractor.

7.3.1 Cultural Heritage- Procedures for Chance Finds

All archaeological evidence should be documented in accordance with national law and Best International Industry Practice (BIIP). Where excavation is carried out, this should be conducted by cultural heritage experts, in accordance with national law and BIIP, with the results provided to the appropriate cultural heritage authorities. A chance find is any unanticipated discovery or recognition of cultural heritage. Most often, chance finds occur during the construction phase of a project. Such finds include, for example, the discovery of a single artefact, an artefact indicating the presence of a buried archaeological site, human remains, fossilized plant or animal remains or animal tracks, or a natural object or soil feature that appears to indicate the presence of archaeological material. When artefacts or sites of cultural heritage are encountered by chance while undertaking excavation during construction activities, the project must include a chance finds procedure, in all contracts related to construction awarded under the project.

The steps in case of chance finds to be followed are: - Stop all work and cordon off the area and do not allow anybody access to the area, unless cleared by the National Trust Department. - Based on discussions with the competent authorities identify further action - Actions at the site may require competent professionals who may need to be contacted and brought in, as needed. All project workers must receive sensitization training on the Chance Find Procedures

7.3.2 Labour Management Procedures

The Labor Management Procedures (LMP) was developed by the PSIPMU as a requirement of the World Bank Environmental and Social Framework in support of the VEEP. The LMP seeks to ensure that measures are in place to manage and mitigate risks associated with employment under the project. The LMP identifies the main labor risks and requirements under the project and establishes the parameters to ensure that these are undertaken and managed in accordance with the requirements of the Environmental and Social Standard2 (ESS2) – Labor and Working Conditions and Occupational Health and Safety. The labor management procedures contain measures to address risks that may arise from the interaction between project workers and local communities. Also included are measures to raise awareness of such risks; communicate expectations regarding appropriate conduct, together with disciplinary measures; and the adoption of the code of conduct.

The objectives of ESS2 and the LMP are to:

(i) Promote safety and health at work

(ii) Establish fair treatment, non-discrimination and equal opportunity for project workers

(iii) Protect project workers, including vulnerable workers such as women, persons with disabilities, children not of working age, in accordance with ESS2 and in-migrant workers, contracted workers, community workers and primary supply workers, as appropriate.

(iv) Prevent the use of all forms of forced Labor and child labor; support the principles of freedom of association and collective bargaining of project workers in a manner consistent with national law

(v) Provide project workers with accessible means to raise workplace concerns.

When risks are identified, those will be addressed and managed by the procedures set out in the projects LMP. The GoSVG is strongly committed to evaluating risks and impacts throughout the life of the project and managing the adverse impacts. The LMP is applicable to all project workers.

The LMP applies to all project workers, whether full-time, part- time or temporary.

The complete GRM can be accessed on the VEEP website at https://veep.gov.vc/veep/images/pdf/VEEP_LPM.pdf.

7.3.3 Grievance Redress Mechanism

ESS 10 [Stakeholder Engagement and Information disclosure] recommends that a Grievance Redress Mechanism (GRM) be created to address all concerns of the PAPs. There should also be a separate GRM for project workers (ESS2).

The GRM is an effective tool for early identification, assessment, and resolution of complaints. The Government of St. Vincent and the Grenadines recognizes a GRM as an integral tool in the development process. In the country's National Economic and Social Development Plan (2013-2025), Goal three (3) promotes good governance and increases the effectiveness of public administration: outcome, 3.3 solicits avenues to educate the public about their legal rights and avenues for redress.

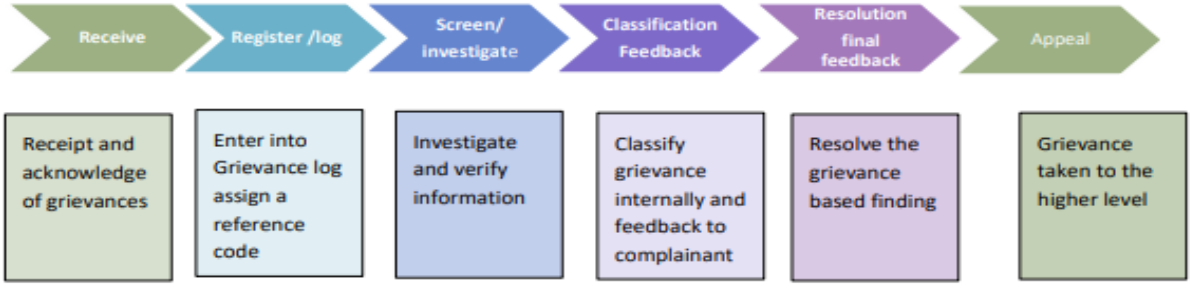
The GRM should also provide a special avenue for addressing Sexual Exploitation and Abuse and Sexual Harassment (SEA/SH). The specific nature of sexual exploitation and abuse and of sexual harassment (SEA/SH) requires tailored measures for the reporting, and safe and ethical handling of such allegations. A survivor-centered approach aims to ensure that anyone who has been the target of SEA/SH is treated with dignity, and that the person's rights, privacy, needs and wishes are respected and prioritized in any and all interactions.

The project's Social Specialist will be responsible for dealing with any SEA/SH issues, should they arise. A list of SEA/SH service providers will be kept available by the project. The GM should assist SEA/SH survivors by referring them to Services Provider(s) for support immediately after receiving a complaint directly from a survivor.

PROCESSING OF GRIEVANCE

The structure of the GRM is as follows:

Figure 1: Diagram of Processing Grievance



1. Receive Grievance

The PC should receive all grievances. Through the consultation process in each participating country, stakeholders will be informed of various avenues through which the mechanism can be accessed.

Mode of receiving grievances

Complaints can be made in person, anonymously, writing, verbally over the phone, by fax, emails or any other media.

Sample Notification to the public on mediums through which grievances can be submitted

Email:	cenplan@svgcpd.com
Telephone:	784-457-1746
By letter:	The Project Grievance Officer -
	Volcanic Eruption Emergency Project
	Ministry of Finance, Economic Planning and Information Technology
	Bay Street
	Kingstown

The complete GRM can be accessed on the VEEP website at https://veep.gov.vc/veep/images/pdf/VEEP_GRM.pdf.

7.3.4 Stakeholder Identification and Consultation

Project stakeholders are parties that have a direct and indirect interest in the project and have a direct and indirect impact on the success of the project. Due to their diverse needs and interests, stakeholders have different expectations for the project. The stakeholders of this project can be divided into seven (7) major groups; governmental, residents, community organizations and businesses, the funding agency, the Water Authority, PAPs and other interested parties.

An analysis of the project stakeholder groups identified the main benefits to key stakeholders of the project. For instance, the Water Authority will benefit from the enhanced infrastructure, which will enable the provision of improved service to the residents when the project is completed and operational. Residents and businesses in the project area will benefit from an improved water supply; additionally, employment opportunities will be created during construction.

Stakeholder engagement is critical at all stages of Bank funded projects and is an inclusive process to be conducted throughout the project life cycle. In the World Bank's Environmental and Social Framework (ESF), "Stakeholder Engagement and Information Disclosure", is the tenth standard (ESS10) which recognizes "the importance of open and transparent engagement between the Borrower and project stakeholders as an essential element of good international practice". The ESF ensures that World Bank financed projects are guided by transparency, non-discrimination, social inclusion, public participation and accountability. ESS 10 emphasizes that effective stakeholder engagement can significantly improve projects' environmental and social sustainability, enhance project acceptance, and contribute significantly to successful project design and implementation. Accordingly, when properly designed and implemented, stakeholder engagement supports the development of strong, constructive and responsive relationships that are important for the successful management of a project's environmental and social risks.

General information to be provided to the stakeholders include: (a) The purpose, nature, and scale of the project; (b) The duration of proposed project activities; (c) Potential risks and impacts of the project on local communities, and the proposals for mitigating these, highlighting potential risks and impacts that might disproportionately affect vulnerable and disadvantaged groups, and describing the differentiated measures taken to avoid and minimize these; (d) The proposed stakeholder engagement process highlighting the ways in which stakeholders can participate; (e) The time and venue of any proposed public consultation meetings, and the process by which meetings will be notified, summarized, and reported; and (f) The process and means by which grievances can be raised and will be addressed.

Community engagement is essential for the successful implementation of the project. Thus, a public town hall meeting is suggested as an effective means of communicating directly with the community and obtaining immediate feedback prior to the start of physical implementation. However, using other modalities of communication including social media posts, radio and television announcements, and notices read at church and other gatherings, may help to ensure that the information being disseminated reaches a wider audience. Virtual meetings with members of the community or key stakeholders can also be held. These engagements will be conducted by the PIU and the Design Consultant.

Stakeholder consultations for the VEEP commenced in 2021 and are ongoing. Specific to the works at Fancy, Owia and Sandy Bay, the Design Consultant has regularly engaged the Central Water and Sewerage Authority regarding development of the design. Discussions held with residents in the project area

indicate that the communities are aware of the VEEP and have a basic awareness of the planned water interventions. In all the project areas the interviewed residents strongly supported and endorsed the plans to improve the water infrastructure in order to alleviate the perennial problem, of water supply shortages in the aftermath of heavy rainfall, faced by the communities.

Discussions with the Youth and Community Mobilization Officers for the project areas highlighted the critical role that the churches in the project area can play in disseminating project information. The Churches were also identified as a venue for project meetings in the absence of other public buildings. Table 5 below lists the project stakeholders which should be consulted during project implementation.

In addition to the stakeholder consultations which have been held, consultation will continue throughout project implementation. Importantly, due to the high rate of project activity ongoing on the island in the aftermath of the eruption, a number of governmental stakeholders highlighted the issue of meeting or consultation fatigue possibly impacting planned consultations. While this situation may result in less-than-optimal participation in planned community consultations, a collaborative effort with the other VEEP infrastructural project components in the scheduling and hosting of community consultations prior to the start of construction and during construction is recommended, to reduce the total number of consultations held without comprising the effectiveness of the engagements.

7.4 Monitoring

Environmental and social monitoring will be an implementation requirement to determine and ensure the water supply system works are meeting stipulated conditions or requirements and are not negatively impacting the environment or people. The monitoring program will assist in determining the effectiveness of the environmental and social management mitigation measures and provide early warnings of any distress, pollution, and other incidents so that the required corrective action can be implemented. The monitoring programme will also assist in determining if additional impact control measures may be required based on the environmental and social condition being experienced.

There are two basic forms of environmental and social monitoring:

1. **Compliance monitoring**- which checks whether prescribed actions have been carried out, usually by means of inspection and/or enquiries; and

2. **Effects monitoring**- which records the consequences of activities on one or more environmental or social components, and usually involves physical measurement of selected parameters or the execution of surveys, to establish the nature and extent of induced changes.

Compliance monitoring is usually given more emphasis in building construction projects because most impact controls take the form of environmental and social protection measures incorporated in the design and contract documents, and the extent to which these are complied with by the contractor(s) plays a major part in determining the overall environmental and social performance of the project. Compliance monitoring affords the opportunity for a rapid response to construction impacts.

Day-to-day environmental monitoring will be undertaken by a suitably qualified employee attached to the design supervision firm, specifically assigned as the Site Clerk. The Site Clerk, supervised by the design supervisor, will undertake the role of Environmental and Social Compliance Monitoring Officer and undertake systematic observation of all site activities. This person may have other responsibilities, as long as s/he is able to properly meet the environmental and social monitoring requirements. An employee of the contractor will also be responsible for Environmental and Social Compliance Monitoring and report to the Contractor and also provide reports through the Contractor to the VEEP and the Supervising consultant's Environmental and Social Specialists. The VEEP's and the Supervising consultant's Environmental and Social Specialists will review and ensure the contractor's implementation of the ESHS contractual requirements through site inspections, audits and other means as necessary; review and approval of contractor's ESHS documentation required under the contract; advising CRE on appropriate actions, including contractual remedies, in the event of non-compliance; investigating incidents and identifying system changes to prevent recurrence; reporting on ESHS matters as required.

The application of remedies for non-compliance with contractual ESHS requirements will be in accordance with the administrative arrangements described in the contract.

Monitoring will, for the most part, take the form of visual observations, and site inspections will place an emphasis on early identification of any environmental problems and the initiation of suitable remedial action through communications to contractors. Where remedial actions have been required, further checks will be required to ensure that these are being implemented to the agreed schedule and in the required form. As information of the principal problem areas come to the fore, attention will be concentrated on activities which are known to be the most troublesome.

The Environmental and Social Compliance Monitoring Officer or Site Clerk will report to his/her Project Manager/Engineer daily, using conventional report forms which coverage will be extended to include key environmental and social matters, while the Project Progress Report will provide a summary of the broader environmental and social issues encountered during construction. The Project Engineer will decide on the appropriate course of action to be taken in cases where unsatisfactory reports are received from the Environmental and Social Compliance Monitoring Officer / Site Clerk regarding environmental or social matters. In the case of relatively minor matters, verbal interaction with the Contractor on the need for remedial action may suffice. In all serious cases the Project Engineer/Manager has the responsibility to order a stop to any aspect of the works in the event where serious environmental damage or public nuisance/safety hazard is either imminent or has already been caused. In cases of incidents and accidents, the PIU and Supervising Consultant must be informed immediately. The PIU will also inform the World Bank within 24 hours and follow up action including root cause analysis shall be carried out as agreed with the Bank and the contractor will be required to implement such corrective action under the supervision of the supervising consultants and the VEEP PIU.

As part of the compliance monitoring and contractual agreement, there must be visitation by the engineers (CES)'s environmental and social specialists in conjunction with the monitoring effort by the VEEP and Ministry Project implementation Unit team. These visits by the CES's environmental and social specialists are to ensure that the design conditions stipulated within the ESIA and ESMP are being met to ensure minimization of any negative environmental and social impacts of the various component works over the 18 months-period of the project.

7.5 Reporting

On site, generally there will be a reporting process to ensure feedback on the project and the effectiveness of the measures being implemented. Bi- weekly reports may be prepared by the design supervision firm to summarize the results of the daily site monitoring, remedial actions which have been initiated, and the effectiveness of those measures in respect to the desired result. The reports will also identify any unforeseen environmental problems and will recommend suitable additional actions. Informal discussions will be held with the residents of the community to ascertain whether and how they are impacted by the ongoing works.

Monthly progress meetings should be convened with the PIU, the design supervision firm and Contractor in attendance along with the Environmental Compliance Monitoring Officer /Site Clerk as part of routine project meetings to review the environmental and social matters and measures. These discussions and relevant decisions should be circulated by the PIU to key line agencies.

8 CONCLUSION AND RECOMENDATIONS

The following conclusion and recommendations apply to the proposed water supply system works based on this Environmental and Social Impact Assessment study.

The potential negative environmental impacts of the sub-projects are not expected to be long-term or large-scale, and in general, they relate to the disruption of vegetation, disruption of the soil and landscape, air pollution, noise from construction equipment and machinery, soil pollution and disturbance, pollution of surface and groundwater, waste management, human safety, and land / crop related matters.

It has been determined that the proposed works can be undertaken with the following conditions:

1. All requisite environmental and social mitigative measures as per the ESIA are implemented.

2. The contractor must implement and abide by the stipulations of the ESIA and the ESMP.

3. The Supervising consultant CES must engage an environmental and a social inspector to monitor and ensure that the required environmental and social mitigative measures are being implemented as per the ESMP.

4. The VEEP PIU, CWSA, and all pertinent agencies must monitor the work to also ensure compliance.

5. All designs and implementation must be based on acceptable international standards for engineering, construction, environmental safety, and best management practices.

ANNEXES

ANNEX 1 REFERENCES

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ANNEX 2 LIST OF CONSULTATIONS

Stakeholder agency	Contact Person	Date
Central Water and Sewerage Authority (CWSA)	Eng. DaSilva Eng. Jonathan Francis.	Friday 7th July 2023. Initial Meeting and then Throughout process with Eng Francis
Volcanic Eruption Emergency Project (VEEP)	Team members Ms. Sharika Mandeville Ms. DeAnna Ralph Ms. Nyasha Hamilton Ms. Josel John	7th July 2023 Initial meeting and then throughout process with Ms. John
Forestry Department Ministry of Agriculture, Rural Transformation, Forestry and Fisheries	Mr. Leon Matthews Ranger Supervisor	12 July 2023 and throughout period
Rabacca Livestock Livestock Breeding and Multiplication Centre at Orange Hill. Ministry of Agriculture, Rural Transformation, Forestry and Fisheries	Ms. Esther Wilson Farm Attendant	13 July 2023
Land and Surveys Department Ministry of Transport, Works, Lands and Surveys, and Physical Planning	Mr. Keith Francis Chief Surveyor	14 July 2023
CWSA - Solid Waste Management Unit	Ms. Zinzie Robertson Solid Waste Environmental Engineer	14 July 2023
Ministry of Agriculture, Rural Transformation, Forestry and Fisheries	Mr. R. Gumbs Chief Agricultural Officer	14 July 2023
Youth Division –Ministry of National Mobilization, Social Development, Family, Gender Affairs, Youth, Housing and Informal Human Settlement	Ms. G. Anthony Youth Officer	14 July 2023
Social /Community Development Division– Ministry of National Mobilization, Social Development, Family, Gender Affairs, Youth, Housing and Informal Human Settlement	Mr. K. Collis Head- Social Department Mr. S. Yearwood Community Development Officer	14 July 2023
Chief Engineer's Office Ministry of Transport, Works, Lands and Surveys, and Physical Planning	Mr. Allistair Campbell (Chief Eng. Acting)	17 July 2023
Fisheries Department Ministry of Agriculture, Rural Transformation, Forestry and Fisheries	Mr. Kris Issacs Deputy Chief Fisheries Officer	17 July 2023
Physical Planning Department Ministry of Transport, Works, Lands and Surveys, and Physical Planning	Mr. Imron Williams Mr. Colin Layne Chief Building Inspectors	17 July 2023
National Emergency Management Organization (NEMO)	Mr. Carl Phillips Senior Planner	18 July 2023

Ecoengineering, Kairi, Trintoplan	Indranny Sammy_EcoEngineering Debbie Reyes_EcoEngineering Dr. Tameka Deare_Kairi(Social Specialists) Andrea Able_Trintoplan	18 July 2023
Kairi	Dr. Tameka Deare_Kairi(Social Specialists)	25 July 2023
Overland Baptist Church	Ms. Elicia Edwards	29 July 2023

List of Residents Interviewed

Ms. P. Cain	Resident	Georgetown
Ms. Esther Wilson	Livestock Attendant	Rabacca Livestock Station
Ms. Louanne Johnson	Supervisor	Rabacca Livestock Station
Mr. Rawlston Mc. Barnett	Stockman	Rabacca Livestock Station
Mr. Ezekiel Roberts	Farmer	London
Mr. Kernon Ashton	Farmer	London
Mr. Ollie Jeremiah Brackin	Farmer	London
7 fishers	Fishing	Owia
Ms. Das	Farmer	Fancy
Mr. Godfrey	Farmer	Fancy
Mr. A. Bowens	Forestry Officer	Fancy
Ms. Zilma Michael and family	Farmer	Fancy
Mr. C. Ballantyne	Resident	Fancy

ANNEX 3 SITE PHOTOS

Site photos of the sites for the works to be executed.

High Demand on Water Supply - Ongoing construction Sandy Bay, Distillery, George Town, Owia Fishing Processing Complex

Construction activities at Sandy Bay. One example of project placing a demand on the existing water supply.

Distillery at Georgetown is also a large consumer of water

Owia Fishing Processing Complex is a large water consumer.

Tourama Tank Site

Tourama tank site. Note secondary vegetation growth and slope of site which suggest cut and fill engineering operation with attendant initial destabilization of slope and soils which would require retaining measures.

Standing on the site and looking north east. Note coconut and other fruit trees in secondary growth. Note existing access road travelling past the site to agricultural lands.

Point Village Tank

Standing on tank site at Point and looking down to the north. Note very close proximity to existing residence which suggests potential impacts of noise, dust, drainage issue, and general nuisance.

Banana crop on the site. Removal will require compensation under social impact.

The existing narrow residential road up from Pont High Road to site also serves as a residential access. Potential nuisance and social issues if this road is blocked with material or access is restricted for residents.

Orange Hill Tank

Access road to existing Rabacca Livestock Breeding and Multiplication Centre at Orange Hill. The access road in very poor condition and narrow. Traffic management issues.

Looking east at the facility towards the tank site. Where existing tank was located and destroyed by the Volcanic eruptions in 2022.

Picture of facility with animal pen. Potential impact minimal of noise and some dust.

Fancy Tank

Fancy concrete tank within fenced enclosure on lower slope of Volcano. Note secondary vegetation around tank site. Intention to extend a pipe from proposed gravel filter in Julie Riverbed approximately 200m away along with a pressure pump and feed tank through disinfection system.

Surrounding land use with subsistence potato farming and general secondary vegetation with fruit trees such as papaw, banana, coconut and mango.

Note narrowness and precariousness of existing footpath to the tank. Subject to slippery conditions and wash out during heavy rains leading to Occupational health and safety issues for any proposed works.

Narrowness of existing access uphill that continues to narrow even through residential area and some garden farming leading to path to the water tank and river works location approximately ½ a mile away. Construction material must be transported manually from this point.

Note existing old metal distribution line running near existing residence from the tank much higher up above. near rea

Perseverance Water Treatment Facility

The Perseverance Water Treatment Plant located on approximately 3 acres of land treats and distributes water to surrounding lower communities.

Treatment facility at Perseverance. Care must be taken during any works to mitigate the potential issue of polluting this operation in any way.

Water storage and treatment tank

River Crossing

George Town_Spring Village

Concrete residence has been constructed over the 6" dia water pipeline on the banks of the Perseverance River at Spring Village where it crosses the river..

Closer view of pipe crossing under residence. Limited space to facilitate any maintenance or construction work. Issue of noise and dust. Domestic birds in cages under house.

Existing pipe crossing across Perseverance River

Use of Perseverance River for recreational use. Note children bathing and catching crayfish.

Pipe crossing is around this narrow corner of the existing residence restricting transportation of material and working area.

Narrowness of access to crossing site through existing residential community. Potential nuisance impacts of dust and noise.

Narrowness of access to crossing site through existing residential community. Potential nuisance impacts of dust and noise.

River Crossing_ Owia_vulnerable pipe

Owia. Note pipe is on river bed and vulnerable to damage from any loose boulders or other objects from further upstream. Easy to access by persons.

Owia. Access to the pipeline is through a residential community and pig pen on a non defined path.

Another example of river crossing with pipe going under existing river bed.

Bridge crossing at Perseverance

Crossing on way to Perseverance Water Treatment Facility in Jennings. Water overtops bridge especially when culverts are blocked and has damaged bridge and threatens pipeline.

View of bridge crossing looking upstream to Scabby Dam. Pipeline is very vulnerable

Road /Pipe crossings

Sandy Bay

Sandy Bay. Note proximity of houses to main road and the potential for impacts on these households during pipeline works in the road.

Owia. Note existing pipeline that will need to be upgraded along side of road and against wall of residential property.