# **Environmental Assessment Document**

ADB Project No.: WBG Project No. Status: Final Date: December 2024

# Solomon Islands: Urban Water Supply and Sanitation Sector Project

Phase 2 - Subproject 1: Honiara Water Mains Replacement Project

# **Public Environmental Report**

Prepared by Solomon Water

Prepared for Asian Development Bank and World Bank Group

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# Abbreviations

ADB	Asian Development Bank		
AP	Affected Person(s)		
BOD	Biochemical oxygen demand		
BMP	Building Materials Permit (issued by MMERE)		
CAC	Community Advisory Committee (part of GRM process)		
CESMP	Construction environmental and social management plan (developed by the contractor)		
COC	Code of conduct (part of the CESMP)		
COD	Chemical oxygen demand		
COVID-19	Corona Virus Disease 2019		
CSS	Country Safeguards Systems		
CSC	Contract Supervision Consultant		
DC	Development Consent (issued by ECD-MECDM)		
DDR	Due Diligence Report		
DMA	District Metering Areas		
DN	Diameter Nominal		
ECD	Environment Conservation Division (within MECDM)		
EHS	Environmental, Health, and Safety		
EHSG	Environmental Health and Safety Guidelines (of the World bank)		
ESA	Environmental and social assessment (process of screening, assessment and reporting)		
ESM	Environmental and social management		
ESMP	Environmental and Social Management Plan		
ENSO	El Nino Southern Oscillation		
ERP	Emergency Response Plan (part of the CESMP)		
EHSO	Environmental, health and safety officer (of the contractor)		
FGD	Focus Group Discussion		
FIRR	Financial internal rate of return		
FS	Feasibility study		
GBV	Gender-based violence		
GIS	Geographic Information System		
GRM	Grievance Redress Mechanism		
GRC	Grievance Redress Committee		
HSP	Health and safety plan (part of the CESMP)		
HWMR	Honiara Water Mains Replacement subproject (subject of this PER)		
IA	Implementing Agency		
ISS	Informal Settlement Supplies		
LARP	Land Acquisition and Resettlement Plan		
LMMA	Locally Managed Marine Areas		
MDPAC	Ministry of Development Planning and Aid Coordination		
MECDM	Ministry of Environment, Climate Change, Disaster Management and Meteorology		
MID	Ministry of Infrastructure Development		

MLD	Million liters per day		
MMA	Marine Managed Areas		
MMERE	Ministry of Mines, Energy and Rural Electrification		
MOFT	Ministry of Finance and Treasury (executing agency)		
NDS	National Development Strategy		
NEMS	National Environment Management Strategy		
NRW	Non-Revenue Water		
OP/BP	Operational policies/Bank policies (safeguard requirements of the World Bank)		
PCCSP	Pacific Climate Change Science Program		
PER	Public Environment Report (requirement under the CSS)		
PMO	Project Management Office		
PMU	Project Management Unit		
PPA	Project Preparation Assistance		
PVC	Polyvinyl Chloride		
ROW	Right of Way		
SEAH	Sexual exploitation, abuse and harassment		
SEP	Stakeholder engagement plan (of the UWSSSP)		
SIG	Solomon Islands Government		
SIWA	Solomon Islands Water Authority		
SOE	State Owned Enterprise		
SPS	Safeguard Policy Statement 2009 (of the AB)		
STP	Septage treatment plant		
SW	Solomon Water (implementing agency)		
TOR	Terms of Reference		
TSS	Total suspended solids		
UWSSSP	Solomon Islands Urban Water Supply and Sanitation Sector Project		
UXO	Unexploded Ordnance		
VAC	Violence against children		
WB	World Bank		
WBSP	World Bank safeguard policies (as set out in the OP/BP)		
WMP	Waste Management Plan (part of the CESMP)		
WTP	Water treatment plant		

# **Executive Summary**

**Background.** The Solomon Islands Government (SIG,) with support from Asian Development Bank (ADB) and World Bank Group (WB), is implementing the Solomon Islands Urban Water Supply and Sanitation Sector Project (UWSSSP) to improve the water supply and sanitation services in Honiara and five provincial towns.

The project will improve access to safe water and improved sanitation in urban and peri-urban areas in Solomon Islands and assist Solomon Water (SW) in implementing high priority components identified in its 30 - Year Strategic Plan and 5 - Year Action Plan.

The UWSSSP is being delivered in two phases, the first phase has been under implementation since 2020. Phase 2, which includes five subprojects, is in the process of completing the feasibility studies including the environmental and social (E&S) due diligence and detailed engineering design. The first subproject—Honiara Water Mains Replacement (HWMR)— encompasses the upgrade of 10km of the existing pipeline south-west of Honiara to northeast of Honiara, which is from Tasahe to the Panatina reservoir. The HWMR includes linking the pipelines to other existing water mains pipelines and replacing the existing pipes.

**Institutional arrangements.** The Ministry of Finance and Treasury (MOFT) is the Project executing agency and SW is the implementing agency, operating through a Project Management Unit (PMU). Ministry of Environment, Climate Change, Disaster management and Meteorology (MECDM) is the regulatory agency responsible for the implementation of the environmental elements of the country safeguards systems (CSS). SW's PMU, on behalf of the SIG, is responsible for: (i) implementing the project in compliance with the project agreements and covenants as set out in the project administration manual (PAM) for ADB and project operations manual (POM) for WB; (ii) supervising the implementation of the subproject construction contracts; (iii) reviewing and approving when satisfactory the construction environmental and social management plans (CESMP) prepared by the contractor for each subproject and requesting ADB and WB provide 'no objection' to commencement of physical works; (iv) ensuring that the CESMPs are properly implemented and monitored by the contractor; and (v) conducting monitoring and inspections of the contractors' CESMP implementation and reporting of the same.

**Legal and policy framework.** The Environment Conservation Division (ECD) within MECDM has the mandate to implement the Environment Act 1998, Environmental Regulation 2008, and the Environmental Impact Assessment (EIA) Guidelines 2010. The ECD will review the public environmental report (PER) or environmental impact statement (EIS) accompanying the development application and, if satisfied with the identification of risks and impacts and associated mitigation measures, issue development consent (usually with a list of conditions that must be met) for any project or proposed development. The project must also comply with the requirements of the ADB's Safeguards Policy Statement 2009 (SPS) and the World Bank Operational and Bank Policies for safeguards, referred to collectively as the WB Safeguard Policies (WBSP).

**Screening and scoping.** The screening and scoping of the UWSSSP overall and each of the subprojects was undertaken based on the proposed scope of works and existing conditions within the zone of impact of each subproject. The UWSSSP has been categorized as "category B" for environment given that it will have site specific, largely temporary, and intermittent impacts during construction and most impacts can be avoided or reduced through mitigation measures. This PER has been prepared for the HWMR as the appropriate level of assessment for a category B project to comply with both the CSS and the requirements of the ADB and WB.

**Climate change adaptation.** Climate change risk and adaptation assessment (CRA) must be addressed since Solomon Islands is classified as a fragile or conflict affected situation (FCAS). Further, Honiara is vulnerable to the effects of sea level rise, extreme weather events, and intense rainfall resulting in flooding of streams and localized flooding in low lying areas.

During the design phase, onsite flood and hydrological assessments were undertaken. This provided detailed information for the design of the existing trunk main routes and mains which crossed rivers, streams, drains and creeks, or traversed hills or slopes.

Anticipated impacts. Following the screening, based on engineering design, the environmental and social risks and impacts of the HWMR were identified and assessed. This includes the potential impacts arising from the design and procurement, pre-construction, construction, and operation and maintenance stages. Overall it is concluded that the risks and impacts will be relatively minor, largely temporary (during the construction stage), localized, and can be mitigated or managed to acceptable levels provided that the measures set out in the environmental and social management plan (ESMP) of this PER are implemented and monitored.

Pre-construction considerations are the responsibility of the PMU and contractor and include climate change vulnerability and risks reflected in HWMR design; updating of the PER and its ESMP based on detailed design; application for the development consent (DC); integration of the updated PER and ESMP and DC including conditions into the bid and contract documents; update of the project's Stakeholder Engagement Plan (SEP); adaption as required of the overall UWSSSP grievance redress mechanism (GRM) for the subproject; development and submission of the CESMP by the contractor. The CESMP, elaborated from the ESMP, will reflect the contractor's construction approach and methodology to ensure appropriate environmental and social management (ESM) during the construction period; review of the CESMP by the PMU; identification of materials sources, materials extraction, audits of existing suppliers and/or due diligence undertaken for opening of a new source and application for buildings material permit (BMP) by the contractor; addressing biosecurity issues and potential introduction of alien invasive species by the contractor (as part of their CESMP); securing land access arrangements by the PMU, any temporary land access for construction purposes will be negotiated by the contractor; and undertaking unexploded ordnance (UXO) survey and clearance as necessary. As identified in the ESMP, actions necessary to address pre-construction risks and impacts will be included in tender documents and construction contracts.

- The construction phase considerations include communications to affected communities, implementation of the relevant elements of the project' GRM; site access, clearance and site establishment including potential disruption of other utilities (power and communication cables); soil erosion and sedimentation control; disposal of excavation spoils; oil and hazardous materials management; dust control; site waste management including storage, transport and disposal; construction noise and vibration; traffic management; community and occupational health and safety; potential social issues due to influx of workers; potential damage to archaeological and cultural heritage assets. The contractor will be required to fully implement and monitor the approved CESMP during the construction phase.
- Operational considerations, to be implemented by SW, will include hazardous materials management, waste management, invasive species management, health and safety risks during the operation and maintenance activities. Operational impacts will be addressed by implementation of the actions identified in the operations phase of the ESMP and SW's existing in-house operational procedures.

Overall, few of the risks and impacts are irreversible and all of the risks and impacts can be managed and reduced to acceptable levels through compliance with the ESMP which elaborated by the contractor into a detailed CESMP which will be implemented, monitored and supervised.

**Analysis of alternatives.** The do-nothing option is not considered a feasible alternative as the critical water supply infrastructure is in poor condition and needs rehabilitation and upgrade. Further, doing nothing will not meet the objective of the UWSSSP. The main alternatives for the HWMR subproject include differing potential alignments and locations. The reasons for choosing the areas for rehabilitation, options for pipe material types and pipe sizes etc. are identified and discussed.

Environmental and social management plan. This PER includes an ESMP which takes account of the baseline environmental conditions and identifies and evaluates the likely risks and impacts and mitigation strategies required for the for the proposed subproject. The ESMP establishes all of the ESM requirements to be implemented during delivery of the HWMR and these ESM provisions will be incorporated into the bid and contract documents. The PER (and its ESMP) and development consent are part of the contract and therefore are legally binding documents. Prior to the commencement of any works (including site establishment, clearing and grubbing) the contractor will develop their CESMP and submit it to the PMU for review. The contractor will be required to recruit a full-time environmental, health and safety officer (EHSO) and deputy EHSO to assist the contractor to implement the CESMP, including site specific plans, and sub-plans (traffic management, waste management, health and safety etc.). The SW environmental officer will review the CESMP and share the draft CESMP with ADB and WB for review and comment. Once the CESMP is considered satisfactory, the PMU will approve the CESMP and will advise the contractor they may take possession of the site and start works. Including monitoring the implementation of the approved CESMP by the contractor.

**Consultation, participation and disclosure.** As per the project's SEP, SW has undertaken community consultations during the detailed design phase and will continue to do so during the construction phase. Information has been provided to stakeholders who include representatives from directly affected and beneficiary communities, various government agencies, civil society organizations, non-government organizations, and representatives from communities. The consultations and information summaries are in both English and pidgin.

Stakeholders expressed their full support to the project and clarifications on some concerns raised were discussed and clarified by SW. Some typical concerns have been raised as outlined in the relevant section of this report.

The project's SEP was prepared during the preparatory phase to guide the engagement, consultations and information disclosure during the design and implementation stages of the project. This will be implemented for the HWMR.

For the HWMR, the contractor will address the relevant elements of the SEP, and how they will implement these, in their CESMP. The contractor will document all communications and consultations and provide this information to the PMU as part of their monthly reports.

**Grievance redress mechanism.** SW has an established GRM which has been adapted to the requirements of the UWSSSP. Phase 1 of the project confirms that SW's GRM meets the requirements of both ADB and WB. The PMU will implement the GRM for the HWMR and the contractor will address the relevant elements of the GRM, and how they will implement these, in their CESMP. The contractor will maintain a grievance register and provide information to the PMU as part of their monthly reports.

**Monitoring, inspections and reporting.** When the HWMR commences, a system of monitoring, inspections and audits and reporting of these will be undertaken to ensure overall compliance with the ESM measures established in the ESMP and the approved CESMP.

Reports will include summaries of institutional arrangements for implementation of the ESM requirements, compliance and non-compliance with the approved CESMP, accidents and incidents, communications activities, GRM, and any capacity building activities undertaken.

Reporting will include contractor's monthly reports to the PMU, quarterly progress reports (QPR) and semi-annual safeguards reports (SMR) (including summary of contractor's monthly reports and safeguards matters) prepared by the PMU for submission to the executing agency, ADB and WB. ADB, WB and SW through MOFT will disclose the monitoring reports.

**Conclusion and recommendations.** Implementation of the HWMR can be undertaken provided that the following recommendations are put into effect and reported to MOFT, ADB and WB: The contract of the design consultant will include provisions requiring them to reflect ESMP requirements in the design process.

- As necessary, the PER and ESMP will be updated based on the detailed design.
- The tendering process will advocate environmentally responsible procurement and will include the PER (and its ESMP) as part of the bidding and construction contract documents.

- The development and submittal of a CESMP prior to commencement of any physical works (including site establishment, clearing and grubbing) will be included as a condition of the tender and contract documents.
- The contractor will implement fully and effectively the approved CESMP and monitor the same. The PMU will inspect and report on the contractor's compliance with the approved CESMP.
- Provisions for the creation and operation of community advisory committees, a GRM requirement, will be included in the construction contract.
- Monitoring, inspection and reporting of all ESM requirements identified in the PER and DC during implementation will be undertaken by the PMU and the contractor; and
- SW, and the contractor, will continue public consultation and information disclosure as per the requirements of the SEP, during detailed design and construction phases.

# 1. Introduction

# 1.1. Project Overview

- 1. The Solomon Islands Water Authority (SIWA) trading as Solomon Water (SW) is a state-owned enterprise established under the Solomon Islands Water Act 1992. SW is mandated to provide the proper management and development of urban water resources and sewerage services in Solomon Islands. At present SW delivers water to ~65,000 people in four urban centers namely: Honiara, Auki, Noro and Tulagi. Eighty-nine percent of the total population served live in Honiara, while only 11% collectively reside in the other urban centers. Furthermore, SW has also been requested to take over town water supply systems in Gizo and Munda in Western Province, and Taro in Choiseul Province. SW also provides sewerage services to 1,150 residences in Honiara.
- 2. In pursuing its vision of "Safe Water for a Healthy Nation", SW prepared a 30-year Strategic Plan 2017 2047 detailing the planned improvements to deliver safe and reliable water supply and sewerage services in its areas of operation. A 5-year Action Plan was also developed to implement projects identified in the first five years of the Strategic Plan.

# 1.2. Project Background

- 3. The Urban Water Supply and Sanitation Sector Project (UWSSSP) commenced in 2020 and is designed to improve access to safe water and improved sanitation in urban and peri-urban areas of the Solomon Islands. Donor agencies include the Asian Development Bank (ADB), European Union (EU), and World Bank (WB). These institutions have been supporting the Government of Solomon Islands (SIG) to implement the UWSSSP, an investment program, which will provide substantial infrastructure and associated services to support sustainable growth and development of water and sanitation in the Solomon Islands.
- 4. Institutional arrangements. The Ministry of Finance and Treasury (MOFT) is the executing agency, and the implementing agency is SW through its Project Management Unit (PMU). The Environment and Conservation Division (ECD) of the Ministry of Environment, Climate Change, Disaster management and Meteorology (MECDM) is responsible for the implementation of the country safeguards systems (CSS) for environmental management and protection which include the Environment Act 1998, Environment Regulations 2008, and the subsequent Environmental Impact Assessment Guidelines 2010.
- 5. Objective of the project. The project aims to improve access to safe water and improved sanitation in urban and peri-urban areas of Solomon Islands by assisting SW to implement its highest priority goals classified in its 30-Year Strategic Plan and a 5-year Action Plan.
- 6. The strategic outputs of the project include:
  - Output 1: Secure and safe urban water supplies;
  - Output 2: Effective, efficient and safe urban sanitation services;

- Output 3: Enhanced awareness of hygiene and water related issues, and sustained improved hygiene behavior;
- Output 4: SW is financially and technically sustainable; and
- Output 5: Watershed protection (the Honiara Watershed Management Project). Expanding access to improved water, improved sanitation and waste disposal services is critical to wellbeing, for the poor and less well off, who are predominantly in outlying islands.
- 7. Overall project outcomes include improved health of the Solomon Islands population and improved efficiency, accessibility, and sustainability in water and sanitation services.
- 8. Project design and implementation. The first phase which has been under implementation since 2020 includes six subprojects (water supply and sanitation network upgrades, water treatment plant, and wastewater treatment plant and outfall) in Honiara and water supply upgrades in the five provincial towns.
- 9. The detailed engineering design (DED) of Phase 2, currently underway, specifically relates to Outputs 1 and 2. Phase 2 includes five subprojects located in urban and peri-urban areas of Honiara, Auki, and Choiseul Bay for the physical infrastructure improvements. Through feasibility studies (including the E&S due diligence) and DED critical water supply and sewerage systems for rehabilitation and new reservoir sites, water sources and pipeline routes for the new water supply network expansions are identified. The five subprojects are listed in Table 1.1.1 and locations shown in

10. Figure	91.1	below.
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Subproject (SP) ID	Subproject Name	Location	Description	Level of study and design
SP 1	Water Supply Pipeline Rehabilitation (HWMR)	Honiara	Includes replacement of 10 km of existing water pipes, the subject of this report	DED
SP 2	Water Supply Network Expansion	Auki	Includes 2 new reservoirs, laying of new water pipes and connections to households and local businesses	DED
SP 3	Water Supply Network Expansion	Honiara	Includes new reservoirs, laying of new water pipes and connections to households and local businesses	DED
SP 4	Sewer System Rehabilitation	Honiara	Includes replacement of existing sewer pipes and manholes	DED
SP 5	New Water Supply Network & Sewer System	Choiseul Bay	Includes new reservoirs, sewage treatment plants, laying of new water and sewer pipes and connections to households and local businesses. Submarine water pipelines between the three islands (Choiseul – mainland, Supizae, Taro) are also being considered	FS



Figure 1.1: Subproject sites for FS and DED under Phase 2 of UWSSSP

11. Four separate environmental and social assessments (ESA) are to be developed for four of the subprojects. This report details the environmental and social management (ESM) requirements for the Honiara Water Mains Replacement subproject (HWMR).

## **1.3.** Scope and Objective of the Environmental and Social Assessment

- 12. On behalf of the SIG, SW and its PMU will ensure that the CSS and E&S safeguard requirements of the ADB and WB will be complied with for design and implementation of the UWSSSP. As the UWSSSP is a sector project, meaning that not all subprojects were fully designed at the time of approval by the financiers, an environmental assessment and review framework (EARF) and a land acquisition and resettlement framework (LARF) were prepared to guide the assessment and due diligence of the subprojects to be developed during project implementation. The due diligence, including land acquisitions and resettlement plans (LARP) or land due diligence reports (LDDR) and ESA for the subprojects in both phase 1 and 2 will be undertaken in compliance with the EARF and LARF
- 13. The EARF sets out the processes and procedures for screening, assessment and reporting, review and monitoring of each subproject to be prepared during the project implementation. The EARF requires that in the ESA the subprojects comply with the requirements of the CSS, the World Bank's Safeguards Policies (WBSP) and the ADB Safeguard Policy Statement 2009 (SPS).

- 14. As part of the feasibility study safeguards due diligence has been undertaken for the HWMR. In complying with the EARF procedures, a screening checklist was prepared, and the subproject was screened based on the specific design and the existing E&S conditions of the zone of impact, and it was determined that, according to the WBSP and SPS, the subproject is categorized as category B for environment. This is based on the conclusion that most of E&S impacts and risks will be site-specific, intermittent or temporary in nature as they are largely related to the construction phase, and most if not all of the risk an impacts can be readily managed or mitigated through implementation of the measures that will be identified in the environmental and social management plan (ESMP) prepared for the HWMR as part of the ESA.
- 15. The EARF also requires that the CSS be complied with. In accordance with the Environment Act 1998 and Environment Regulations 2008 a proposal application for the HWMR was prepared and submitted to ECD on 6th December 2023. The ECD gave a determination on 20th December 2022 that a Public Environmental Report (PER) was required as part of the development consent (DC) application.
- 16. The objectives of the ESA include the following:
  - Develop a PER which will assess and describe the existing environmental conditions of the subproject area and identify environmental values and sensitive receptors through site observations, survey, consultation and investigations including review of available data and information about the site.
  - Describe the proposed activities and works that will be undertaken at the subproject sites during the project implementation phases (pre-construction, construction, operation and maintenance) and identify and evaluate their potential risks and impacts as well as determining the significance of impacts.
- 17. Based on the above, include the appropriate ESM measures to avoid or mitigate the risks and impacts and establish the requirements for monitoring in an environmental and social management plan (ESMP) as part of the PER. This report has been prepared based on primary data collection through site assessments, stakeholder engagement and utilizing readily available secondary data and information including the PER developed for other UWSSSP subprojects.
- 18. Data gaps have been identified which include noise and water quality and a requirement is included in the ESMP that the baseline for these conditions be completed early in the pre-construction phase.

# 2. Policy, Legal and Administrative Framework

20. As per the project's EARF, the environmental safeguards requirements of the project will be addressed within the context of the Solomon Islands CSS as well as the requirements of the SPS and WBSP.

# 2.1 Country Safeguards Systems: Environment

- 21. The CSS for environment includes legislation (laws and regulations) governing management and protection of the environment, various supporting legislation, and procedures established to implement the CSS. The ECD within MECDM is the regulatory agency responsible for implementing the Environment Act and Environment Regulations, which stipulate the type of activities for which DC must be sought and which require some level of ESA. Its mandate includes reviewing and clearing proposal and DC applications (accompanied by the ESA) and monitoring for environmental compliance of all projects on behalf of the SIG. The ECD is also responsible for wider environmental conservation and protection including management of protected areas, waste management, hazardous substances management, invasive species control and management, and is the agency responsible for managing the compliance of all projects.
- 22. The Solomon Islands does not have emissions or water quality standards. While environmental standards are not provided in the regulations, the MECDM requires the World Health Organization (WHO) standards to be met. In addition, the UWSSSP must comply with the WB Environmental Health and Safety Guidelines (EHSG) which include standards for a range of parameters including noise, air and water quality.

#### 2.1.1. Environment Act

- 23. The Environment Act 1998 provides the legal basis for environmental protection and management. It provides the foundation of the Solomon Islands' ESA system. The core objectives of the Act are to provide for, and establish, integrated systems of development control, ESA, waste management and pollution control, including:
  - Prevention, control and monitor pollution;
  - Reducing risks to human health and prevent degradation of the environment by all practical means, including the following;
  - Regulating the discharge of pollution to the air, water and land;
  - Regulating the transport, collection, treatment, storage and disposal of wastes;
  - Promoting recycling, re-use and recovery of materials in an economically viable manner; and
  - To comply with and give effect to regional and international conventions and obligations relating to the environment.

24. The Act is divided into four sections as follows:

• Part I: states that in the event of any conflict between the Environment Act and other legislation, the Environment Act shall prevail.

- Part II: establishes and defines the powers and role of the ECD.
- Part III: establishes the requirements for ESA, review, and monitoring. This provides for an ESA to consist of either a PER or an environmental impact statement; and,
- Part IV: details requirements for pollution control and emissions (noise, odor, and electromagnetic radiation) and requirements to permits for the discharge of waste. Noise (restrictions on emitting unreasonable noise) is covered in Article 51(1).
- 25. The Environment Act requires one of two levels of ESA, depending on the scale and anticipated impacts of a development proposal as listed in the Second Schedule: (i) PER or (ii) environmental impact statement for developments which may cause more serious impacts. The Environment Regulations 2008 further defines the procedures for undertaking the ESA of projects and the process of application for, and issue of DC.
- 26. The ECD has issued a determination letter (Appendix 1) to SW, stating that the HWMR subproject will require the conduct of a PER.

#### 2.1.2. Environment Regulations

- 27. The Environment Regulations of 2008, promulgated under the Environment Act, were issued to establish the procedures for undertaking the ESA of developments and projects and to provide further detail as to what needs to be covered in a PER and environmental impact statement.
- 28. The Regulations require a project proponent or developer to submit a proposal application to the Director of ECD for project screening, the application is reviewed to determine the likely significance of risk and impact and the required level of ESA. The decision resulting from the review may determine if:
  - No further assessment is required, as such the development application is accepted, and development consent is issued.
  - A PER is required; or
  - Where major projects or development are considered as large scale or with long term unavoidable detrimental impacts such as logging, large scale agricultural developments, mining and large-scale tourism developments and infrastructure projects, a more detailed ESA is required which includes technical, economic, environmental, and social investigations.
- 29. Following the review and approval of the report it will be published by the Director in such manner as acceptable or most effective for the purpose of bringing it to the attention of the public, stakeholders, and other persons whose interests are likely to be affected by the proposed development. Any person(s) who considers that the development will have an impact on their interest may submit a written objection to the director within 120 working days from the date of issuance.
- 30. The Director on receipt of the objection shall review it and plan where they deemed it necessary after consulting the affected parties will: (i) issue the DC with (or without) conditions; (ii) require the developer to prepare a further ESA following the requirements set out in the Regulations or (iii) refuse the consent for the prescribed development. The Director may also amend the conditions stipulated in the DC, if the discharge or emission is carried out in manner consistent with all relevant environmental policies.

31. Also in the Regulations it is stipulated that a developer must submit an EIA Report to the MECDM for any prescribed development and the Director of ECD shall not issue any DC if: (i) the PER or EIS did not support the application; (ii) the discharge of waste, noise, odor, radiation, or other forms of pollution is inevitable; and, (iii) discharge of waste or emission of noise, odor or electromagnetic radiation would be harmful to the environment. MECDM can also require an ESMP and a corporate policy for each of the companies that is or are involved in the project development.

#### 2.1.3. Environmental Impact Assessment Guidelines

32. The Environmental Impact Assessment Guidelines 2010 were developed to assist ECD administer the second schedule of the Environment Act. The guidelines comprise procedural descriptions, required consultations with stakeholders in the process and fees required for development type. The guideline was prepared by the ECD with the aim of simplifying the description of the procedures required by the Act, provide basic advice and guidance to government officers, planners, developers, resource owners on the process of ESA as required by the Act and its Regulations. Advice from ECD indicated that these guidelines have been adopted and are to be used by all developers required to prepare ESA under the Act.



Figure 2.1: Procedure for EIA as per EIA Guidelines 2010 (MECDM, 2010)

Source: MECDM (2010)

## 2.2 Other Relevant Legislation of the CSS

#### 2.2.1 Water resources

33. Waters Resource Bill 2006. This Bill was prepared to supersede the Rivers and Water Act (Revised edition1996). The bill has not been passed by the Cabinet. The purpose of the Bill is:

- To provide for the integrated water resource management of Solomon Islands; To promote the most efficient, fair and beneficial use of natural water.
- To ensure the natural water resources are available for the sustainable use for the benefit of all present and future Solomon Islanders.
- To provide for the protection of natural watercourses and water catchments; and,
- To provide for the control of activities occurring over or beside waterways or watercourses.
- 34. The Bill requires a Waters Resources Advisory Board, whose function is to advise the Minister on matters pertaining to the Act and consult with the Director of Water Resources on technical matters. The Director with his/her staff shall administer, manage, and implement the Act accordingly to achieve the purpose of the act. The Bill covers all water bodies, rivers, streams whether in a registered or non-registered, public, or private or customary land in Solomon Islands. The Water Resources Management Division of Ministry of Mines, Energy & Rural Electrification (MMERE). The MMERE has the authority to control the use and development of all water bodies such as catchments, riverbanks, ground water or flood control zones as a water control area. Logging, mining, and other activities such as sand and gravel extraction in water catchments, riverbanks and riverbeds may be restricted by the MMERE according to the movement of surface water. This also includes any contraction, altering, removing or in any way impedes or is likely to impede flow or movement of surface water. This is a very important clause as it may have a direct impact on sand and gravel extraction in the future if the current activities are not managed or sustainable.
- 35. The Bill clearly states that a development must not obstruct, divert, or dam the river, and if so, it must make application to the Minister who upon receiving the request will assess and if agree will issue a license accordingly.
- 36. **Rivers and Water Act 1996**. This law was enacted to administer and control developments that would impact on a river. The Act, however, only applies to rivers that have been designated under the Act. This means that all activities taking place within and around the vicinity of the declared Rivers are governed under the Rivers and Waters Act 1996. It provides that the MMERE may grant to any person a permit to divert water from any river upon application with the following requirements: (i) application for water diversion, (ii) description of the water diversion, (iii) plans, and (iv) maps. The permit shall specify the river and that part thereof from which water may divert, the quantity thereof and such other terms and conditions as the Minister may impose.

## 2.2.2 Wildlife protection

- 37. Wildlife Protection and Management Act. Provides for the protection, conservations, and management of wildlife in Solomon Islands by regulating the export and import of certain animals and plants. It is also intended to address the compliance of the obligations imposed on Solomon Islands under the Convention on International Trade in Endangered Species (CITES). It provides lists of: (i) "Prohibited or Restricted Exports" in Schedule I, (ii) and "Regulated and Controlled Species" in Schedule II. It was amended in 2017 to strengthen Solomon Islands' compliance to the requirements of CITES.
- 38. **Protected Areas Act 2010**. This Act and its Protected Areas Regulations 2012 establish procedures for the establishment and management of protected areas and to conserve

and regulate biological diversity. Some key objectives of the Protected Area Act are as follows:

- To establish a system of protected areas or areas where special measures need to be taken to conserve biological diversity;
- To develop, where necessary, guidelines for the selection, establishment and management of protected areas or areas where special measures need to be taken to conserve biological diversity;
- To regulate or manage biological resources important for the conservation of biological diversity whether within or outside protected areas, with a view to ensuring their conservation and sustainable use;
- To promote the protection of ecosystems, natural habitats and the maintenance of viable populations of species in natural surroundings;
- To promote environmentally sound and sustainable development in areas adjacent to protected areas with a view to furthering protection of the protected areas; and,
- To rehabilitate and restore degraded ecosystems and promote the recovery of threatened species, such as, through the development and implementation of plans or other management strategies.
- 39. In addition, Part 3 of the Act allows for the declaration, registration and management of protected areas; Part 5 of the Act prohibits any unauthorized bio-prospecting research in these areas except if given permission by the Advisory Committee; and Part 6 provides for the appointment of inspectors to enforce the provision of the Act. There are sections throughout the Act that highlight fines and breaches of the Act.
- 40. **Biosecurity Act 2013**. This law along with the Biosecurity Regulations 2015: (i) prevent the entry of animal and plant pests and disease into Solomon Islands; (ii) to control their establishment and spread; (iii) to regulate the movement of animal, plant pest and diseases and of animals and plants and their products; and (iv) to facilitate international cooperation in respect of animal and plant diseases and related matters. Duties and responsibilities under the legislation are performed by Biosecurity Solomon Islands (BSI), a Department of the Ministry of Agriculture and Livestock.

## 2.2.3 Mines and Minerals Act

- 41. The Mines and Minerals Act (as amended in 2008) establishes the regulatory system for all mining applications and licensing and provides the system to regulate and manage mining activities including the management and permitting process required for all alluvial mining (rock, gravel, and sand extraction). Construction materials must be sourced by the contractor in accordance with the guidelines and processes outlined in this Act. For new sources, the contractor will be required to apply for a Building Material Permit (BMP) from the Department of Mines and Minerals (DMM) of MMERE. The use of existing permitted quarries is preferred to the use of new locations.
- 42. Part VIII of this Act needs to be complied with regarding mining and extraction of aggregate or gravels from rivers. Article 64 requires that BMP be issued for the extraction of building materials. Articles 65–67 outline the format for a BMP application and rights of a BMP holder to enter and extract building materials.

- 43. Article 68 sets out the obligations of a BMP holder, which include payment of fees and royalties; operating using good mining practices; report to the Director on the amount removed and sales details; and, at closure of the mining area, make the area safe.
- 44. Article 69 exempts government departments, provincial, or local authorities from these requirements if they own the area where the mining is being done. The extraction of materials requires a PER to be prepared. While the Mining Act does not specify this as a requirement for a BMP, a requirement of the Environment Act is that all other consents, permits and licenses required for a development be submitted to the ECD as part of the DC application and review process, ECD would require the ESA to cover the risks and impacts associated with those activities. Approvals of BMPs are via a Board that is convened four times a year for this purpose.
- 45. **Town and Country Planning Act**. This Act provides for the: (i) administration of town and country planning in Solomon Islands, (ii) preparation of local planning schemes, and (iii) control and development of land. It provides a list of items to consider in the preparation of local planning schemes. It points to the need of ensuring that land is developed and used in accordance with proper polices. It also advocates the principle that the promotion of the welfare of people includes the preservation or creation of an environment appropriate for their needs. This law applies to all urban areas.
- 46. **Provincial Government Act 1997**. This act gives power to the Provinces to make their own legislation including for environment and conservation. Schedule 3 of the Act provides a list of activities for which the Provinces have responsibility to pass ordinances. One of the activities includes Cultural and Environment protection of wildlife, coastal and lagoon shipping.

## 2.2.4 Labor, health and safety

- 47. Labor Act. According to the Labor Act no children under the age of 18 shall be employed or undertake any industrial work. This act deals with protections for workers. Part IX Care of Workers requires the employer to provide workers with rations (Article 65); protect workers and dependents from malaria (Article 66); provide workers with an accessible supply of clean, non-polluted water for drinking, washing and for other domestic purposes (Article 67); make sufficient and proper sanitary arrangements for workers (Article 68); provide accommodation for the worker and family if they are not conveniently located to the workplace (Article 69).
- 48. Article 70 requires the employer to provide medical care at the workplace including: (i) treatment facilities, medicines, first aid equipment and transportation facilities; (ii) responsibility to move workers as quickly as possible either to the employer's treatment facilities or to the nearest medical facilities; (iii) treatment for workers or hospitalization; and (iv) should a worker die the employer is obliged to pay for funeral costs. Article 71 states that the employer may be required to provide medical facilities and services of a medical practitioner, and the employer is to maintain a register of workers treated.
- 49. The Labor Act (Cap 73) 1996 edition discusses the laws relating to employment. Part III and IV of the acts clearly define the allowable working hours, wages and minimum wages. Part V defines written contracts of employment for both local and non-indigenous workers as well as work permits requirements with penalties. It also outlines workers' rights and employer's penalties for not complying with the requirements, and Part VI and VII includes the prohibition for women to work at night and child labor.
- 50. For management of labor or workers Solomon Islands has ratified several fundamental conventions of the International Labor Organization (ILO).

- 51. Appendix 2 provides a list of the ILO conventions ratified by the Solomon Islands.
- 52. **Safety at Work Act 1996**. States that it is the duty of every employer to provide a safe workplace and to ensure the health and safety of employees under their control. This Act is linked to the Labor Act and the Safety at Work (Pesticide Regulations) 1983.
- 53. **Environmental Health Act**. This act provides for the management and control of public health in the Solomon Islands. Among other items, it empowers the local authority on the construction, operation, and management of sewerage systems, including the sewage disposal works. It also provides penalties for the willful pollution of a water supply source.

#### 2.2.5 International conventions

- 54. The CSS also includes several multi-lateral environmental agreements (treaties and conventions) covering various aspects of sustainable development, environmental management and protection, and safeguarding of cultural heritage and traditional knowledge that the SIG Solomon has ratified or is a party to. The Solomon Islands has ratified on 1995 the Convention on Biological Diversity (CBD) and on 1994 the United Nations Framework Convention on Climate Change (UNFCCC). These international conventions explicitly reference the application of environmental assessment to address the effects of human activities. Use of appropriate procedures requiring environmental impact assessment of proposed projects that are likely to have significant adverse effects on biological diversity is advocated by the CBD.
- 55. A list of international agreements and conventions to which Solomon Islands is a party is presented in Appendix 2.

# 2.3 Strategies, Policies and Plans

56. The following policies are important considerations in terms of services provided by SW in the country.

#### 2.3.1 National Water Policy

- 57. The National Water Policy is a national policy which emphasizes on water resources management and water and sanitation services with an integrated multi sectoral approach to sustainable water management which aims to ensure that sustainable development, management and supply of water, wastewater services as well as appropriate sanitation for the benefit of current and future generation of Solomon Islanders.
- 58. The vision of the policy is that: 'Every Solomon Islanders shall have reasonable access to sustainable, adequate, quality water'. Its mission is: 'In participation with all stakeholders, ensure the sustainable development, management and supply of water, wastewater services as well as appropriate sanitation for the benefit of current and future generation of Solomon Islanders'.

#### 2.3.2 Solomon Water 30 Year Strategic Plan 2017 – 2047

59. The SW's 30 – years Strategic Plan is published in June 2017 and is the overarching document that provides a strategic direction in the short-, medium- and longer-term plans of SW. This can be integrated into business processes to enable alignment of day-to-day operation and decision making with the strategic direction. The strategic plan aims to make

sure that the ongoing sustainable development of SWs water and wastewater services throughout Solomon Islands to at least 2047.

- 60. It also includes the key challenges faced in providing water supply and wastewater services and incorporates Solomon Water's Vision and Mission. The Vision of the plan is: 'Safe Water for a healthy nation' while its mission is: 'To provide reliable and safe water supply and sewerage systems within our area of operations in Solomon Islands, while working in partnership with the community to plan, deliver and operate infrastructure in a manner that seeks to minimize the social and environmental impacts of our activities'.
- 61. The 30-Year Strategic Plan also covers consultation with stakeholders and disclosure of information and monitoring and evaluation framework. The plan shall be reviewed every five years while keeping in focus Solomon Waters key objectives of providing sustainable water and wastewater services, meeting forecast growth demands, expanding its footprint in existing areas of operations and gradually expanding services to other provincial centres as mandated under the legislation. It will also consider what has been achieved over the preceding five years revising growth projections and related program of future capital works and refining corporate objectives and levels of service targets.
- 62. The 5-year Plan outlines the short-term actions and priorities, while the medium-term actions and priorities is also outlined in the 30-Year Strategic Plan. The short-term actions include works and focuses on planning for future growth and continuous improvement in the quality of water and wastewater services.

## 2.3.3 National Development Strategy 2016-2035

- 63. The National Development Strategy (NDS) is a very comprehensive policy that strategizes ways to achieve the development aspirations of the country. The NDS focuses on two key areas: social and economic livelihoods. These two key areas are enshrined into the NDS National Vision "Improving the Social and Economic Livelihoods of all Solomon Islanders".
- 64. Therefore, to achieve all those NDS Objectives, SW as one of the country's SOE ensures that it provides access to clean water to its clients. Being an SOE, SW strives to improve the quality and accessibility of water it provides to households, government houses, business houses and industries in the urban areas. Such is important to improving the social and economic livelihoods of people and more so to support growth and economic development of the country.

## 2.3.4 The National Environment Management Strategy 2020 - 2023

- 65. The National Environment Strategy (NEMS) is a framework that links related policies and programs to provide a plan for environmental actions and stewardship and promotes the establishment of good governance and best practice. The first Solomon Islands National Environment Strategy (NEMS) was developed in 1992 which is based on a collective of strategies developed to address environmental issues with a basis to integrate environment considerations in economic development. The 2020 2023 NEMS was developed by the Secretariat of the Pacific Regional Environmental Programme (SPREP) with the Environment and Conservation Division (ECD). The NEMS is based on the 2019 State of the Environment Report and progress since 1992 is also considered. It includes actions put in place as a means of linking development.
- 66. This strategy is aligned with the NDP and is linked to other sector plans and policies. It is purposely to guide the coordination and collaboration among all stakeholders in carrying

out the key policies, programs and actions to promote sustainable development and conservation.

- 67. The structure of the NEMS is based on seven subject areas: 1. Culture and Heritage 2. Atmosphere and Climate 3. Land 4. Marine and Coastal 5. Freshwater 6. Biodiversity, and 7. Built Environment.
- 68. The NEMS is a commitment by the government to regional frameworks such as the SAMOA Pathway, the national sustainable development goals and targets, and also multilateral environment agreements on climate change, ozone, biodiversity and waste. The NEMS also highlights gaps to be addressed for the protection of the environment to achieve economic aspirations and to enhance community wellbeing.

# 2.3.5 National Climate Change Policy

- 69. The MECDM launched the first National Climate Change Policy 2012-2017 in 2012 highlighting steps the government would take in aiding the country and its people to exist and adapt to present imminent climate change and its impact. The Policy aims to integrate climate considerations within the framework of national policies and guiding the government and its partners to ensure the people, natural environment and economy of the country are resilient and able to adapt to the predicted impacts of climate change. It is the guiding framework to: (a) integrate climate considerations and support the implementation and achievement of the National Development Strategy and other regional and international policies and frameworks; and (b) to guide the government and its partners' efforts in ensuring that; (i) the people, natural environment, and economy of the country are able to adapt to the predicted impacts of climate change; and (ii) the country benefits from clean and renewable energy, energy efficiency, and mitigation technologies that improve people's livelihoods and the national economy.
- 70. The second and updated National Climate Change Policy 2023 2032, was launched in 2023. This policy is the overarching policy developed as an instrument to combat the existing and potential impacts of climate change and its interaction with development actions. Also to take advantage of the chances to support the country's low emission status and concurrently support economic growth and strengthen resilience against climate change. This policy also acknowledges that addressing climate change relies on the implementation of relevant policies and programs across sectors and governance levels. It also aligns with the national, regional and international policies, strategies and frameworks.
- 71. The aims of the climate change policy are to: (i) establish and strengthen the governance framework to address climate change emergency; (ii) target adaptation and risk resilience on key vulnerabilities; (iii) focus mitigation actions on sustainably lowering emissions and enhancing sinks, whilst simultaneously promoting economic growth and strengthening our resilience to climate change; (iv) address loss and damage; (v) achieving national obligations to meet our regional and internation commitments; (vi) strengthen technical capacities for assessment, technology and finance mobilization and mainstreaming of climate change actions.

## 2.3.6 National Energy Policy

72. The National Energy Policy recognizes the importance of reducing dependency on imported fossil fuel. Solomon Islands have abundant of resources renewable energy source such as solar, hydropower, geothermal and biomass and wind energy.

# 2.4 Financier's Requirements

#### 2.4.1 ADB Safeguard Policy Statement

- 73. All projects to be funded or administered by ADB shall comply with the requirements of the SPS. The goal of the SPS is to promote the sustainability of project outcomes by protecting the environment and people from projects' potential adverse impacts.
- 74. The SPS has the objectives to (i) avoid adverse impacts of projects on the environment and affected people; (ii) where possible; minimize, mitigate, and/or compensate for adverse project impacts on the environment and affected people when avoidance is not possible; and (iii) help borrowers/clients to strengthen their safeguard systems and develop the capacity to manage environmental and social risks. The SPS comprises three safeguards' requirements: environment, involuntary resettlement; and indigenous peoples. The environment safeguard requires due diligence which entails a process of addressing environmental concerns, risks and impacts throughout the project cycle and preparing ana appropriate instrument for implementation and monitoring.
- 75. In accordance with the SPS, screening and categorization of a project (taking into account all if its subprojects and/or components) will be undertaken to (i) reflect the significance of potential impacts or risks that a project might present; (ii) identify the level of assessment and institutional resources required for the safeguard measures; and (iii) determine disclosure requirements. Consequently, the SPS categorizes potential projects into categories of impact (A, B, C or FI) to determine the level of environmental assessment required to address the potential impacts as follows:
  - Category A: Projects with potential for significant adverse environmental impacts. An EIA is required to address significant impacts.
  - Category B: Projects judged to have some adverse environmental impacts, but of lesser degree and/or significance than those for category A projects. An initial environmental examination is required to determine whether significant environmental impacts warranting an EIA are likely. If an EIA is not needed, the initial environmental examination is regarded as the final environmental assessment report.
  - Category C: Projects unlikely to have adverse environmental impacts and which do not require any due diligence beyond the screening and review of environmental implications.
  - Category FI: Projects are classified as category FI if they involve a credit line through a financial intermediary or an equity investment in a financial intermediary. The financial intermediary must apply an environmental management system unless all subprojects will result in insignificant impacts.
- 76. ADB will not finance projects that do not comply with the SPS and the host country's social and environmental laws and regulations, including those laws implementing host country obligations under international law. The SPS also contains a prohibited activities list identifying specific activities that ADB will not finance.
- 77. ADB's SPS applies pollution prevention and control technologies and practices consistent with good practices as reflected in internationally recognized standards such as the WB EHSG. The EHSG provides the context of international best practice and contribute to establishing targets for environmental performance. Application of occupational and

community health and safety measures, as laid out in the EHSG is required under the SPS.

78. The General and Industry Sector EHSG are available at the following link - http://www.ifc.org/ehsguidelines.

#### 2.4.2 World Bank Safeguards Policies

- 79. The WBSP aims to prevent and mitigate potential damage to the environment and communities generated in the development process. The WBSP provide the environmental and social safeguard requirements that must be complied with during the identification, preparation and implementation of WB-financed programs and projects.
- 80. The WBSP include ten safeguard policies established to inform decision making, ensuring that projects financed by the WB are environmentally and socially sustainable. The water supply subprojects may be covered by these policies: Environmental Assessment (OP/BP 4.01), Natural Habitats (OP/BP 4.04), Indigenous Peoples (OP/BP 4.10), Physical Cultural Resources (OP/BP 4.11) and Involuntary Resettlement (OP/BP 4.12). Table 2.1 presents these policies and their application to the Honiara water supply component.
- 81. As noted above, the EHSG are technical reference documents with general and industryspecific examples of good international industry practice. When one or more members of the World Bank Group are involved in a project, these EHSG are applied as required by their respective policies and standards. The General EHSG are designed to be used together with the relevant industry sector EHSG which provide guidance on issues in specific industry sectors. When host country regulations differ from the levels and measures presented in the EHSG, projects are expected to achieve whichever is more stringent.

#### Table 2.1: WBSP: Main Objectives, Applicability and Sub-Projects Triggers<sup>1</sup>

Safeguard Policies	Main Objective	Applicability	Application to Honiara Water Supply
			Components
OP 4.01 Environmental Assessment	The objective of this policy is to ensure that projects financed by the World Bank are environmentally sound and sustainable, and that decision making is improved through adequate analysis of actions and their possible risks and environmental impacts in the natural environment (air, water and soils); human health & security; physical-cultural resources; and global and transboundary and global environmental aspects.	This policy is applicable when a project or sub-project has potential to cause negative environmental impacts in its area of influence.	Triggered Environmental risks associated with the project include temporary noise, waste and air quality impacts associated with construction, potential limited vegetation clearing for the purpose of creating access to new water supply sources or pipelines, constructing the water treatment plants, etc. The EARF (equivalent to WB ESMF) and Resettlement Framework (RF) (equivalent to WB RPF) establish the process to mitigate risks and impacts of the project overall. Consultations with stakeholders and affected communities are used to inform the decision-making process. As per the EARF, the ESA for this subproject is a PER.
OP 4.04 Natural Habitats	This policy recognizes that the preservation of natural habitats is essential to protect original biodiversity, for the preservation of environmental services and products for human society and for long term sustainable development. Therefore, the Bank supports the protection, management and restoration of natural habitats by funding projects as well as via political dialogue, sector work and the economic sector. By funding projects, the Bank expects the proponents to apply the precautionary principle in the management of natural resources, in order to ensure opportunities for sustainable environmental development.	This policy is used by any Project or sub-projects considered as potential originator of significant changes (loss) or degradation of natural habitats, be it directly (through the construction) or indirectly (with the human activities caused by the project). OP4.04 defines a natural habitat as land and water areas where (i) the ecosystems' biological communities are formed largely by native plant and animal species, and (ii) human activity has not essentially modified the area's primary ecological functions.	Triggered The policy OP4.04 was triggered for the project to be consistent with the ISDS. The IEE established that the project is not located in areas where there will significant changes (loss) or degradation of natural habitats, be it directly (through the construction) or indirectly (with the human activities caused by the project). Construction will occur in areas of highly modified ecosystems and impacts during operations on environmental and socioeconomic values will be minor.

<sup>&</sup>lt;sup>1</sup> This table was taken from the EARF of the UWSSSP. The application to the HWSRP is explained in the last column.

Safeguard Policies	Main Objective	Applicability	Application to Honiara Water Supply
OP 4.10 Indigenous Peoples	For all projects proposed for Bank funding that affect indigenous peoples, the Bank requires the borrower to undertake free, prior and informed consultation with affected Indigenous Peoples to ascertain their broad community support for projects affecting them. The project financed by the Bank must include measures to: (a) avoid adverse effects on indigenous populations; or (b) when it is not possible to avoid the effects, minimizes, mitigates, or compensates for such purposes. The projects financed by the Bank are designed with the assurance that indigenous people receive social and economic benefits that are culturally appropriate and adequate gender and inter-generations.	This policy is applied when the Project affects direct or indirectly indigenous people.	Triggered The OP4.10 policy is triggered for the project to be consistent with the World Bank Integrated Safeguards Data Sheet (ISDS, p.16 May 2018). However, the project is located in areas where Indigenous Peoples are the sole or the overwhelming majority of direct project beneficiaries. They are not a discriminated, marginalized group, but part of the majority population, sharing the same culture, identity, and characteristics. IP aspects have been integrated into the Project Design ensuring FPIC principles, and broad community support for the project. The project will focus on rehabilitating failed water supply infrastructure or providing new infrastructure, this will benefit the community. An RF will be prepared which sets out the methodology for land acquisition / access for the project, if needed. Once land access is required, the process will include consultations with local government, local communities and various community groups (i.e., youth and women groups). The IEE/EARF will ensure free and prior informed consultation is undertaken and broad community support is achieved for the project.
OP 4.11 Physical Cultural Resources	The objective of this policy is to assists countries to avoid or mitigate adverse impacts on physical cultural resources from development projects that it finances. Physical cultural resources are important as sources of valuable scientific and historical information, as assets for economic and social development, and as integral parts of a people's cultural identity	This policy is used by any Project or sub-projects considered as potential to cause changes (loss) or degradation of physical cultural resources. OP 4.11 defines physical cultural resources as movable or immovable objects, sites, structures, groups of structures, and natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance.	Triggered The project involves construction works in modified urban and peri-urban areas, where it is unlikely that unknown physical cultural resources will be encountered. However, a Chance Find procedure will be included in the CESMP to ensure appropriate measures are taken in the event cultural resources
	and practices.		are encountered. The chance find procedure is a

Safeguard Policies	Main Objective	Applicability	Application to Honiara Water Supply Components
		Depending on the project and the nature of its impacts, various instruments can be used. An Environmental Assessment capturing impacts on physical cultural resources is required for the project and sub-projects.	project-specific procedure that outlines what will happen if previously unknown heritage resources, particularly archaeological resources, are encountered during project construction or operation. The procedure includes record keeping and expert verification procedures, chain of custody instructions for movable finds, and clear criteria for potential temporary work stoppages that could be required for rapid disposition of issues related to the finds. It is important that this procedure outlines the roles and responsibilities and the response times required from both project staff, and any relevant heritage authority, as well as any agreed consultation procedures. <sup>2</sup>
OP 4.12 Involuntary Resettlement	The objective of this policy is to: (i) avoid or minimize involuntary resettlement, where feasible and explore all viable alternative project designs, (ii) assist displaced people in improving their former living standards, income earning capacity, and production levels, or at let in restoring them, (iii) encourage community participation in planning and implementing resettlement; and (iv) provide assistance to affected people regardless of the legality of land tenure.	This policy does not cover only physical relocation but any loss of income sources resulting in: (i) relocation or loss of shelter, (ii) loss of assets or means of livelihood, (iii) loss of income sources or means of subsistence, whether the affected people must move to another location. This policy also applies to the involuntary restriction of access to legally designated parks and protected areas, resulting in adverse impacts on the livelihood of the displaced persons. In these cases, the World Bank requires the establishment of RP or LARP based on the RF for any project or sub-project.	Triggered The projects involve small amount of land acquisition and impacts related to use of easement for new trunk mains. A RF has been prepared to assess potential impacts and outline measures to avoid, mitigate or manage these impacts. In the case land access is required, a Resettlement Plan (RP) will be developed. Communities will be consulted to ensure there are no pending issues. A formal grievance redress mechanism will be established to channel and manage potential grievances arising during project implementation.

Source: UWSSSP EARF, 2019

<sup>&</sup>lt;sup>2</sup> Guidance Note 8 - International Finance Corporation

# **3 Description of the Project**

# 3.1 Components of the Subproject

82. The HWMR is in Honiara City, Solomon Islands. Honiara is situated on the northwestern coast of Guadalcanal Island at coordinates: 9°25'55" south 159°57'20" east as shown in Figure 3.1.



Figure 3:.1 Map of Guadalcanal Island showing location of Honiara

Source: Google Earth Pro (2023)

- 83. **Rationale for the project**. Many of the existing water supply mains and sewerage systems in Honiara need replacement and rehabilitation as they typically inhibit signs of deterioration and failure. Water mains leakage issues contribute to high levels of non-revenue water in Honiara as well as other provinces which SW has estimated to be approximately 60% (20% from commercial losses and 40% from physical leakage from pipes).
- 84. The increasing population of Honiara is also putting pressure on the existing water sources and SW facilities due to the high demand for regular water supply services.
- 85. The proposed rehabilitation works include eight pipeline sections as follows.
  - Construction of new DN 355 PE 100 Polyethylene pipeline from Ngossi Chamber to new Titinge Reservoir site (approx.1100m pipeline length). Replacement of DN225 Grey PVC Pipeline.

- Construction of new DN450 PE 100 Polyethylene pipeline from Titinge Reservoir towards Dai Pacha (approx.400m pipeline length). Replacement of DN225 Grey PVC pipeline.
- Construction of new DN355 PE 100 pipeline from Skyline Reservoir to West Kola Ridge (total pipeline length of approx. 1930m). Replacement of DN200 Grey PVC pipeline.
- 4. Construction of new DN315 PE100 (Pipeline 1) pipeline from West Kola Ridge towards East Kola (approx. 1060m pipeline length). Replacement of DN 200 Grey PVC pipeline.
- Construction of new DN315 PE100 (Pipeline 2) pipeline from West Kola Ridge towards East Kola (approx. 1700m pipeline length). Replacement of DN 150 Grey PVC pipeline.
- 6. Construction of the new DN250 PE100 (Pipeline 2) pipeline from Nancy Valve towards Vura (approx. 330m pipeline length). Replacement of DN100 Grey PVC pipeline.
- 7. Construction of new DN355 PE100 pipeline from Borderline Reservoir to Kombito (approx. 600m pipeline length). Replacement of DN 150 Grey PVC pipeline.
- 8. Construction of the new DN315 PE100 pipeline from Kombito Spring to Panatina Reservoir (approx. 3240 pipeline length). Replacement of DN 200 Grey PVC pipeline.





Source: Google Earth, 2022

# 3.2 **Purpose and Objectives of the Subproject**

- 86. The HWMR will replace water trunk mains to address ongoing water mains leakage issues which contribute to high levels (60%) of non-revenue water (NRW) which results in significantly high volumes of water being lost and not billed resulting in lost revenue.
- 87. The economic cost to repair leaks on specific portions of mains and the presence of poorquality pipe materials has been a long-standing issue therefore it is proposed by SW to replace the existing trunk main with new pipes by using a good quality pipe and increasing the sizes of the pipes to meet the current and future demands, thereby reduce pipe leakage to improves system pressures.
- 88. The purpose of the subproject is twofold: reduce leakage losses associated with poor quality older pipework (predominantly grey PVC pipework with a history of material failures); and, improve the hydraulic capacity of the bulk water transmission system to cater for future demands.
- 89. The benefits of the new mains include:
  - Improve existing water supply service reliability and solve pressure issues.
  - Ensure water distribution capacity for long-term demand requirements.
  - Rationalize existing distribution and enable better monitoring of the system; and
  - Contribute to reducing non-revenue water in Central and East Honiara district metering areas (DMAs).

#### 3.3 Location and Existing Conditions

- 90. Approximately 55% of the households in Honiara are currently connected to the SW network for drinking water while 45% get water from other sources rainwater tanks, rivers/streams, communal standpipes, and unprotected wells. The Honiara water supply system is a large urban system with multiple surface and groundwater sources, servicing nearly 8,500 connections with chlorinated water.<sup>3</sup>
- 91. This subproject is in Honiara City with some sections within the jurisdiction of the Guadalcanal Province. Approximately 60% of the proposed pipeline for replacement exists within the current road reserves within Honiara City while other sections are in private lands fixed term estates (FTE), registered and customary lands. The identified sites for pipeline rehabilitation are divided into different areas or sections from which nine areas comprising of a total of 10 km of pipelines are prioritized for replacement under this sub-project.
- 92. Assessments were undertaken to determine the prioritized trunk mains for rehabilitation based on key factors such as the condition of the trunk mains, materials used, criticality of the mains with respect to service interruptions, NRW and possible expansion of the city (Honiara), hydraulic capacity of the mains to service current and future demands, operation and maintenance of the system by SW.

<sup>&</sup>lt;sup>3</sup> SW. 2017. 30 Year Strategic Plan 2017 – 2047: Main Report. Page 12

- 93. At present it was found that the age of pipelines is not known although it is an important factor to indicate the vulnerability of a main to leakage and/or failure as assets deteriorate over time. Therefore, estimation of the period the pipelines were used was agreed upon with SW for the assessment based on the pipe materials and period when materials are mainly used in most countries in the region.
- 94. It was noted that the grey-PVC pipe (Plate 3.1) is the most common pipe used in the Honiara water supply network. However, this is found to be of poor quality and is prone to failure such as longitudinal cracks, bursts and being brittle. This has resulted in frequent negative experiences with the existing water supply system. At other sites modern polyethylene and PVC pipes were used as this is a high-quality product with significant longevity and durability.

#### Plate 3.1: Grey PVC pipe used at most sites with burst



95. SW has been efficiently tracking leaks from mains and recorded the locations of the leaks. This has significantly contributed to the prioritization of the mains for replacement as the location of the pipeline and the level of leak occurrences were also considered.

Figure 3.3: Location of recent mains leaks in Honiara



Source: SW (2022)

96. NRW tracking is also undertaken by SW on monthly basis on the established DMA of the Honiara network. This makes it feasible to track pipe sections that require further leak detection and repair intervention as well as tracking the progress on current NRW initiatives. From this it was noted that leaking mains are a major contributor to high leakage within respective DMAs.
97. On this basis the NRW was divided into the two main components of apparent losses and real (leakage) losses and the DMAs with high leakage losses are located and prioritized. These are shown in the Table 3.1.

DMA ID	DMA name	NRW (%)	% Physical losses	% Apparent losses
WHRa	White River A	43%	98%	2%
WHRb	White River B	59%	99%	1%
ROVa	Rove A	15%	99%	1%
ROVb	Rove B	8%	95%	5%
ROVc	Rove C	13%	90%	10%
TASab	Tasahe A & B	58%	91%	9%
TASc	Tasahe C	33%	98%	2%
NGOS	Ngossi	55%	98%	2%
MBA	Mbokona	44%	90%	10%
LGKK	Lengakiki	66%	97%	3%
VAVA	Vavaea Ridge	43%	95%	5%
SKYL	Skyline	57%	98%	2%
MB15	Mbokonavera	54%	94%	6%
TUVA	Tuvaruhu	42%	98%	2%
LWKa	Lower West Kola A	57%	97%	3%
LWKb	Lower West Kola B	64%	95%	5%
WKOa	West Kola Ridge A	29%	89%	11%
WKObcNH	West Kola Ridge B & C	81%	99%	1%
TN MV	Tanuli & Mbua Valley	8%	85%	15%
KMVT	Kombivatu	42%	97%	3%
NAHA14	Naha Valley	39%	95%	5%
KBJ RV	Kombito – Borderline	23%	96%	4%
KMTR	Kombito Trunk Main	65%	99%	1%
PEAST	Panatina Ridge East	65%	99%	1%
PINDST	Panatina Industrial	44%	99%	1%
BCREEK	Burns Creek	64%	85%	15%
LGAIR	Lungga and Airport	37%	98%	2%
E Kola	East Kola ridge Tank	67%	91%	9%
Summary		51.93		

Table 3.1: Honiara DMAs NRW by leakage and apparent losses

Source: SMEC, 2022

98. Inadequate sized trunk mains are also considered as these cannot deliver the required levels of service due to high velocities resulting in high head losses and the ability to adequately provide acceptable service to cater for current or future water demand. SW has developed a calibrated network model for Honiara to identify mains that have excessively high velocities (generally >2m/s) and has recognized the critical portions of their network and the key mains required to deliver water reliably without excessive water losses. Figures 3.4 and 3.5 show high velocity pipes and leak repairs done.





Source: SW (2022)

### Figure 3.5: High velocity pipelines and DMAs



Source: SW (2022)

99. The mains identified for replacement are listed in Table 3.2 and shown in Figure 3.6.

	Table 3.2: Water	supply areas	identified for	pipeline	rehabilitation
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Areas	Pipeline	Start	Finish	
Area 5	1,2	Titinge	Titinge Reservoir (Valeato)	
Area 8	3	Skyline Reservoir (Papaho)	Mataniko River	
Area 9	3	Mataniko River	Towards West Kola	
Area 10	3	Towards West Kola	Old West Kola Reservoir Site	
Area 11	4,5	Old West Kola Reservoir Site	Towards East Kola	
Area 12	5	East Kola	Vura 1 Heights	
Area 13	7	Borderline reservoir	Kombito	
Area 15	8	Kombito Spring	Panatina Reservoir	
Area 17	1,2	Tasahe (Towards Titinge Tank)	Titinge Reservoir (Valeato)	



#### Figure 3.6: Location of water supply areas

Source: Solomon Water (2022)

Pressure testing of the new main is expected to be carried out as the work progresses. The pipeline is to be laid to the required grades and levels with the best possible alignment regarding avoidance of possible manmade or other infrastructure or rock conditions but slight changes in alignment to be agreed with SW. Pipes will be disinfected, and pressure tested and the method of disposal/dilution or dichlorination of chlorinated disinfection water is to be agreed with SW

# 2.1.4.

# 2.1.5. Area 5 and Area 17 (Pipelines 1,2)

- 100. These areas are located south west of Honiara and it is within the jurisdiction of Guadalcanal Province and there are four settlements or villages within the pipeline route, as shown in Figures 3.7 and 3.8 there are no pipelines connections or network in the villages in the area.
- 101. This pipeline transports potable water from the Titinge Reservoir to residential areas in Honiara such as Lengakiki, Mbokona, Mbumburu and Tasahe areas. The trunk mains passes over high terrains through common secondary vegetation regrowth and trees including gardens constituting of root crops, vegetables and fruit trees in the proximity of the trunk route.
- 102. There is also a stream east of the reservoir tank which passes through the Rove Catchment Area which is north of the Titinge trunk and Titinge Reservoir in the valley this is located about 0.81 km from the Honiara Botanical Garden. There is a settlement north of the catchment area and the stream is highly used by locals for recreational purposes.
- 103. The land is customary land that is held mainly as by the customary landowners as registered perpetual estates with members of the land-owning tribal group settling in the area. As also observed on site there are currently new developments particularly residential houses being built by locals who had been leasing lands from the customary landowning groups for residential purposes. Other developments on site include residential housing, a school, canteens and market huts.

104. There are no protected areas and ecologically sensitive areas or an area of cultural significance within the project area's boundary. No known endemic or endangered species of flora or fauna are observed on site.

# 3.3.1 Area 17: Tasahe Ngossi Chamber to new Titinge Reservoir (Pipeline 1)

- 105. This pipeline begins at the Ngossi Chamber and terminates at the proposed new Titinge Reservoir site. This pipeline replaces the grey DN225 pipeline. The pipeline is approximately 1,100 m long (Figure 3.16)
- 106. The proposed new main is a DN355 Polyethylene PE100 pipeline with SDR 13.6 (PN 12.5) and SDR11 (PN16). The section of SDR11 pipework is located at the creek crossing. A new DN300 electromagnetic flowmeter in a chamber shall also be installed. The pipeline will follow the alignment of the existing pipeline and due to the criticality of the pipeline, the existing pipeline is to remain in service until the new replacement pipeline is commissioned. Pressure testing of the new main is expected to be carried out as the work progresses.
- 107. Pipes are to be laid to the required grades and levels at best possible alignment considering avoiding possible manmade or other infrastructure or rock conditions and the contractor may recommend slight changes in alignment to be agreed with SW.
- 108. Air valve and scour valves are to be installed at high/low points and anchor blocks are to be constructed at strategic locations. The pipeline in the concrete encased creek crossing is SDR11 for minor creek crossings concrete encasement shall be constructed to the standard details.

Pipes will be disinfected, and pressure tested and the method of disposal/dilution or dichlorination of chlorinated disinfection water is to be agreed with SW.





# Figure 3.7: Area 17 Ngossi (Tasahe Road) to Titinge RT (Pipeline 1)



## 3.3.2 Area 5: Titinge Reservoir to Dai Pacha (Pipeline 2)

- 109. The pipeline begins at the existing (old) Titinge reservoir and terminates towards Dai Pacha. This pipeline replaces the grey DN225 pipeline. The pipeline is approximately 400 m long as shown in Figure 3.17.
- 110. The connection at the existing chamber will be a new DN200 electromagnetic flowmeter will be installed in the chamber to replace the existing DN200 damaged flowmeter. All pipework in the chamber will be replaced with a new 2 m long DN200 spool piece installed upstream of the flowmeter.
- 111. The new pipeline will be a DN450 Polyethylene PE100 pipeline with SDR 13.6 (PN 12.5) and SDR 11 (PN16). For the stream crossing the pipeline the pipes that will be used is SDR11 and this shall be placed in a concrete encased creek crossing. This shall comply with the creek crossings (concrete encasement) standard details of SW.
- 112. The PE pipe will be wrapped in a PVC sheeting designed to ensure prevention of any abrasion of the pipe wall due to thermal expansion/contraction of the PE pipe. In addition, the PE pipe is to be full of water and the ends secured before concrete is poured to avoid possible ovality of the pipe wall due to the weight of the concrete as well as to ensure adequate submergence of the pipeline itself. The PE pipeline at such crossing is also PN16 (SDR11) rated to ensure a thicker more resistant pipe strength. The exact location of the scour valve at the crossing will be determined by SW.
- 113. The pipeline follows the alignment of the existing pipeline and due to the criticality of the pipeline, the existing pipeline will remain in service until the new replacement pipeline is commissioned and operational.
- 114. Air valve and scour valves are to be installed at high/low points as shown on the drawings. Anchor blocks are to be constructed at strategic locations.

## Figure 3.8: Area 5 - Titinge RT to Dai Pacha (Pipeline 2)



### Figure 3.17: Area 5 Pipeline or mains for replacement (Pipeline 2)



# 3.3.3 Area 8 to Area 11 (pipelines 3,4,5)

- This trunk main route is divided into four sections with a total length of 3.55 km (Refer 115. to Figures 3.9 – 3.12). The pipeline starts at Area 8 from the Skyline Reservoir at Papaho to cross the Mataniko River and ends at the Vara Creek area. The trunk runs along the existing road from Papaho to the Mataniko River and pass across the river and onto the Tuvaruhu road at Vara Creek where Area 9 starts from this site the pipeline passes in a privately leased land along the road and into other FTE or leased land up the hill towards west Kola. From west Kola, Area 10, the trunk main runs along the west kola road to the old SW tank site (to be refurbished under another project) and then from this site to Talise and then to east Kola reservoir. The section between the old SW tank site and Talise is particularly challenging with two parallel 315 mm diameter mains to be constructed in a very narrow road corridor sometimes restricted to just 6m wide. There is also potentially a third parallel water main to be constructed at the same time for the future Honiara Water expansion project. Although this third main diverts South off the West Kola Road approximately 380m East of the old tank site section includes very narrow road easement widths. SW would not want to revisit this area and cause further disruption building that third main later.
- 116. The sub-project areas do not traverse any ecologically sensitive areas. There are secondary regrowth areas where the pipeline runs including traversing private residential areas. The sub-project will be within the road corridor except where the pipeline runs up the hill towards west Kola where it is within privately owned lands. There are other developments within the proximity of the trunk main such as roadside market stalls and canteens, fences, and access to individual residences. Land in these sub-project areas is registered FTE leased to private owners
- 117. No ecologically sensitive or protected areas are within the sub-project area although the pipeline crosses the Mataniko River the river is highly polluted due to settlements upstream. Also, on site the river is not used for common household uses such as drinking and cooking and although it is polluted the people residing along the riverbank use the river for washing and swimming.
- 118. There were no known species of flora and fauna observed on site, as these areas have been highly developed for residential purposes for more than 20 years.

### Figure 3.9: Area 8 - Papaho to Vara Creek (Pipeline 3)



Figure 3.10: Area 9 - Vara Creek to West Kola (Pipeline 3)



Source: Google Earth Pro, 2023

## Figure 3.11: Area 10 - West Kola to West Kola Old RT Site (pipeline 3)



# Figure 3.11: Area 11/1 - West Kola Old RT Site to Talise Market (parallel pipelines 4 &5 plus potentially third pipe)



### Figure 3.12: Area 11/2 - Talise Market to East Kola RT (pipeline 5)



# 3.3.4 Area 12: East Kola to Vura 1 Heights (Pipeline 6)

- 119. Area 12 covers the trunk main which runs from east Kola to Vura 1 heights in east Honiara. The trunk main is within the vicinity of registered FTEs and residential areas as shown in Figure 3.13.
- 120. On site there are grasses, fruit trees such as bananas and other secondary regrowth and a stream which the main crosses. Figure 3.13 shows the residences on site where the trunk main passes through along the easement.
- 121. There are no environmentally sensitive or protected areas and no known species of endemic or endangered flora and fauna observed on site.

### Figure 3.13: Nancy Valve to Vura 1 heights (Pipeline 6)



Source: Solomon Water, 2022

# 3.3.5 Area 13: Borderline Reservoir to Kombito (Pipeline 7)

- 122. Area 13 starts from the Borderline reservoir to Kombito Market, the trunk main runs along the road corridor and does not traverse any FTEs. As shown on Figure 3.14, there is little vegetation as the land is already cleared for the existing road. However, there is a vegetable and betel nut market near the reservoir site at the Borderline bus stop which is currently being used on a regular basis by residents of the area. There are also other developments such as market stalls and small canteens along the road and another vegetable and betel nut market at Kombito as well as roadside barbecue stalls. These two areas are mostly used by the residents for such commercial activities.
- 123. There are no environmentally sensitive and protected areas or endemic or endangered species of flora or fauna identified on site

### Figure 3.14: Area 13 - Border RT to Kombito Market (Pipeline 7)



# 3.3.6 Area 15: Kombito Spring to Panatina Reservoir (Pipeline 8)

- 124. This area starts from the Kombito springs, and the trunk passes through several residential areas from Kombito to Gilbert Camp, Aekafo, Lau Valley, Leo Creek, Panatina Valley and then to the Panatina Reservoir (refer to Figure 3.15). These areas are informal settlements with most of the residences in the area not connected to this water supply source preferring other sources of water such as springs and streams found within the area.
- 125. The trunk traverses a densely populated area where there is minimal vegetative cover except for some fruit trees and flowering plants planted by the household owners. There are some springs and streams within the area with local residences utilizing these water sources.
- 126. There are no sensitive or environmentally protected areas and no endemic or endangered species of flora and fauna found on site.

127.

### Figure 3.15: Area 15: Kombito Spring to Panatina Reservoir (Pipeline 8)



Source: Solomon

Water, 2022Area 5: Titinge to Dai Pacha DN450 PE100 Pipeline 2

## 3.3.7 Area 8 to 11-1: Skyline to Old West Kola Tank Site

- 128. The Skyline to West Kola pipeline begins directly downstream of the flowmeter at the chamber wall and terminates at the Old West Kola Tank site as shown in Figure 3.18.
- 129. The new pipeline will be a DN355 Polyethylene PE100 pipeline with lengths of SDR 13.6 (PN 12.5) and SDR 11 (PN16). The pipeline commences with a connection immediately downstream of the chamber wall at Skyline. The SDR13.6 pipeline will be laid down a steep terrain until reaching the Mataniko River Crossing. The pipe class changes to PN16 as the pipeline commences the steep descent down to the Mataniko River Crossing and continues using PN16 until the pipeline starts its ascent towards the West Kola Ridge. The pipeline changes from SDR 13.6 to SDR 11 at Chainage 683 and then changes from SDR11 back to SDR 13.6 at chainage 1150.
- 130. Piping across the Mataniko River shall be constructed according to the design approved by SW in the DD report of this project. The PE pipe will be wrapped in PVC sheeting to ensure a bond breaker between the PE pipe wall and the concrete and shall be weighed down with water to allow for submergence underwater. PVC sheeting will reduce the risk of any abrasion of the pipe wall due to thermal expansion/contraction of the PE pipe. The PE pipeline is also PN16 rated to ensure a thicker, more resistant pipe strength. Pipeline set out points have also been provided for the Mataniko river crossing.
- 131. The creek crossing at Vara Creek will be constructed according to the minor creek design or drawing. A minimum of 750mm covers from top of concrete encasement to creek bed. The pipeline from Vara Creek up to the top of the hill on Kola Ridge is very steep and will generally follow the high side of the concrete footpath which runs up the hill.
- 132. The pipeline will be laid on the best possible alignment to avoid possible manmade or other infrastructure or rock conditions. Slight changes in alignment will be agreed with SW.
- 133. Air valves and scour valves will be installed at high/low points and concrete anchor blocks will be constructed at key points on the pipeline on firm ground or rock and their location may require to be moved slightly to achieve firm anchorage.
- 134. The pipeline terminates with the connection approximately at Chainage 1930 at the Old West Kola Tank site.

135.



#### Figure 3.18: Area 8-11 Skyline reservoir to Old West Kola Tank Pipeline for replacement

45 | P a g e

## 3.3.8 Area 11-2: Old West Kola Tank Site towards East Kola

- 136. Pipelines commence at the old West Kola Tank site. The pipelines to be used are DN315 PE100 SDR 13.6 PN12.5 and will be laid to the required grades and levels. Pipeline 1 replaces the existing DN 200 Grey PVC main, and Pipeline 2 replaces the existing DN150 Grey PVC main.
- 137. The pipeline will be laid on the best possible alignment to avoid possible manmade or other infrastructure or rock conditions. Slight changes in alignment will be agreed with SW.
- 138. Air valves and scour valves will be installed at high/low points and concrete anchor blocks will be constructed at key points on the pipeline on firm ground or rock and their location may require to be moved slightly to achieve firm anchorage.
- 139. Pipeline 1 is the shorter of the two pipelines (approx. 1060 m) and terminates near Talise Market as shown in Figure 3.19. Pipeline 2 is approximately 1710m long and terminates near the road junction at the East Kola RT site shown in Figure 3.20.

### 3.3.9 Area 12: Nancy Valve to Vura DN250 PE100 Pipeline

- 140. The pipeline begins near the Nany Valve as shown on Figure 3.21 and replaces the old DN100 main. The pipeline comprises DN250 PE100 SDR13.6 and SDR11 (at the creek crossing). The pipeline from Chainage 0 down to the creek is very steep. The pipeline follows the existing pipeline up to approximately 10 m from the creek crossing.
- 141. At the creek, the pipeline will follow a new alignment running adjacent to the creek (min 5m from edge of creek) until it crosses the creek near the creek bridge. The creek crossing will be constructed using SDR11 pipe. The PE pipe will be wrapped in PVC sheeting the risk of any abrasion of the pipe wall due to thermal expansion/contraction of the PE pipe. In addition, the PE pipe will be filled with water before concrete is poured to avoid possible ovality of the pipe wall due to the weight of the concrete as well as to ensure adequate submergence of the pipeline itself. The PE pipeline at such crossing will be a PN16 rated to ensure a thicker more resistant pipe strength.
- 142. After the creek crossing, the pipeline will then follow the access road up the hill then connected to the existing main.
- 143. The existing pipeline is to remain in service until the new replacement pipeline is commissioned. Pressure testing of the new main is expected to be carried out as the work progresses.

### Figure 3.19: Area 11/2 Old West Kola Tank Site to Talise Market



### Figure 4 Old West Kola RT Site to East Kola RT



### Figure 3.21: Nany Valve to Vura Heights



### 3.3.10 Area 13: Borderline Reservoir to Kombito DN355 PE100 Pipeline

- 145. The pipeline begins at Borderline reservoir and terminates at Kombito market area. This new pipeline replaces the existing grey DN150 pipeline. The pipeline is approximately 600 m long and detailed pipe route is shown in Figure 3.22. The old DN200 flowmeter will be removed and replaced with a new DN200 electromagnetic flowmeter in a chamber to the standard detail. The small diameter tapping bands with pipework will need to be relocated to the new pipework downstream of the new flowmeter after the existing flowmeter has been removed.
- 146. The new pipeline will be a DN355 Polyethylene PE100 SDR 13.6 (PN 12.5) pipeline. The pipeline follows the alignment of the existing pipeline and due to the criticality of the pipeline, the existing pipeline is to remain in service until the new replacement pipeline is commissioned. Pressure testing of the new main is expected to be carried out as the work progresses. The pipeline will be laid to the required grades and levels and on the best possible alignment to avoid possible manmade or other infrastructure or rock conditions or on the roadside of the existing pipeline (not shoulder side) to avoid location close to the edge of the road/embankment but any slight changes in alignment will be agreed with SW.
- 147. Air valves and scour valves will be installed at high/low points and concrete anchor blocks will be constructed at strategic locations along the pipeline. Pipes will be disinfected, and pressure tested and the method of disposal/dilution or dichlorination of chlorinated disinfection water is to be agreed with SW.

## 3.3.11 Area 15: Kombito Spring to Panatina Reservoir DN315 PE100 Pipeline

- 148. The pipeline begins at the Kombito spring as shown in Figure 3.23. The pipeline is approximately 3,240m long and terminates at the Panatina Reservoir site, and the connection and initial section of pipeline is near houses. The new pipeline will be a DN315 Polyethylene PE100 pipeline with SDR 13.6 (PN 12.5) and SDR11 (PN16). The section of SDR11 pipework is located at the creek crossing(s).
- 149. The pipeline follows the alignment of the existing pipeline and due to the criticality of the pipeline, the existing pipeline is to remain in service until the new replacement pipeline is commissioned. Pressure testing of the new main is expected to be carried out as the work progress. The pipeline will be laid on the best possible alignment to avoid possible manmade or other infrastructure or rock conditions. Slight changes in alignment will be agreed with SW.
- 150. For creek crossings the minimum cover of 500mm to the top of the concrete encasement. The pipeline in the concrete encased creek crossing is SDR11. For minor creek crossings (concrete encasement) this shall follow the design for minor creek crossing. The PE pipe will be wrapped in PVC sheeting the risk of any abrasion of the pipe wall due to thermal expansion/contraction of the PE pipe. In addition, the PE pipe will be filled with water and the ends will be secured before concrete is poured to avoid possible ovality of the pipe wall due to the weight of the concrete as well as to ensure adequate submergence of the pipeline itself. The PE pipeline at such crossing is also PN16 (SDR11) rated to ensure a thicker more resistant pipe strength. The exact location of the scour valve at the crossing will be determined by SW.

### Figure 3.22: Borderline RT to Kombito Market



## Figure 3.23: Kombito Spring to Panatina RT

151.



# 3.4 Subproject Elements

- 152. Mains replacement will include whole pipeline replacement for those mains that use the grey PVC pipe material. New mains replacement pipelines are to be constructed using Polyethylene pipe.
- 153. The current pipeline diameter was identified as well as a minimum replacement pipe diameter based on a maximum velocity of 1 m/s. It was noted that SW has good local knowledge on future proposed and potential developments in Honiara and wants to make sure that any pipeline replacement will cater for the foreseeable future growth. As such SW adopted a conservative approach in selecting larger replacement pipeline diameters. Subject to confirmation during the detailed design phase, all replacement pipelines are proposed to be Polyethylene PE100 (pipe material) SDR 13.6 (PN12.5) while the actual pressure ratings will be confirmed during the detailed design phase. Similarly, the use of flowmeters on these mains will be considered.
- 154. The total calculated main for replacement includes: DN250 (211 m), DN315 (5,979 m), DN355 (3,513 m) and DN450 (392 m). Table 3.3 summarizes the proposed 10 km of pipelines for replacement as well as the proposed pipe replacement size and material at each site.
- 155. The design, construction activities and supply of products and materials associated with pipeline construction (across all segments) are based upon the SIWA Water Supply Design and Construction Code 20163.
- 156. During construction, all existing services on site shall be located and protected and the repair of any damaged services shall be carried out promptly. These shall be done by potholing every 20 to 50 m intervals in advance of pipe laying. The new pipeline will ideally be laid at the existing routes or at an offset distance of 1.0 to 2.0 m from any existing pipelines. Materials temporarily excavated as part of trenching shall be stockpiled immediately adjacent to the trench and then used to refill the trench upon completion with excess removed to an approved offsite location. Stockpiled material will be protected from erosion.
- 157. Concrete thrust and anchor blocks will be constructed at key locations on the pipeline to counteract pipe movement. Thrust block designs will be as per SW standards. During the operation of the utility, the pipelines will require periodic inspection and maintenance to check for leaks and ensure operational reliability.

## Table 3.3: Summary of 10 km selected for replacement

Pineline	DMA	DMA			Existing pipe			Proposed pipe	
No.	Area No.	Name	Start	Finish	Length (m)	Material	Diameter	Diameter	Material
1,2	17	T2T	Tasahe Ngossi Chamber	Section towards Titinge Tank	177	Grey PVC	DN225	DN355	PE
1,2	17	T2T	Toward Titinge Tank	Titinge Reservoir	825	Grey PVC	DN200	DN355	PE
1,2	5	TBT	Titinge Tank	Before reaching Dai Pacha	392	Grey PVC	DN225	DN450	PE
3	8	WKOA	Skyline Res	Mataniko River	863	Grey PVC	DN200	DN355	PE
3	8	WKOA	Mataniko	Mataniko	113	Grey PVC	DN225	DN355	PE
3	9	WKOA	Mataniko	Towards West Kola	447	Grey PVC	DN200	DN355	PE
3	10	WKOBC	Towards West Kola	Old West Kola Tank Site	502	Grey PVC	DN200	DN355	PE
4,5	11-1	WKOBC	Old West Kola Tank	Towards East Kola	1,029	Grey PVC	DN200	DN315	PE
4,5	11-2	WKOBC	Towards East Kola	Towards East Kola	458	Grey PVC	DN150	DN315	PE
4,5	11-2	WKOBC	Towards East Kola	Towards East Kola	1,252	Grey PVC	DN200	DN315	PE
6	12	EKOLA	Nancy Valve East Kola	Vura 1 Heights	211	Grey PV	DN100	DN250	PE
7	13	KBJRV	Borderline Reservoir	Kombito	586	Grey PVC	DN150	DN355	PE
8	15-2	KMTR	Kombito Spring	Panatina Tank	3,240	Grey PVC	DN200	DN315	PE
Total		·			10,095				

# 3.4 Construction Approach

### 3.4.1 **Pre-construction Phase and Investigations**

- 158. The implementation of the project's feasibility, design and construction phase will start with investigations of the site including climate change vulnerability assessments, population growth projections, geotechnical, geophysical, and topographical survey as well as UXO Clearance (if needed). All these reports will be submitted to the Solomon Water PMU for review.
- 159. Solomon Water (SW) will ensure that necessary approvals for works to commence are met and responsible authorities have given consents to work within the proposed work sites for both rehabilitation and expansion. Also, sites are accessible to transport material, equipment and labor following existing routes.
- 160. The contractor and SW will ensure that the residents or communities and the respective utility providers as well as MID are informed of the works since works will be in the existing right of way (ROW.). The contractor will also identify and list sensitive receptors on site and prepare a construction environmental and social management plan (CESMP). The plans will be reviewed and approved by SW-PMU before any work commences (including site establishment and clearing activities).
- 161. The Contractor will ensure that mains for replacement are located and identified then potholing will be done to expose the existing pipes for inspections before replacement.

### 3.4.2 Construction materials

- 162. Materials will be sourced or acquired in Honiara or locally while other materials that are not available in Honiara will be sourced internationally. All necessary construction materials shall be obtained from approved sources. Imported materials will be transported by shipping vessel to Honiara and by trucks to approved storage or work sites.
- 163. Should the works require sourcing from a quarry or borrow pit the contractor will identify sites for sourcing materials such as gravel or coronus and apply for a building materials permit (BMP) from the Mines Division of the Ministry of Mines, Energy and Rural Electrification (MMERE). The contractor is expected, where possible, to purchase aggregates locally from approved suppliers operating with DC and BMP. The contractor will undertake an E&S audit of the proposed suppliers to ensure they are operating with permits and in accordance with good international practice (GIP).

### 3.4.3 Construction stage activities

- 164. Activities during the construction stage will be programmed by the contractor. Activities will be sequenced according to their construction schedule/program.
- 165. **Site preparation, surveying and demarcation**. Surveying and demarcation of the areas for laying of pipes and identifying and recording location where this will obstruct access. There will be minor clearance of plants including disturbances to the surrounding areas.
- 166. Clearing and grubbing entails removal of vegetation including trees, shrubs and other flora from the site and excavation for the foundations works and construction areas for access road and areas for laying of pipes and reservoirs.

- 167. Vegetation and other obstacles on site will be cleared to pave way for excavation activities; the excavation of the site would not involve much machinery since most of the areas had already been developed and cleared.
- 168. Grubbing will be mainly of topsoil comprising of loose soil, organic matter, drift sand, unsuitable soil, and rubbish to the required depth from the normal ground level. Clearance will be undertaken using machinery and handheld equipment or by labor.
- 169. **Stockpiling of construction materials**. Stockpiling will be done at an approved site that will allow for timely and efficient progress of the works. This will include stockpiling of construction materials such as cement, sand, and gravel, including other materials purposely for the works. Stockpiles will be located 25m from any water course or coast and will be fenced.
- 170. Temporary areas for construction materials will be established near each location of major works. These areas should not interfere with public movement (vehicular or pedestrian movement traffic) and obstruct any water causes and drainage systems.
- 171. Stockpiling areas on site or offsite shall be discussed with SW by the contractor before commencement of construction works.
- 172. **Transportation of materials**. Material transportation will be done during the construction works. This may involve loading pipes, aggregates such as sand or gravel and equipment or machinery to be used for the works.
- 173. Construction vehicles will use local access paths/roads or negotiate access with landowners to obtain access to private lands. Where local access roads are used, the contractor will return these roads to their original condition after the completion of work.
- 174. Many of these locations are to be decided between the contractor and SW prior to construction. Site inspections will be undertaken as required to determine sites which minimize environmental and social impacts.
- 175. **Mains replacement works**. The works for the proposed water supply rehabilitation will include earthworks which will be kept to a minimum magnitude to maximize the available space, with a depth and width of 1m. Site constructions for replacement of the trunk main from Skyline reservoir (Papaho) to Vara Creek will also include works in the Mataniko River and the Vara Creek stream. These activities will not impede the river flow or have significant impact on the habitat.
- 176. Pipelines shall be laid in prepared trenches (either equipment or manually excavated) to a shallow and required depth and provided with sand bedding for pipe protection. Trenches shall be located within the existing road corridor and existing network areas. Works for the subproject include:
  - Site clearing and marking out of alignments
  - stockpiling of construction materials
  - trench excavation
  - Removal of existing pipes
  - Replacement and installation of new pipes
  - pipe laying and testing; and
  - Trench backfilling and surface restoration.

- 177. **Requirements for water crossings or creeks and pipe trenches.** Pipelines will generally be installed using trenching methods along roads except for sections where mains will go under the creeks or rivers where it will require concrete casing to protect against scouring and other obstructions. To minimize impacts on the surrounding environment trenching will only be limited to the actual area of works and erosion and sediment control measures shall be implemented. After these works disturbed slopes or area shall be revegetated.
- 178. Pipes will be laid according to SW standards (SIWA Construction Code). Figure 3.24 provides general requirements for pipe trenching and installation which will depend on the type and quality the road. Based on the above diameter selection, the minimum width of the trench at the bottom would then be 1m.





Source: SW PRF BOD Honiara WS, September 2019

- 179. Wherever possible, roadsides will be favored to limit formed road surface damage and reinstatement as well as potential settlement. It is expected that most of the network will be installed under existing formed road surfaces given the limited space available and obstacles such as trees, services, signs, poles and drains in the road edges.
- 180. **Excavation and trenching**. Excavation activities for trenches shall be done by an excavator or by handheld equipment if the area is confined, not suitable for machinery and to avoid any damage to other existing asset on site. This activity shall be done to locate and expose existing pipes, valve, and anchoring blocks in line with the existing and required design alignment. It will also be done based on the depth and width dimensions required by SW to properly undertake the work. Trenches shall be kept free of water by dewatering and pipes shall temporarily seal at its open end when there is no works to avoid the entry of foreign materials such as contaminated water or dirt.
- 181. It must also be free of any remains, waste, vegetable, organic or any such undesirable material which must be removed before pipe installation.



Figure 3.25: General layout for pipe trench and installation in tar/sealed road and ground

Source: SW (2019)

- 182. Trenches shall be adjusted to cater for the gradient and elevation for gravity flows. Also, if the bottom substrate is not suitable for pipe laying or could affect the type of pipe used, bedding materials will be used under and around the installed pipe. The materials shall be compacted and smoothed out evenly as approved by SW.
- 183. It is noted that rock may be found at shallow depths along the pipeline route and the trenching methods or types: Type1 (off road), Type 2 (in road) trenching to suit the area.

Figure 5 General layout for pipe trench and installation



Source: SW PRF BOD Honiara WS (September 2019)

184. When assembling pipes there will be risk of damaging the pipe when joining the pipes by pushing too far up the bell. Hence, care must be taken to ensure that joining of pipes stops at the required line for insertion of pipe.





185. Thrust and anchor blocks (Figure 3.28) will be required at specified locations along the pipeline such as bends, tees, valves, reducers, and end caps as per specifications. This shall be determined by the design engineer. All laid pipelines shall be inspected and tested hydraulically after the completion of installation. Releasing air from the system once the pipes are installed is very important and shall be done by the installation of a fire hydrant and installation of an air release valve at the high ends.

Figure 3.28:Typical detail plans of anchor and thrust blocks



186. **Disconnection and dismantling of existing pipes.** As the existing pipelines are expected to remain in service during construction of the replacement pipelines, the Contractor is to lay the new main alongside the existing pipeline. Once the replacement pipeline has been fully pressure tested, the pipeline may be connected at the start and end point and the old main cut and capped at each end.

- 187. **Installation and testing of water mains**. Pipes will be installed in already prepared trenches alongside existing piping and will be installed one section at a time and will be done in accordance with the manufacturer's instructions and as directed by SW or according to SWs guidelines. During installation pipes will be closed off with caps or temporary plugs or other materials accepted by SW to not allow water and foreign material entering the pipe while it is being placed in the trench. No debris, tools, clothing, or other material shall be placed in the pipe at any time.
- 188. **New pipeline on steep areas or slopes**. Due to the steep topography of Honiara and risk of slips/landslides, the new pipelines are generally to be located on the high side of the existing mains that is away from the edge of any embankment to minimize risk of movement.
- 189. **Backfilling and surface restoration.** After the water pipe mains are installed and passes final inspection and testing, the trench shall be backfilled with selected earth in layers, watered, rammed, and compacted to the satisfaction of the supervising engineer. The trench is filled with soil added in layers and shall be carefully compacted by each layer to prevent settling in the future. After backfilling areas slopes and exposed areas will be revegetated immediately, roads pavement will be repaired, and construction waste will be removed.
- 190. **Masonry, concrete work and related activities**. The construction works will also involve masonry and concrete works and related activities like steel works and pipe laying. Works and materials that will be used shall be in accordance with required SW standards.

## 3.4.4 Solid waste disposal

- 191. Waste bins shall be provided at the work sites with protection from the weather and stray animals. These will provide for proper segregation and storage of wastes at the work site before disposal at the Honiara Landfill.
- 192. As part of the CESMP the contractor will develop and implement a waste management plan.

# 3.4.5 Construction period, workforce and equipment

- 193. The construction period has not been estimated at this time but will be included in the tender document. During the construction of the proposed activities SW will ensure that the contractor abides by the Country Safeguards Systems and the donor safeguards guidelines
- 194. Construction workforce or labor information will be provided by the contractor during the implementation phase and is highly dependent on the construction approach of the contractor. However, based on similar construction projects, the total workforce for this type of construction works can be estimated to have about 50 to 150 workers at its peak construction period with 30 percent are expected to be international skilled workers while 70% will be skilled local workers and unskilled casual workers which will be recruited from Honiara.
- 195. For the physical works typical construction machinery and equipment will be used. This will include but not limited to handheld equipment such tools, dump trucks, service trucks, pay loaders, graders, bulldozer, small road rollers, small trench compactors, concrete mixers, trench excavators, and small cranes including standard earth moving equipment and machineries for site preparation and the construction activities.
196. The exact number of vehicles and machinery and equipment which will be used during the construction phases will be presented in the contractor's environmental management plan. Also, this will be included in the detailed engineering design report. While the exact number of vehicles which will be used by SW during the operational phase will be confirmed by SW.

### 3.4.6 Chemicals and hazardous materials

- 197. It is anticipated that the hazardous or harmful wastes produced during the works will be from cement sludge that needs to be disposed-off properly at an approved site including other substances for the pipeline and manhole rehabilitation works. During the construction there will be activities that will produce dust and excavation activities that will likely result in siltation and sedimentation. These will be contained or mitigated according to their specific management plan.
- 198. Chemical or hazardous substances and wastes will only be used during the testing and pipe reticulation, and during the operation of the water supply. This will include chemical reagents used in water treatment such as oxidizing agents (chlorine).

## 3.5 **Operational Activities**

- 199. Once the construction is completed, the facilities will be used for its intended purposes and will be operated by SW personnel on site will ensure that the facilities are operating and well maintained.
- 200. The facilities will be repaired and maintained regularly during the operational phase by the SW. Such activities will include repair and maintenance of pipes and replacement of worn-out materials among others.

## 3.6 Analysis of Alternatives

- 201. Initially a selection of more than 50km of mains was identified and this was later reduced to 28km of mains that were then assessed and prioritized based on points score. From this 28km, 16km of mains of highest scoring mains based on approaches and methods adapted for selection under this sub project was prioritized for further shortlisting to 10km.
- 202. The material mostly used for the mains are grey PVC pipe materials which is a poor performing type of PVC pipe that was installed in Honiara prior to the availability of higher quality PVC (UPVC, MPVC, OPVC) pipe materials being available. The grey PVC pipelines in particular account for most of the leaks and pipe failures in Honiara. Therefore, for the replacement of mains it is proposed that Polyethylene pipe material will be used due to its longevity and suitability to Honiara conditions.
- 203. Pipe sizes for replacement will be increased to DN 250, DN 315, DN 355 and DN 450. The proposed lengths and increased diameter of existing mains

# 4 Baseline: Description of the Existing Environment

### 4.1 **Project Location**

204. The Solomon Islands comprises a double chain of 992 islands (volcanic and coral atolls) that forms an archipelago stretching approximately 1,600km across the Southwestern Pacific Ocean between the latitudes of 5 – 12 degrees south and longitude 152 to 170 degrees east (Figure 4.1). The total land area is approximately 28,000 km<sup>2</sup> with an exclusive economic zone of 1.6 million km<sup>2</sup> that represents the third largest archipelago in the South Pacific Ocean. The nation is bordered to the west by Papua New Guinea (PNG), south by Vanuatu, east by Tuvalu, and northeast by Nauru and north by the Federated States of Micronesia. The nation's unique geography and scattered nature of islands has given rise to a heritage of considerable environmental and ecological diversity.





Source: Solomon Islands Maps & Facts - World Atlas

205. **Defining the project area**. The proposed development site is located within the Honiara City Council (HCC) jurisdiction and the city is divided into twelve wards and three constituencies (Figure 4.2). The subproject areas are located at the following wards in Honiara as shown Table 4.1.

#### Table 4.1: Subproject locations in Honiara and Guadalcanal

Area	Ward
Area 5: Titinge (Mbokona Heights) to Titinge Reservoir (Valeato)	Tandai
Areas 8: Skyline Reservoir (Papaho) to Mataniko River	Vavaea, Mataniko
Area 9: Mataniko River to West Kola	Mataniko
Area 10: West Kola to Old West Kola Reservoir Site	Kolaá
Area 11: Old West Kola Reservoir Site to East Kola (State Ridge)	Kolaá
Area 12: East Kola to Vura 1 Heights	Kolaá, Vura
Area 13: Borderline reservoir to Kombito	Vura
Area 15: Kombito Spring to Panatina Reservoir	Panatina, Tandai
Area 17: Tasahe (Towards Titinge Tank) to Titinge Reservoir (Valeato)	Tandai

### 4.2 Physical Environment

#### 4.2.1 Climate and climate change

- 206. Solomon Islands has a typical tropical oceanic climate (high temperature and high humidity) throughout the year with a pronounced wet season from November to March and a dry season from April to October. The country is subjected to tropical cyclones that are associated with the south-easterly trade winds (November to March) and is also vulnerable to the effects of tsunamis generated from volcanic activity in the Asia-Pacific region.
- 207. Guadalcanal has an equatorial maritime climate influenced by El Nino Southern Oscillation (ENSO) events, the South Pacific Convergence Zone, and the West Pacific Monsoon. The climate in Honiara is hot, oppressive, windy, and overcast.
- 208. **Temperature**. Solomon Islands has a relatively uniform temperature ranging from 22 degrees Celsius (°C) to 31°C throughout the year. The monthly average maximum temperatures are 30°C to 31°C and the monthly average minimum temperature range from 22°C to 23°C. Figure 4.3 shows the average monthly high and low temperature recorded for Honiara from 2015 to 2022.

#### Figure 6Average monthly temperature of Honiara



Source: Weather Spark, 2023

#### Figure 4.2: Ward map of Honiara



209.

- 210. Wet season and rainfall. The wetter season lasts 3.6 months, from December to April, with a greater than 34% chance of a given day being a wet day. The month with the most wet days in Honiara is February, with an average of 12.7 days with at least 1 mm of precipitation.
- 211. The drier season lasts 8.4 months, from April to December. The month with the fewest wet days in Honiara is July, with an average of 6.9 days with at least 1 mm of precipitation. Based on this categorization, the most common form of precipitation throughout the year is rain alone, with a peak probability of 47% in February.



Figure 4.4: Daily chances of precipitation in Honiara

212. The average annual rainfall is mostly within the range 3000 to 5000 mm with most monthly rainfall amounts more than 200 mm. In most of the Solomon Islands, the wettest months are during the northwest monsoon season (January to March averaging 380 mm), with a tendency for reduced amounts during February when the equatorial trough is normally furthest south.



Figure 4.5: Average monthly rainfall for Honiara

Source: Weather Spark, 2022

Source: Weather Spark, 2023

- 213. Rain falls throughout the year in Honiara. Figure 4.5 shows the average monthly rainfall for Honiara from 2015 to 2022. The month with the most rain in Honiara is February, with an average rainfall of 250mm and the month with the least rain in Honiara is September, with an average rainfall of 66mm.
- 214. **Humidity**. Relative humidity throughout the country shows little seasonal variation, however it does have a marked diurnal fluctuation. Humidity is highest in the morning and frequently reaches 90 percent. The apparent humidity level in Honiara, as measured by the percentage of time in which the humidity comfort level is muggy, oppressive, or miserable, does not vary significantly over the course of the year, remaining a virtually constant 100% throughout.



Figure 4.6: Humidity levels in Honiara

- 215. **Wind**. In Solomon Islands the southeast trade winds are usually established in the month of April and continues from May to October and during this period more than 75% of the winds are easterly, and 60% are from east to southeast. The SE trade wind is steadier and stronger over the southern part of the group of islands compared to the west to northwest winds which usually develop from November to April. Wind speed over open areas is about 30 km/hr. and stronger SE wind speed is about 40 km/hr. which occurs when the sub tropical high-pressure belt is stronger than usual in the South.
- 216. Wind speeds over land vary as it tends to increase during the morning and reaches a maximum during the afternoon at about the time of the maximum temperature during the day. While the speed drops at night to 20-30 m/hr. However, during tropical cyclones between the months of November and April or at any time of the year (as occurring in recent years) very intense cyclones winds near the cyclone epicenter usually have a speed of 200 km/hr.<sup>4</sup>

Source: Weather Spark, 2023

<sup>&</sup>lt;sup>4</sup> Solomon Islands Climate in Brief (met.gov.sb)

- 217. **Climate change**. Climate change trends around the Solomon Islands are affected by processes occurring over large areas of the Pacific Ocean, from the northern to the southern subtropical zones (35°N to 35°S), as described above. Climate change induced risks in Honiara include flooding, sea level rise, storm surges and changes in wind and wave climate, resulting in potential increases in extreme wave heights.
- 218. Climate change impacts particularly sea-level rise is projected to intensify which will result in the coastal hazards affecting communities including coastal erosion and inundation to be more intense and occurring more frequently. During the climate vulnerability assessments it was noted that the only subproject area that is likely to be impacted by coastal hazards is Rove which is at the coast including Vura with the system outfall at the coast. While the other proposed sub-project sites (Tuvaruhu and Vara Creek) are not exposed to coastal hazards due to the location of the site from the coasts, flooding is an issue as these areas are within the Mataniko river flood plain.
- 219. Studies by the National Adaptation Program of Action (NAPA) shows that surface air temperatures for Guadalcanal have increased by 1oC between the years 1962 to 2007 and according to the International Panel on Climate Change (IPCC) the sea level has increased by +0.77 mm/yr. However, rainfall varies greatly, showing droughts will be expected in some parts of the country due to more frequent ENSO effects including intense and frequent tropical cyclones.
- 220. It is predicted that the air temperature will continue to rise and by 2030 sea and air temperature will increase by 0.4°C to 1°C. This will result in very hot days, warm nights, and a decline in cool weather conditions. While the annual rainfall will increase and there will be occurrence of extreme rainfall seasons more often including less frequent but more intense tropical cyclones. Other common impacts of climate change include coastal erosion, flooding, sea level rise, storm surges, occurrences of pests and diseases and other ENSO related changes due to temperature and rainfall. Figure 4.7 shows the projected average annual rainfall and temperature for Solomon Islands.

	2030	2050	2070	1.5°C global warming	2°C global warming	3°C global warming	4°C global warming
Temperature from 1986-2005 (°C)	0.6 (0.4 to 1.0)	0.8 (0.6 to 1.2)	0.8 (0.4 to 1.2)	0.7 (0.4 to 0.8)	1.1	1.9 (1.5 to 2.1)	2.5 (2.1 to 2.9)
		1.3 (1.0 to 1.9)	2.1 (1.5 to 3.0)		(0.7 to 1.3)		
Annual rainfall from 1986-2005 (%)	3 (-2 to 9)	3 (-1 to 7)	3 (-3 to 8)	1 (-2 to 4)	1 (-4 to 8)	1 (-5 to 11)	6 (-6 to 16)
		3 (-3 to 9)	5 (-3 to 14)				

Figure 4.7: Projected average annual temperature and rainfall for Solomon Islands

Source: CSIRO and SPREP 2021

- 221. There is very high confidence that the Solomon Islands surface air temperature and sea surface temperature will increase in the future. Under a low-medium-high-emissions scenarios air temperature will increase by a range of 0.2-1.0°C, 0.4-0.1.2, and 0.4-1.0 respectively by year 2030; 0.2-1.0°C, 0.4-0.1.2, and 0.4-1.0 respectively by year 2055; and 0.2-1.0°C, 0.4-0.1.2, and 0.4-1.0 respectively by year 2090. The intensity and frequency of days of extreme heat are projected to increase.
- 222. **Sea level rise**. Sea levels are expected to continue to rise in the future. Under a lowmedium-high-emissions scenarios sea level will rise by a range of 4-14cm, 5-14cm, and 4-15cm respectively by year 2030; 10-26 cm, 5-14 cm, and 8-30 cm respectively by year 2055; and 17-45 cm, 19-58 cm, and 20-60 cm respectively by year 2090 (BOM and CSIRO, 2011). Combined with storm surges and extreme events this is likely to cause increasing coastal erosion and coastal flooding. Rising sea levels create not only stress on the physical coastline, but also on coastal ecosystems. Saltwater intrusions can contaminate freshwater aquifers, many of which sustain municipal and agricultural water supplies and natural ecosystems.
- 223. Figure 4.8 shows sea level projections that incorporate the higher Antarctic contribution have been evaluated for Solomon Islands and show a rise of between approximately 0.09-0.18 m by 2030 and an increase of 0.65 to 1.22 m by 2100 under RCP8.5 (CSIRO and SPREP, 2021).



#### Figure 4.8: Sea level rise projections for Solomon Islands

224. Aquifers are also highly vulnerable to the effects of human-caused contamination as well as sea level rise and saltwater intrusion related to climate change. Salinization of groundwater is increasing in most coastal villages and atoll of the Solomon Islands due to ingression of seawater during extreme weather events or as an ongoing trend.

Source: CSIRO and SPREP 2021

- 225. The PCCSP also concluded that the available data of wind-waves are not suitable for assessing long-term trends, however, it has noted that wind-waves around the Solomon Islands vary across the country, being small at Honiara, while at the outlying islands such as Santa Cruz waves are much larger. Seasonally, waves are influenced by the trade winds and the West Pacific Monsoon (WPM) and display variability on interannual time scales with the ENSO.
- 226. Vulnerability is the degree to which an asset or property is susceptible to or unable to cope with adverse effects of climate change, including climate variability and extremes as well as natural hazards. It is a function of exposure and sensitivity of assets to climate and the capacity of the asset to adapt to changes. On the other hand, risk is determined through the investigation of hazards, exposures, and vulnerability, and can be expressed as a function of probability and the likely impacts within a given timeframe. In the context of this study, and based on expert judgment, both the likelihood of hazards occurring, and the magnitude of consequences or impacts of the hazards being identified (if they do occur) has been determined.

### 4.2.2 Hazards and disaster risk

227. The Solomon Islands is prone to natural hazards including cyclones, earthquakes, tsunamis, and landslides. Due to the location of Solomon Islands at the junction of the tectonic plates, there is constant seismic activity including earthquakes and volcanic eruptions hence considered as one of the most seismically active landmasses. Natural geological hazards often occurring on the islands are earthquakes, tsunamis, volcanic eruptions, and other hazards. Figure 4.9 shows the climate related hazard areas in Honiara.



Figure 4.9: Identified climate related hazard areas in Honiara

Source: Trundle. A & McEvoy. D (2016)

228. **Cyclones**. Tropical low-pressure systems occur each year over the Solomon Islands at times when the equatorial trough is in the vicinity, but few of these develop into tropical cyclones. Generally, tropical cyclones occur in the months of November to April associated with heavy rainfall and flooding events. The average frequency of tropical cyclones is between one and two per year, tending to increase southwards.

- 229. Because tropical cyclones are usually in the early stage of their life cycle, they are relatively small but can result in serious damage due to strong winds and heavy rainfall.
- 230. Tropical cyclones usually result in abnormally high ocean tides that may rise 3-6 m above the regular tide. This is due to the pooling of seawater by the frictional effect of very strong winds persistently gusting on shore as the cyclone approaches a shallow coastline. This can result in inundation of low-lying coastal plains and impacts on the shoreline and beach on beach profiles. This often formulates southeast and travels southwest or vice versa. The islands that are most exposed to tropical cyclones are Temotu, Makira Uluwa and Rennell Bellona including the southern region of Guadalcanal.
- 231. Figure 4.10 shows the tropical cyclone pathway and exposure in the country with the red-colored sections being the highest exposure to cyclone. Guadalcanal is located within the cyclone path and is exposed to its impacts. One of the most destructive cyclones which had affected the island of Guadalcanal was cyclone Namu which occurred in 1986. The cyclone resulted in extremely high rainfall causing extensive flooding and storm surges resulting in the most destruction ever experienced. The most recent cyclones to have affect Honiara and other islands were tropical cyclone Ita which caused the most devastating flash flood in the history of Solomon Islands in April 2014, and TC Harold in April 2020, which caused major damage to infrastructure in Guadalcanal (including Honiara City) and other provinces. Cyclones are projected to decline in the south-west Pacific Ocean basin by the end of the 21st century. However, the cyclones that do occur are likely to be more intense or severe (category 4 and 5) with a projected 2% to11% increase in maximum wind speed. Figure 4.10 shows that Honiara's exposure to tropical cyclone is moderate compared to other islands in the country.



Figure 4.10: Tropical cyclone hazard pathways and exposure in Solomon Islands

Source: MECDM (2020)

232. **Flooding**. Extreme rainfall events can lead to both localized flash flooding and severe riverine flooding as a product of the large catchment areas that lie upstream of the city. Honiara is vulnerable to severe flooding as occurred in April 2014 when a slow-moving tropical depression delivered heavy rains in the Solomon Islands and the highest recorded

daily rainfall associated with this event was 318mm on 03-Apr-14. Over four days, more than 732 mm of rain was recorded in Honiara.

- 233. The resulting flood was reportedly the worst and had damaged most infrastructure and utilities in Honiara. It also displaced some 10,000 people initially and affected approximately 52,000 people in total (SIG, MDPAC. 2014).
- 234. An assessment identified a total economic impact of SI\$787 million (US\$108 million), equivalent to 9.2 percent of gross domestic product at the time. The heavy rains caused flash flooding in Honiara, Guadalcanal, Isabel, Malaita, and Makira-Ulawa. It caused severe damage to several residential and commercial areas and urban infrastructures. Flooding has happened in the past and many damaging floods are known to have happened, including those associated with tropical cyclones in 1966, 1967, 1972, and 1986. The Koa Hill floodplain was also flooded in 2009 and 2012. Based on modeling studies undertaken for flooding in Greater Honiara's river systems it was found that there is a 1:50 and 1:70 flood event (World Bank, 2021). Figures 4.11 4.13 show the peak flood depths for 1:100 flood event over three flood plains within the boundary of Honiara.

Figure 4.11: Peak flood levels over White River floodplain for 1:100 flood event



Source: T+TI in World Bank, 2021



Figure 4.12: Peak flood depths over Mataniko River floodplain for 1:100 flood

Source: T+TI in World Bank, 2021



Figure 4.13: Peak flood depths over Burns Creek & Lungga River floodplains for 1:100 flood

Source: T+TI in World Bank, 2021

- 235. The main trunk sections of Area 9 are within a flood zone and a section of Area 8 will pass through the Mataniko.
- 236. **Drought**. Severe drought conditions caused by El Nino activities were experienced in 1997/1998 in parts of Guadalcanal, Makira and Western provinces and they were declared disaster zones. During the same period, the mean air and water temperatures decreased

by 2°C, but little variation was recorded for mean annual rainfall. The incidence of drought is projected to decrease in the future over the course of the 21st century.

- 237. Volcanic eruption. The volcanoes of the Solomon Islands form a NW-SW trending island chain continuing along to the Bougainville Island chain (which forms part of Papua New Guinea). The islands belong to a volcanic arc caused by the Subduction of the oceanic crust of the small Solomon Plate under the Pacific Plate. New Georgia Sound constitutes the junction between the New Georgia-Kolombangara-Vella Recent volcanic province and the older Choiseul Cretaceous-Early Tertiary basaltic platform. The main observed fault is NW-SE. This area is tectonically complex, marked by the interaction of several closely spaced oceanic microplates separated by subduction zones and short spreading centers, such as one extending from SE New Guinea to Kavachi volcano.
- 238. There are 11 volcanoes in the vicinity of the Solomon Islands of which four have been active in the recent past, Kavachi and Cook are submarine and Savo and Tinakula islands. The closest volcano to Guadalcanal or Honiara is Savo as shown in Figure 4.14, there are no active volcanoes in Guadalcanal Province.



Figure 4.14: Location of Savo to Honiara

Source: Google Earth Pro, 2023

239. **Earthquakes**. Earthquakes are common in Solomon Islands with 66 earthquakes reported for the year 2017; as such they are a near-weekly event. The active seismicity is directly linked to the location of Solomon Islands at the junction of several tectonic plates that results in constant seismic activity including earthquakes and uplifting of land and reef areas. Solomon Islands remain vulnerable to future earthquakes. Figure 4.15 shows that Guadalcanal Province or Honiara's exposure to seismic hazards is high. Meaning it is highly exposed to earthquakes and other seismic hazards. Most earthquakes epicenters In Solomon Islands occur in the San Cristobal trench. This trench runs NWSE direction from PNG through Solomon Islands.



#### Figure 4.15: Seismic hazard pathways and exposure in Solomon Islands

Source: MECDM, 2020

- 240. The most recent destructive earthquake was on the 6th of February 2013 with a magnitude 8 which struck the island of Santa Cruz in Temotu Province leading to a tsunami which generated a peak sea level change of 0.9 1 m. Similarly, a destructive earthquake and tsunami occurred in Western and Choiseul provinces on 2 April 2007.
- 241. **Tsunami**. Tsunamis are caused by the vertical displacement of seabed fault lines during earthquakes, or by other processes such as a volcanic eruption, volcanic collapse, or submarine landslide. Tsunami-generating earthquakes tend to be shallow and of relatively large magnitude (i.e., greater than Richter Scale magnitude 7.0), hence the occurrence of a large shallow earthquake located beneath the ocean will often produce a tsunami, providing there is vertical offset of the sea floor.
- 242. The Solomon Islands has been impacted by 22 tsunami events between 1926 and 2016. Most tsunamis were caused by earthquakes in, or close to, the Solomon Islands whist two were caused by a distant earthquake and one by landslides on a volcano. Four tsunamis caused loss of life, and at least five tsunamis caused significant damage to structures, four of which had increased sea wave heights of 3 to 6 m.

1. The largest tsunami more recently was in April 2007 that was triggered by an earthquake of magnitude of 8.1 (Richter Scale) and resulted in considerable damage and loss of life predominately in the Western and Choiseul provinces. The tsunamis generated a wave with a focus run of up to >12 m in some areas (Newman, et al., 2011). The Pacific Tsunami Warning Centre in Hawaii provides tsunami warning advice for the Pacific Island Countries, including the Solomon Islands.

## 4.2.3 Air quality

243. Air quality in Solomon Islands is very good, largely because of there being very few industries and a relatively small vehicle fleet generating emissions. There are no air quality or emissions standards in Solomon Islands and no monitoring is undertaken.

244. Honiara being the capital of Honiara has recorded some industrial operations, the highest number of vehicles in the country and several logging operations the air quality is very good and clean due to no major industrial activity and very low number of vehicles operating on the island. Dust and other fumes are also not an issue at the proposed sub-project sites. Within the proposed development sites vehicle fleet is low compared to the CBD area and there is no major industrial development hence the air quality is very good. Therefore, elevated air quality parameters will need to be mitigated and closely monitored during the construction phase.

## 4.2.4 Hydrology and water resources

- 245. Freshwater availability varies considerably across the archipelago. On the large volcanic islands like Guadalcanal, water resources derived from river systems are abundant due to the mountainous topography and weather conditions. Whilst the coral atolls and islets have no perennial surface water resources and rely on rainwater and thin fresh groundwater lenses as aquifers which are small and depend mainly on precipitation for recharge. Naturally, the rivers on Guadalcanal descend to the coastal plain having a northeasterly trend and follow fault fracture lines in their upper sections which are typically steep and torrential. Once they reach the coastal plain, the rivers develop a meandering pattern and closer to the coast where channel bank height decreases the rivers can meander within braided channels. The major river deltas in Guadalcanal are found in northeast Guadalcanal which also has abundant potential for groundwater.
- 246. Honiara has four major water catchments, and several small coastal watersheds. The major water catchments are the Mataniko, Rove, White, and Lungga rivers. Mataniko River cuts through the central built-up area of Honiara, while Lungga River meanders in the eastern part and is the longest river with a catchment area of 377 km<sup>2</sup>.
- 247. The quality of surface water in general is good. However, the quality of surface waters associated with the urban and village areas, especially in Honiara is declining. Groundwater quality is good but being sourced from alluvium that also contains limestone materials makes the water hard. There is however a lack of adequate time series reliable hydrological data available to properly address historic and current water quality issues. Anthropogenic inputs associated with poor management of sanitation such as sewage and waste from light industry (e.g., petrochemicals) are the main causes of pollution that has significantly decreased water quality in most urban and semi-rural locations including the areas associated with the subprojects. In addition, practices such as logging and the traditional slash and burn method of farming have gradually degraded environmental conditions associated with the rivers and streams, threatening key catchment areas for example at Lungga and Mataniko rivers.
- 248. In 2017 a surface water physical and chemical quality monitoring study was undertaken in coastal rivers and streams around Honiara. Data associated with nutrients and/or microbiological contaminants were not investigated during this study. Similarly, time series data recording levels of fecal coliform bacteria and other potential water borne human pathogens are all but absent in the literature. Table 4.2 provides a summary of data collected from this study.

#### Table 4.2: Summary of physio-chemical water quality data

249. <b>Site</b>	250. Description	251. <b>0</b> c	252. <b>P</b> H	253. <b>0</b> R P m V	254.Ε C μ S /c m	255.T D S p p m	256. <b>D</b> <b>O</b> 257.%	258. <b>D</b> O p m	259.Turbid ity FNU
WS01	Mataniko - river mouth	27.2	7.83	200.1	9798	4899	64.1	4.91	11.3
WS04	Small stream Kukum	30.5	7.74	197.0	543	272	47.3	3.52	1.7
WS05	Panatina	31.8	7.65	196.1	594	297	32.3	2.35	15.5
WS11	Tanavasa River	28.6	7.53	199.1	334	167	82.6	6.37	32.5
WS14	White River	29.5	7.67	201.4	326	163	63.9	4.85	6.7
WS15	Mataniko - upstream	29.2	8.23	199.8	314	157	110.7	8.43	0.6

Source: Axiomwater Technologies (2017)

260. Hydrogeological structure of the Honiara can be simplified as shown in Table 4.3.

Table 4.3:	Aquifers in	Honiara	ground	water	basin
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Formation	Groundwater	Merit and demerit in groundwater development
Alluvium	Sand and gravel layer store the groundwater.	Area of aquifer distribution, size of aquifer and recharge area are too small. It is subject to sea water intrusion.
Honiara coral reef limestone	Limestone has much porosity suitable for groundwater storage. The groundwater occurs as perched water.	Limestone is distributed only in upper half of terrace and size of this aquifer is small. Recharge area is also small. So this aquifer is not suitable for large groundwater development. In addition, there is a risk of groundwater contamination from town area.
Honiara Beds	Comprises sandstone and limestone forming a good aquifer. Water from Kobito Spring and Panatina Bore-field comes from this formation.	Sandstone/limestone form confined aquifer in depths of <100 m. All the boreholes that were drilled so far are taking groundwater from Honiara Beds.
Mbonehe limestone	This formation keeps huge amount of groundwater within in cave systems which has large recharge area. White River spring originates from the formation.	This aquifer exists deeper than GL – 100 m over the study area. Limestone is compact with poor porosity. Cave system with the groundwater is locally developed. It is not easy to detect the groundwater of this aquifer because of deep occurrence of groundwater. This aquifer cannot be direct target of ground water development.
Poha Diorite	Groundwater occurs as fissure water.	This formation exists too deep in the ground for the study to be target for groundwater development.

Source: JICA Report (2006)

261. Aquifers in Honiara can be considered independent from the other groundwater basins. Lungga River becomes the physical boundary of the groundwater basin in the western and the southern side. Iron Bottom Sound is the northern boundary of the groundwater basin. There is no physical boundary on the western side. This report defines the groundwater basin that covers Honiara as "Honiara Groundwater Basin". The groundwater in the basin flows from SSW to NNE direction to reach Iron Bottom Sound. This can be assumed since both slope of hills and dipping of stratum face the same direction toward NNE. Honiara groundwater basin shows a rectangular shape in plain, and aquifer is equally distributed all over the basin. Honiara City's main rock formation is limestone with large cave system where water is flowing like underground rivers such as the Kongulai spring (JICA. 2006).

262. **Water resources**. The Honiara water supply system relies on a variety of surface water and groundwater sources that have been progressively developed over time. With natural springs being the historical supply, groundwater has recently been developed, thus diversifying the water resource. Under current conditions, springs account for approximately 62% of the production, with Kongulai springs corresponding to 41% of the overall capacity. It is therefore a key facility that supplies most of the high-level reservoirs. As detailed in the SW's Strategic Plan, the remaining production is essentially sourced from 27 groundwater boreholes located across the city area.



Figure 4.16: Existing water supply system in Honiara

Source: SW 5 Year Action Plan (2017)

- 263. Located within Honiara Botanical Garden, Rove Spring is an artificial wetland from which water gravitates to the central area. It is understood that the source experiences less variations in terms of raw water quality. Nevertheless, human activities are taking place in the catchment area and there is a risk of contamination.
- 264. The Kombito spring is located on the south-eastern edge of Honiara. It consists of a concrete weir that has recently been refurbished. A settling basin has been constructed near the spring during the JICA project. Nevertheless, the facility has not been used yet, as it is understood to reduce the already limited hydraulic head, thus limiting the water supply capacity. SW is now installing a new transmission line from the source to Panatina to increase the supply from Kombito spring which would then enable us to operate the treatment facility.
- 265. Kongulai Spring relates to the White River. The point of intersection is near the 6th crossing, and both flow in the same channel and drain into the coast.
- 266. The Honiara water supply system relies on a variety of surface water and groundwater sources that have been progressively developed over time. With natural springs being the historical supply, groundwater has recently been developed, thus diversifying the water resource. Under current conditions, springs account for approximately 62% of the production, with Kongulai springs corresponding to 41% of the overall capacity. It is

therefore a key facility that supplies most of the high-level reservoirs. As detailed in the Strategic Plan, the remaining production is essentially sourced from 27 groundwater boreholes located across the city area.

267. Nearly 60% of these bores (16) were recently installed as part of the JICA aid project (JICA Project for the Improvement of Water Supply Systems in Honiara and Auki), completed in 2014. However, production from the boreholes cannot fill the gap between the production capacity and water demand. While facilities implemented in 2013 were expected to provide an additional 3.2 MLD source capacity per bore field (i.e., 12.8 MLD in total), the four bore fields only supplied around 7 MLD. Table 4.4 presents the summary of the actual production based on average values from January and February 2019.

Table 4.4: Honiara water supply system - water resources and production

Туре	Water source	Components	Av. daily production (m <sup>3</sup> /day)	% supply from the total	Approx. elevation (masl)
	Kongulai Spring gravity	Gravity supply to White River	~2,500*	8%	105
	Kongulai Spring pumped	Tasahe the transfer E. Kola'a	~11,000*	33%	105
Spring (62%)	Rove Spring	Gravity to Rove & White River	3,250	10%	35
	Kombito Spring	Gravity supply to Panatina	3,577	11%	90
	Tasahe Bore Field	04 BHs with PS	2,790	8%	50
	Titinge Bore Field	04 BHs with PS	1,289	4%	45
	Skyline Bore Field	04 BHs with PS	996	3%	40
Groundwater	Tuvaruhu / JICA bores	04 BHs with PS	1,555	5%	-2
(38%)	Tuvaruhu / SW bores	04 BHs with PS	1,641	5%	-15
	Borderline bore-field	04 BHs with PS	1,712	5%	45
	Gilbert Camp bores	04 BHs with PS	1,466	4%	42
	Panatina Bore Field	04 BHs with PS	1,164	4%	-2
Total	•		32.94 MLD	100%	

Note: Under normal functioning. Average production over the first semester of 2019 is expected to be low due to repeated shutdown of the spring due to high turbidity

Source: SW PRF BOD Honiara WS, September 2019

## 4.2.5 Topography and geology

- 268. **Topography**. The island of Guadalcanal is approximately 148 km long and 50 km wide with a northwest-southeast orientation. The island's topography is highlighted by marked extremes, including rugged mountainous terrain including the nation's two highest peaks, Mount Popomanaseu (2,335m) towards the eastern end of the island and Mount Makarakomburu (2,310m) approximately 32 km south of Honiara, these are flanked by hilly plateaus lightly dissected hills and narrow coastal terrace with interspersed swamps, valleys and significant river catchment areas surrounded by a diverse coral reef and a large and highly productive area in the north, known as the Guadalcanal Plains.
- 269. The topography includes valleys, swamps, and coastal landforms such as terraces and platforms and rivers. There are a variety of soils in the project area, reflecting the geology, different rock types and diversity of landforms.
- 270. **Geology**. Solomon Islands lies at the boundary of three major tectonic plates: Pacific, Australian and Woodlark, which form part of the Solomon Islands Subduction Zone. Further northwest is the Solomon Sea plate, which is the source of most volcanoes in the Solomon Islands. The uplift of the pacific plate along with intermittent volcanic and seismic activity has contributed to the island masses that now form the Solomon Islands. The

islands are, geologically speaking relatively young, and the larger islands are almost entirely volcanic in origin and consist of basalt surrounded by uplifted coral terraces.



Figure 7 Plate tectonics of the Solomon Islands

271. Guadalcanal is located on the northern side of the San Cristobal Trench, a northeasterly dipping subduction zone that has been active since latest Miocene times about 8 million years ago. Oceanic basement rocks and intrusives outcrops in the island's southern mountain zone and successively younger tertiary deposits reef limestones, fluvial clastics and deltaic mark and mudstones occur to the north. The coastal plain is composed of Quaternary sediments. Underplating of Guadalcanal in the late Cainozoic has led to uplift and tilting. The southern side of the island, which borders a major fault, is elevated while its north-central side has subsided a maximum of about 5 km since late Miocene time in the Mbokokimbo Basin. Here, the sequence of sediments thickens towards the east away from a NE-SW trending basement: the Tetare anomaly which together with the drowned coastal morphology of Florida Island, suggests that subsidence increases towards the east and north.

Source: https://www.researchgate.net/figure/Geographic-and-tectonic-setting-of-the-Solomon-Islands





Source: JICA Report (2006)

- 272. Rock formation in Honiara consists of limestone, calcareous sandstone/mudstone of Miocene to the recent, which overlies the basement rock, diorite of Oligocene. The oldest rocks are the Umasani Volcanic, a tholeiitic suite of basaltic andesite with very minor trachyte. While Poha Diorite Complex has been placed into the Umasani Volcanics the Mbonehe Limestone outcrops over a large area peripheral to the main Poha Diorite body resulting in the cockpit karst topography of Honiara. This is about 100m thick and is predominantly poorly bedded, recrystallized, biomicrite or calcarenite. This formation rests unconformable on an eroded platform of Poha microdiorite and dips generally at 10o-25oNE.
- 273. The Gallego lava comprises of cacalkaline suite of Neogene to Pleistocene andesitic dacitic rocks. These outcrop in the crater of Mbelapoke Hill 12km south of Honiara and form bulk of the Choilo mountain in the NW. Both occurrences have associated aprons of volcanic rudites or the Tiaro Tuff-breccias.
- 274. Lungga beds comprise a lithesome of three distinct facies in the south the Mataniko siltstone, in Honiara and Mt. Austen area the Honiara beds (400m thick) which form a sequence of calcareous volcanic arenite and rudites. These pass westwards into the Saghalu Conglomerates which form a mantle of volcaniclastic rudites derived from the Gallego Volcanics in the NW. Kombito Marls are a lagoonal back reef facies of the Honiara Beds. In Honiara, the Honiara Beds are capped by about 60m of coralgal biolithite and derived debris.
- 275. The Honiara Reef Limestone which are associated with a magnificent series of terraces ranging in height from 700 m above sea level to 100m below. Most of the coast is fringed with dead coral which is being swamped by alluvium from the major rivers. Extensive alluvial valleys occur along the Lungga, Poha and Umasani Rivers.

#### Table 4.5: Stratigraphic classification of Honiara

Formation	Age
Coralgal Reef Limestone and Alluvium	Recent
Honiara Reef Limestone	Pleistocene
Lungga Beds (Mataniko Siltstones, Honiara Beds, Saghalu Conglomerates)	Pliocene to Pleistocene
Mbelapoke Hill dyke-swarm	Pleistocene
Hovi Limestone	Pleistocene
Gallego Lavas and Tiaro Tuff -breccia	Lower Miocene to Pleistocene
Mbonehe Limestone	Lower to Middle Miocene
Poha Diorite Complex	Late Oligocene
Umasani Volcanics	Oligocene
Source: Hackman (1979)	•

276. **Soil**. There are 27 soil groups identified in Solomon Islands. Depending on parent material and land use, soils exhibit a range of fertility. The basalt volcanic derived soils are generally rich in nitrogen, phosphorous and organic carbon, but poor in potassium. The alluvial deposited soils are deep, freely drained yellowish brown to red humus-rich medium to coarse textured soils with limited profile development and reasonable natural fertility. The hill soils are older and have weathered to well-structured clays with somewhat poorer internal drainage. These soils have inclusions of limestone within their profiles and may overlie weathered coralline rock materials. Such soils have limited use and where they are retained in forests, are used for subsistence gardens, otherwise, these areas have reverted to extensive areas of grassland and have limited agricultural use. The most agriculturally important soils are the recent alluvial soils found only on the north Guadalcanal plains. They are the most fertile of all Solomon Islands soils.

- 277. The soil is rich in nitrogen, phosphorus, and organic carbon, but are somewhat poor in potassium and magnesium. Phosphorous is most abundant in soils on limestone and least abundant in those on basic and ultra-basic rocks. Organic matter is an important component in the topsoil where the bulk of the soil nutrients are held. Generally, the soil has a good structure, is well drained and usually deep. The upland soils tend to be high in clay.
- 278. For the water mains rehabilitation sites, the soil composition is mostly gravelly clay with traces of sand, sandy and silty clay, moderately to highly weathered limestone and Honiara coral reef limestone including completed weathered sandstone and alluvium. Soils in the subproject areas in general are deep, intensely weathered and leached, free draining and relatively porous. Soil formation is mostly alluvium, limestone, and Honiara beds.

## 4.3 Biological Environment

#### 4.3.1 **Terrestrial Habitats**

279. Solomon Islands is characterized by a high level of biodiversity of plants including 3,210 species of vascular plants, although this is believed to be an underestimate. It is likely that there will be up to 4,500 plant species when those that are unrecorded are included. While diversity is high, endemism is low, with no endemic families and only three endemic genera. Endemism of species is not accurately known but is thought to range from ten per cent of fern species to 80% of pandanus species. The islands with the highest rate of endemism are Santa Cruz (Temotu) and Guadalcanal.

- 280. The main groups of flora include 340 species of ferns, 277 species of orchids, 33 species of palms, 26 species of other nuts (ngali nut, cut nut and alite nut), 20 species of pandanus, 14 species of Eleocarpacae trees, and 11 species of shrubs. Forest in Solomon Islands covers up to 86% of vegetation communities with low altitude forest accounting for the vast proportion of this. Crop land and bush account for 10% of the vegetation communities.
- 281. The terrestrial fauna of Solomon Islands is extremely diverse, probably with a greater diversity of land animals that any other Pacific Island country and has a high level of endemism (UNDP et al., 2002). Fauna includes 223 species of birds (173 residential terrestrial species and 50 other species of shore/sea birds and visitors) including 19 species globally threatened, 52 mammals, 61 species of reptiles (25 are endemic), and 17 species of frogs.
- 282. For Honiara the main fauna found are specifically island imperial pigeon (Ducula pistrinaria); willie wagtail (Rhipiduria leucophrys), pacific swallow (Hirundo tahitica) Rainbow lorikeet (Trichoglossus molucannus) including the common myna or police bird (Acridotheres tristis). Other fauna includes:
  - Reptiles such as snakes (Caenophidia) which are not poisonous, copper tailed skink (*Emoia cyanura*), pacific black skink (*Emoia nigra*), emerald tree skink (*Lamprolepis smaragdina*), house gecko (Gekkonidae).
  - Shellfish scorpions, GAS (*Achatina fulica*), Papuina sp.
  - Insects and spiders Egg flies (Hypolimas sp.), Fresh fly (Sarcophagidae) Banana stalk fly (Nerridae), jumping spider (Salticidae), butterflies.
- 283. In terms of distribution, there is a relatively high level of island endemism. While Western Province records the largest number of species (41), Choiseul and Guadalcanal Provinces have the highest rate of island endemism with six species being found on only one or two islands. Field observations did not show any significant wildlife species within the proposed sub-project area.
- 284. Field observations did not identify any significant, endemic, or endangered flora and fauna in the sub-project sites.

## 4.3.2 Freshwater Habitats

- 285. Freshwater systems throughout the Solomon Islands play a critical role in the location of villages and the community's daily life. The freshwater resources of the Solomon Islands show a high level of biodiversity and endemism, especially among the aquatic insects. According to Polhemus et al (2008) an island-wide assessment of the freshwater river systems in the country, recorded 93 species of Heteroptera representing 28 genera in 12 families of which 60% are endemic at the species level and at least 31 of the species collected are new to science. Sixty-three species of Odonata representing 37 genera and 12 families were recorded of which 44% are endemic at the species level and at least 1 new species was discovered. Nine described species of Gyrinidae, representing two genera and ten described species of Simuliidae, representing 2 genera, were reported of which 90% of both are endemic at the species level.
- 286. In Solomon Islands, as with other mountainous islands of the Indo-Pacific Region, Gobioid fishes are the dominant freshwater fauna, and are mainly represented by members of the Gobiidae, Eleotridae and Rhyacichthidae families. 43 species of fish belonging to 26 genera and 14 families of which at the time of the report there were no

endemic species. One species of Gobiidae (Lentipes solomonensis) subsequently was found to be endemic through additional analysis.

- 287. Like other tropical islands of the Indo-Pacific Region, all native fish species encountered in inland freshwater are migratory species with a life cycle that alternates between ocean and river. Two main migration patterns are followed: catadromous and amphidromous. Eels are catadromous fish with adults migrating to the ocean to spawn, and juveniles migrating back into freshwater systems to grow to maturity. Most of the other aquatic species, such as Gobioids are amphidromous. Spawning occurs in the rivers, and larvae drift passively to the ocean before migrating back as juveniles to the freshwater system where they grow into adults. The factors triggering upstream migration of juveniles are not completely understood. However, it is postulated that flooding, which causes high turbidity, and lunar cycles, play a role for triggering migration in some species.
- 288. Freshwater vegetation comprised mostly of common littoral trees and other plants that can thrive in moist conditions including grasses and water lilies (Nymphaea), water morning glory (Ipomoea aquatic) and primrose willow (Ludwigia octovalvis).

## 4.3.3 Endemic Species

289. The Solomon Islands is included in the east Melanesian Island biodiversity hotspot and as such has a high level of endemism, predominately associated with the country's fauna. This includes 19 mammals (14 bats and five rats), 67 birds, 19 reptiles, three amphibians (frogs), two butterflies and one vascular plant. Choiseul Pigeon, *Microgoura meeki* is endemic to the island of Choiseul and is found in the high mountainous forest areas. The bird was considered extinct; however locals have reported sightings in the densely forested and mountainous areas of the island.

	East Melanesian Islands Hotspot						
Class	Resident & breeding species	Hotspot endemics	Threatened hotspot endemics	Endemism (%)	Threatened endemics (%)	Solomon Islands KBA	
Mammals	81	42	21	51	51	19	
Birds	288	148	34	51	23	67	
Amphibians	49	45	5	92	11	3	
Total	418	235	60	65	28	89	

Source: CEPF – Ecosystem Profile of East Melanesian Hotspot (2012)

290. The subproject area comprises highly modified habitat. No endemic species was observed at the subproject sites during field assessments.

## 4.3.4 **Protected species and areas**

- 291. **Protected species**. As with other Pacific Nations, there is currently little understanding of threatened and protected species knowledge in the Solomon Islands. At present there is limited regional resource documenting the types of species that exist and/or are threatened in the Solomon Islands or the Pacific region. Data is often dispersed, taxonomic expertise is absent, and nomenclature and classification systems can be disputed for various species.
- 292. The International Union for Conservation of Nature and Natural Resources (IUCN) undertakes a global assessment to classify species at varying risk of global extinction. The

2012 IUCN Red List provides the most up-to-date collated information for the Solomon Islands. It identifies and assesses the list of threatened species, which includes 245 bird species, 19 amphibians, 75 fishes, 60 plants, 75 mammals, 522 invertebrates and 6 reptiles.

- 293. Two species of bird have been declared Extinct in the Solomon Islands the Thickbilled Ground Dove, Gallicolumba salamonis and the Choiseul Pigeon, Microgoura meeki but people from Choiseul had reported sightings in the forested mountainous areas.
- 294. Five marine turtle species are found in the Solomon Islands, and all are listed as protected species on the IUCN red list and include the Critical Endangered Hawksbill turtle (Eretmochelys imbricate); the Endangered Green turtle (Chelonia mydas), Olive Ridley turtle (Lepidochelys olivacea) and Loggerhead turtle (Caretta carreta); and the Vulnerable Leatherback turtle (Dermochelys coriacea). None of the species are recorded to nest on the beaches along the northern coastline of Guadalcanal. The identified nestling sites for turtles in Solomon Islands include:
  - Arnavon Islands (Isabel/Choiseul Provinces).
  - Ramos Island (Malaita Province).
  - Russell Islands (Central Province).
  - Litoghahira (Isabel Province).
  - Rendova and Tetepare Island (Western Province); and
  - Vacho/Sirodana and Sasamunga Islands (Choiseul Province).
- 295. There are no threatened or protected species of flora and fauna recorded within the subproject area.
- 296. **Marine and terrestrial protected areas**. There is a total of 79 marine protected areas (MPA) in the Solomon Islands, 35 designated marine conservation area, 39 established and three proposed sites for protection. For terrestrial, there are 14 protected areas, five designated terrestrial protected area, seven established and one proposed protected area, as shown in Figure 4.19.



Figure 4.19: Protected area in Solomon Islands

#### Source:

https://geoserver-

apia.sprep.org/geoserver/www/pamaps/SLB\_SPREP\_PIPAP\_SolomonIslands\_ProtectedAreasMap.pdf

- 297. In addition, the communities of the nation have and are continuing to develop additional marine managed areas (MMA) throughout the nation based principally on the traditional and community ownership that is intricately tied to land and water ownership. It is reported that in total 127 MMA (2016) are located throughout the nation.
- 298. MMAs are informally designated and include the customary management areas established in Roviana and Vonavona Lagoons. These two lagoons have high marine diversity and are important nurseries for hump head parrotfish and hump head wrasse. They form part of the Bismarck Solomon Seas Ecoregion (BSSE), an ecoregion defined by World Wildlife Fund (WWF). Additionally, several marine conservation areas have been established by communities in Marau Sound, Ngella, Marovo Lagoon, Tetepare, Roviana Lagoon and Gizo. Similar areas are likely to be established for marine resource management in the Shortland Islands, Russell Islands, Three Sisters Islands, Leli Island, Lau Lagoon, Suafa Bay, Langalanga Lagoon, Are'Are Lagoon and Small Malaita, Northern Isabel, and Northern Choiseul.
- 299. No protected areas are identified within the boundaries of the subproject area.

#### 4.4 Socio-economic Environment

#### 4.4.1 Population and growth

300. From the 2009 Census Report, the population for Solomon Islands was 515,870 with an annual population growth of 2.3% the estimated population for 2022 is approximately 721, 177 with a sex ratio of 1.07 males to females, a medium age of 19.9 years, a life expectance average of 74.2 years (76.9 females, 71.6 males) and a density 22 persons per square kilometer. This reflects a sharp increase from the 17 persons per square

kilometer recorded in the 2009 census. By global standards the population density of the Solomon Islands at 22persons/km2 is still considered relatively low.

301. Honiara has recorded a population of 64,609 in 2009 with most of the population, 73.2%, within the project's area of influence. In 2022, the projected population for Honiara is 94,206 and based on the annual population growth of 2.7%, most of the population are from the sub-project areas. Table 4.7 shows the ward population of the subproject area.

	2009 Census D	Projected 2022				
Ward	Total population	No. of males	No. of females	Total no. of households	population	
Tandai (Guadalcanal)	14995	7829	7166	2477	23572	
Rove-Lengakiki	2646	1478	1168	339	3265	
Vavaea	6954	3766	3188	937	7406	
Mataniko	4347	2250	2097	543	6607	
Kolaá	10151	5345	4806	1499	14506	
Vura	9096	4697	4399	1268	10633	
Panatina	14108	7486	6622	2002	21811	

Table 4.7: Ward population of the subproject area

Source: SIG Census

### 4.4.2 Health and education

- 302. **Health**. The National Referral Hospital (NRH) and nine (9) city council clinics in the suburbs serve the residents of Honiara including private medical clinics operated by medical doctors. The clinics are under the HCC administration while the Hospital is administered by the MHMS. More than seventy registered nurses, nurse aides and appointed doctors run the clinics. However, this is not sufficient for providing quality medical services to the growing Honiara population and has been an issue to most residents. The Private medical clinics in the city offer better services than the city council clinics and the state hospital, but only some people can afford them. The poor delivery of health services is due to inadequate facilities, a lack of resources, poor working environments, and the non-provision of staff housing.
- 303. The most common diseases and infections recorded in Honiara are Malaria, diarrhea, and pneumonia. As the city's population continues to rise, it is critical that the existing clinics are upgraded, and new ones are built to cater for the current and future needs.
- 304. **Education**. In 2019, MEHRD had reported that there are 1100 schools and ECE Centers operating across the Solomon Islands this comprises of 271 ECE, 510 Primary Schools, 243 Community High School, 16 Provincial Secondary Schools, ten National Secondary Schools and 50 Rural Training Centers. The capital city of Solomon Islands Honiara is the main educational and administration center constitute of Schools that are privately owned, owned by the SIG and the HCC.



#### Figure 4.20: Location of schools in Honiara

Source: MEHRD GIS (2020)

305. There are primary and secondary schools provided by the HCC, these are distributed according to the main population catchment areas of Honiara. Other schools within the city are operated by religious denominations and the government, including private administrators. Schools within the city include ECEs or Kindergarten (41), Primary Schools (12), Community High Schools (22), one Provincial Secondary School and one National Secondary Schools. Honiara also hosts the Solomon Islands National University (SINU) and the main administration center for the fourth University of the South Pacific (USP) Campus. According to the 2009 Honiara Census Report, the literacy rate for population

aged 15 years and above was 94.5% with females having a literacy rate of 91.8% and males 96.9%.

- 306. It was also found that about 5.8% of the population has not attended or completed schooling. In 2009 the school enrolment rate for children ages between 6 and 12 years old is 86.4% which is 3.1% higher than the national enrolment rate of 83.3%. It was also recorded that 40% of all students were enrolled in primary schools, 30% in secondary schools and 12% in Preschools. About 7% of all students attended a tertiary institution, and another 1% attended a vocational institution. Other institutions include apprenticeships, or specialized trades schools.
- 307. In 2019, the ministry of education recorded 30573 enrolled in schools in Honiara alone, 1485 are females and 15765 are males. Table 4.8 shows for enrollment recorded in schools.

	No. of students enrolled				
	Female	Male	Total		
Kindergarten	2,033	2,264	4,297		
Primary	2,142	2,257	4,399		
Community High	9,787	10,175	19,962		
Provincial Secondary	449	594	1,043		
National Secondary	397	475	872		
Total	14,808	15,765	30,573		

#### Table 4.8: Honiara school enrollment 2019

Source: MEHRD, 2020

- 308. However, due to the increasing population students and teachers are often late to school due to traffic congestion and unreliable public transportation. Another issue faced by schools is the student-teacher ratio in most schools is higher than 40:1, with schools lacking adequate space and resources. Also, Secondary schools lack facilities such as offices, libraries, classrooms, playgrounds, and laboratories. Upgrading the existing school facilities and building decent houses for teachers are the key challenges for most of the education authorities. The central government has implemented a free education policy since 2009 to relieve parents of the burden of paying school fees and to increase access to basic education for all children. However, the city council schools impose enrolment and development fees, which are often higher than the original school fees, making it difficult for poor families to send their children to school.
- 309. There are four schools in the sub project areas: Vura Primary and Community High School and Result Academy (at Vura); Tuvaruhu Primary and Community High School (at Tuvaruhu) and Honiara High School (on route to Vara Creek and Tuvaruhu) and Bishop Epalle Primary and Secondary School located less than 500m south of Rove sub – project area.

## 4.4.3 Community and family structure

310. Community and family structures in Solomon Islands are based mainly on the various tribal groupings and lineages in each island. To be part of a group or kinship is a significant aspect of the communities and families in the country. In most islands settlements and villages are often established on tribal lands comprising of individual families belonging to one tribe or lineage living adjacent to each other. Each household is occupied mainly by

the parents and children and in some cases grandparents who need care and support from their families.

- 311. Men are considered as the head of each household as they are the ones who often make critical decisions as they are accountable to negotiate and make decisions. Although men make the decisions, women often play a vital role in these decision-making processes.
- 312. In most cases under which is under little observation women are clearly more influential in making decisions affecting their households and families, women affairs and those involving other relatives who are under their care.
- 313. Communities existing on the islands have a governing body which consists of village chiefs, elders and church leaders that ensure peace and stability exists in the communities and families. Guadalcanal is a matrilineal society, but chiefs and elders are men. While lineages or tribes follows the matrilineal side of the family women tend to follow their husbands when they are married. However, there are situations where a man can follow his wife due to cultural significance of family ties and beliefs of ways to protect the land.
- 314. Honiara hosts people not only from Guadalcanal but other parts of the country with different beliefs and customs. Being the only main urban center in the country there is an increasing number of informal settlements in the outskirts of the city which are also the main project influence areas. These settlements are governed by a committee's set-up to ensure peace and stability exists between the different parties in the area. Disputes occasionally occur and are mostly sorted out at the community level but in extreme cases it can be handed to police for law and order.

#### 4.4.4 Economic sector

- 315. The economy of the Solomon Islands comprises a mix of subsistence production on which most of the island citizens rely and a monetized sector, which includes the public service and commercial business of which the resource development-based enterprises are the largest. Honiara is the heart of the economic sector in Solomon Islands and the main economic activities that residents are involved in include, running private businesses such as canteens and transport services. Other activities include export and import of goods, as well as wholesaling and retailing.
- 316. Livelihoods and employment. Solomon Islands economy is dominated by subsistence agriculture, fisheries and logging related activities, which support around three-quarters of the total population, including almost the entire rural population. It was observed that the main economic activities that residents are involved in include marketing of local farmed produces, marketing of betel nut and tobacco products, selling cooked foods, running private businesses such as canteens and transport services. Women are mostly involved in selling cooked food, clothes and other items such as necklaces, bracelets and earrings.
- 317. **Fisheries**. The EEZ waters of Solomon Islands support commercial purse seine, long line and pole and line fishing activities that have both local and foreign ownership and operational involvement principally targeting species of tuna for many years. The commercial fishing fleet operates between 12 nautical miles outside of the nation's islands and outer boundary of the nation's EEZ.
- 318. Fishing is mainly done by local fishermen for family consumption and selling at the local market or on roadsides. There are no large-scale fisheries operating in Honiara and

residents are only involved in selling fresh fish (tuna and reef fish) which are brought in from the provinces, and second grade fish bought from fishing vessels which are not of good quality.

- 319. **Forestry**. Timber harvesting and export has been the dominant exporting product of the nations for several decades averaging between 20-35% of foreign exchange earnings over this period. Where wood is for customary or domestic purposes and not for sale, no license is required. If forest owners would like to sell timber, there are local timber harvesting licenses and community timber harvesting license available. A community may combine their efforts to cut up to 2,000 m3 per year under a community timber harvesting license.
- 320. There are no logging operations recorded in Honiara but there are logging operations in Guadalcanal. The city hosts most of the timber processing companies involved in buying from local timber harvesters and exporting overseas or reselling to Honiara residents at a higher price.
- 321. While some of the sub-project areas are within the jurisdiction of the Guadalcanal Province, there are no logging operations in the areas.

## 4.4.4 Cultural and historical resources

- 322. Special, sacred, or restricted sites, or tambu areas, including elements of the landscape as well as monuments, represent the history, lineage and society of different clans and lines and have local cultural as well as regional historical significance throughout the Solomon Islands. Traditional medicines and resources derived from terrestrial (native and cultivated flora) and to a lesser extent marine resources play a significant role in the traditional and cultural lives of all communities.
- 323. The National Solomon Islands Museum keeps a National Tambu Site Register, which records several thousand sites. Some provinces also maintain tambu site registers but due to insufficient funds and manpower the recording and registration of all sites is not systematic.
- 324. There are no tambu, sacred or restricted sites within the subproject area in any of the zones recorded in the Register. Subsequent site visits and consultations also did not reveal any known cultural or historical sites and resources. However, if any item should be identified during the works it will be identified and recorded by the developer or SW.
- 325. From observations there are no unique landscapes within the subproject area.

## 4.4.5 Land ownership and use

- 326. Land ownership. Land ownership in the Solomon Islands is complex or in general is held by a group of people or community who are related. As such most of the land throughout the Solomon Islands is refer to as non-registered customary land and is estimated to make up approximately 87 % of all land. The remaining land is either registered alienated land (10%) with the balance being owned by the government (4%) and private owners (2%).
- 327. The focus of land administration had been historically on identified alienated lands, which is generally located in the most productive areas with good infrastructure access. The alienated land is subject to registration under the Land and Titles Act of 1988. The Act

covers customary land rights which include land owned, used, or occupied by a person or community in accordance with current customary usage.

- 328. The land for the subproject is registered and perpetual estate for most rests with the Commissioner of Land. For Areas 5 and 17, although these are not within the HCC boundary the mains are within registered easement and these will not be an issue for SW.
- 329. **Land use**. Most land within HCC boundaries is state land or registered estates. Land outside of the HCC boundary is either customary or privately owned/leased. Land in Honiara is about 22.73km<sup>2</sup> of which about 65% is being developed.
- 330. Major land uses on Guadalcanal include by the HCC which occupies a large part of the north-west coastal side of the island. Major government infrastructure includes Henderson International Airport located east of Honiara, outside the HCC boundaries. Since the 1990s the area to the east includes large oil palm plantations, since 2005, under ownership of Guadalcanal Palm Oil Plantations Ltd.
- 331. The Guadalcanal Provincial office and HCC administrate headquarters are both situated in Honiara. The largest open-air food market is in Honiara CBD, two smaller markets exist on the eastern side of the town, fishing village market and Henderson market and at White River on the western side of the town. There are also numerous smaller, and often illegal, markets that operate in villages, associated with schools and health clinics, as well along the Main Road.
- 332. About 13.5% of land in HCC jurisdiction is occupied by informal settlements. There are about 30 informal settlements located within the HCC boundary plus six others which have trespassed into customary land. Approximately 35% of the total population of Honiara lived in unplanned informal settlements. These settlements lack adequate services such as water and electricity supply. Within the sub-project sites there are farmed produce and betel nut market outlets, schools, shops, clinics, and other developments surrounding the subproject sites.
- 333. The land right on which the proposed development will take place falls under the jurisdiction of the Commissioner of Land and customary landowners. Public utilities such as water rights falls under SW and power supply rights fall under the jurisdiction of Solomon Islands Electricity Authority now trading as Solomon Power.

## 4.4.6 Water supply and sanitation

- 334. **Water supply**. Water resources are natural resources of water that are potentially useful. There are various uses of water, and this includes agricultural, industrial, household, recreational and environmental activities. In Solomon Islands Water resources availability varied significantly from overabundance (sizeable rivers and streams on high islands) to scarce water resources in small islands and low-lying atolls (rain harvesting and exploitation of vulnerable freshwater lenses). On the large volcanic islands, water resources with river systems are abundant due to the mountainous topography and weather conditions. The longest river is Lungga river on Guadalcanal Island with a catchment area of 377 km<sup>2</sup> while aquifers on the islands are small and depend mainly on rainfall for restore water.
- 335. Urban centers and rural villages in the country account for the largest water withdrawal particularly for drinking and household use. On the larger islands, surface water in the form of streams, springs or rivers is the main source of drinking water and for domestic purposes. The industrial sector withdraws water for fish processing cannery,

palm oil factory, mining operations and some small manufacturing industries. The major users of groundwater resources are Honiara city and the palm oil plantations.

- 336. Approximately 20-30 percent of Honiara water supply is sourced from groundwater. In urban areas, piped water accounts for 75 percent of total water withdrawal, rainwater tanks account for 22 percent, bore hole/spring/wells account for 1 percent, and other sources account for 2 percent. SW has 8,000 customers, all metered with about 1900 meters are not functioning. Average consumption is estimated at 196 liter/capita/day.
- 337. In Honiara, the water supply system is managed by SW and the quality of water is regularly checked and chlorinated by SW.



Figure 4.21: Honiara water supply system

Source: SW PRF BOD Honiara WS (September 2019)

338. **Sanitation and wastewater**. There are 12 sewerage systems in Honiara managed by the Solomon Water. The systems are providing a conventional gravity fed sewerage system to around 30,000 people of Honiara, which is about 30% of the current city population. This is only for the capital city of the Solomon Islands and not the provincial centers and the remaining households and businesses are connected to household level septic tanks regulated by the HCC. These systems are gravity fed except two sewage pumping stations, one in the Point Cruz area, serving the central business district and one to the east of the city, located in the KGVI school grounds.

Figure 4.22: Honiara sewerage systems



Source: http://www.solomonwater.com.sb

- 339. The untreated wastewater and sewage are disposed of into the Honiara coast through 17 outfalls along the coast and Mataniko River. However, many of the outfalls are in poor condition due to being damaged and broken near the shoreline which results to near-shore pollution.
- 340. In terms of septage collection, the HCC is responsible for septage collection, but the coverage and quality of services are very limited. After collection the septage is disposed at the Ranadi solid waste dump.

#### 4.4.7 Solid waste management

- 341. Around 36% of the households of Honiara have access to formal solid waste collection services. Most residents not being served are from the informal settlement area.
- 342. The Ranadi dumpsite, located 6 km east of the city, is presently the only dumpsite to serve Honiara and until 2013, it was largely uncontrolled and not constructed to modern standards. Largely due to a Japan International Cooperation Agency supported project, the Ranadi site is better managed, and its life has been extended by about five years. The SIG plans to close this dumpsite and an alternative site for established of a sanitary landfill has been identified in the Henderson Area. This landfill is operated and managed by the HCC. For disposal of construction waste the contractor will be responsible for submitting an application for disposal to the HCC.

### 4.4.8 Other services and utilities

- 343. **Electricity**. Honiara's electricity is supplied by the Solomon Islands Electricity Authority also known as Solomon Power using several energy sources. The main power stations are in Lungga and Honiara. Based on the 2009 census, 64% of the population of Honiara has access to electricity. It was estimated that the demand for power is growing by 6% per annum and by 2020, the peak demand will be around 25.5 MW.
- 344. The electricity in Solomon Islands is characterized by low in-service coverage area and high cost. This is due to its geography and high dependency on imported fossil fuel. The low service coverage is mostly from the informal settlements area. It was recorded that only 18% of the informal settler households are connected to SP.
- 345. **Information and communication**. Cellular phone services are available in Honiara and the government reported that in 2017, most of the population have access to the mobile services networks of either Our Telekom or B-mobile Vodafone. Telekom also provide landline services to most offices and some households. Internet services are provided by both Telekom and B-Mobile, including Satsol. These service providers, including Solomon Submarine Cable, have assets installed along the Main Road which is also where water pipe easements are located.

## 4.4.9 Transport network and services

- 346. The transport network of Honiara comprises the airport (domestic and international), the international seaport, wharves, and road and bridges.
- 347. The only airport in Honiara, the Honiara International Airport, is about 3 km east of the proposed development site. While the International seaport in Honiara, or the Port of Honiara is located at Point Cruz Harbor.

- 348. Honiara has only one main road which runs from the east to the west and connects to the eastern and western Guadalcanal rural roads. This road is a highway road that runs past the project site and connects the rest of Honiara to the international airport, seaport, wharves, the Honiara CBD area, and other important services in Honiara. Within the road reserve, which is 32 m in width, there are public utilities services lines for Solomon Water, Solomon Power and Solomon Telekom which are underground and overhead in certain locations are located (Figure 4.23).
- 349. The Kukum Highway is typically the only main road connecting East of Guadalcanal to Honiara. The road is parallel to the northern coastline of Guadalcanal and has only minor variations in vertical geometry. It does not directly transverse the coast; and it provides access to a diverse range of services and private residences, business, and industrial developments which some generate high volumes of traffic, which are inadequately served by the existing road geometry.

#### Figure 4.23: Honiara road network



Source: MID-CPIU (2020)

350. The highway is served by a series of road networks and the proposed site is not located adjacent to this highway but south of the highway. The subproject anticipates using the Kukum Highway for haulage of material and plant during the construction phase. The contractor will be required to set out the details of haulage (routes, days/time etc), traffic controls, road and traffic safety etc in their traffic management plan which will be part of the CESMP.

# 5 Consultation, Engagement and Information Disclosure

- 351. Information disclosure, public consultation, and public participation are part of the overall planning, design, and construction of the subproject.
- 352. The UWSSSP Stakeholder Engagement Plan (SEP) documents the information disclosure, consultation, and public participation measures to meet ADB and WB standards and requirements of the CSS, including ongoing and meaningful consultation during construction and operation stage works.
- 353. The SEP will be followed during all of the subprojects to be implemented in phase 2. The SEP establishes the process of continuous interaction among beneficiaries and relevant key stakeholders including government ministries, HCC, locally affected communities (including formal and informal settlements), schools, landowners, health clinics, youth, women's groups, business associations, individuals, local landowners, Guadalcanal Provincial government, civil societies, religious groups, public and private service providers, CSOs (including NGOs) and other interested parties that may be consulted in the course of planning and the implementation of SW 5-year Action Plan and 30-Year Strategic Plan (2017-2047).
- 354. Consultation and engagement is essential for the successful implementation of the project and for the efficient service delivery and SW's business operations to the formal and informal settlements in Honiara.

## 5.1 Consultation and Communication

#### 5.1.1 Stakeholder meetings

- 355. An initial stakeholder meeting was facilitated by SW and the phase 1 and phase 2 teams to discuss the UWSSSP and the subprojects to be covered in each of the phases. A total of 25 stakeholders and representatives (nine female and 16 male) participated in the initial meeting. A summary of the meeting is presented below, and the minute of the meeting is attached in Appendix 5 and the community meeting attendance lists are included in Appendix 6.
- 356. During the meeting the project phases, aims, scope, challenges, and underlying reasons for expansion of the water supply services in Auki and Honiara and rehabilitation of the sewerage and water pipelines in Honiara were discussed by SW. The project's grievance redress mechanism (GRM) was discussed. One of the key challenges is some of the areas are not within the town boundary. Furthermore, with the current production, water losses through NRW are at least 50% due to illegal connections (water theft) and physical leakage in systems, issues to be addressed by the subproject.
- 357. The key points discussed during the meeting are as follows:
  - The need to have a technical committee consisting of experts at the national level to deal with such projects
  - Percentage of NRW improvement expected after the project and impacts expected on the tariff
- Potential for the improvement of the Honiara wastewater infrastructures and outfalls to improve the quality of the Honiara coast
- Challenges encountered by SW to secure land for infrastructure to build wastewater facilities
- Standard principles used by SW to select sites for sewer outfalls
- Risk analysis and if there are any mitigation measures relating to the impacts of outfalls in coastal areas
- HCC and SW need to work together to ensure the projects progress
- Lord Howe Settlement issue and complaint on the new National Referral Hospital treatment facilities
- Importance of community consultations and availability and affordability of potable water in homes are issues most concerning to women
- Schools pay water bills based on commercial tariff rates
- Future coordination with other ministries, and,
- Informing participants that site investigations and surveys must be undertaken to ensure land acquisition and resettlement processes such as compensating APs are properly and sensitively undertaken including detailed environmental assessments.
- 358. Subsequent consultations showed that stakeholders and beneficiaries expressed support for the subproject as they see the benefit to Honiara and its residents. The consultations were conducted in a mix of Pijin and English.
- 359. Participants were also informed of the household survey that would be carried out for the Honiara subprojects (05-20 Aug-22) and notices were issued throughout the subproject areas. Some 196 households were surveyed to provide information for the DED.

#### 5.1.2 Community consultations

360. Public notices (Plate 5.1 and Appendix 4), to inform the communities about the planned consultations were distributed and posted at the communities and locations for community consultations a week before the consultations.

#### Plate 5.1: Public information notices posted in the subproject area



- 361. Community consultations with small groups and residents within the subproject area were undertaken between 27-Oct-23 to 03-Nov-23. Ten communities and four market areas were invited to participate, however, some consultations were cancelled/postponed due to weather. Communities where consultations were carried out include Mt. Austen, Aekafo, Gilbert Camp, Papaho and Titinge 1, and the Vara Creek market area. During these consultations the following concerns were raised by the communities:
  - The earlier SW project only did service lines connections to some households and not all households
  - Older community standpipes were removed or decommissioned by SW are these to be replaced?
  - Water supply connection fees and tariffs imposed by SW are high and cannot be afforded by most households if SW could review the costs
  - Borehole south of SSEC Church at Gilbert Camp affects other sources of water (springs and streams) in the area
  - SW did not consult communities when water supply to Gilbert Camp community was cut off when the borehole was installed
  - Will there be compensation to households with existing structures on the water mains for replacement?
  - Length of time taken by SW to connect households to the water supply after payments have been made.
  - Requirements for water supply connection cannot be met by most households, SW to consider reviewing
  - Can local labor to be recruited from the communities for the subproject works?
  - Is SW also thinking about expanding sewerage systems in Honiara?
- 362. It was noted during the consultations that people and communities are very supportive of the project and would like to see improved and reliable water supply in Honiara and the areas. As Honiara is expanding and not only those households within the boundaries of Honiara want access to potable water.

Plate 5.2: Consultations at the communities



363. During implementation, SW through the PMU will continue meaningful public consultations, in accordance with the SEP, with both subproject affected persons and beneficiaries.

# 5.2 Information Disclosure

- 364. The SEP also sets out the procedures required to ensure that all project documents (provided they do not contain any commercially or other sensitive information) are disclosed to, and can be accessible by, the public. All safeguard documents, including semi-annual monitoring reports, are subject to public disclosure, and therefore will be made available to the public.
- 365. The semi-annual safeguards monitoring reports, prepared by SW-PMU, will be disclosed locally and on the ADB and WB websites. The approved CESMP developed by the contractor for the subproject will also be disclosed.
- 366. **Disclosure of the PER**. The PER documenting the impact assessment, mitigation measures and consultation process etc will be submitted to MECDM and will be available for a period of public review. Depending on the number and nature of submissions received, the MECDM may, or may hold a public hearing. The PER will be available to the public from the SW website. Following clearance of the PER by ADB, WB and the ECD, and issue of the development consent, the document will be posted on government and ADB and WB websites.

# 5.3 Grievance Redress Mechanism

- 367. In Solomon Islands, complaints about environmental performance of projects issued with a DC may be brought to the attention of ECD-MECDM. ECD is mandated by the Environment Act and Environment Regulations to monitor the projects issued with a DC and address concerns, complaints, and grievances of the public regarding project performance.
- 368. Implementation of all subprojects under the UWSSSP will be in accordance with SW's in-house GRM which was adapted to ensure compliance with ADB and WB requirements

shortly after the project commenced. It is required that any complaints and concerns of the affected people must be addressed promptly at no costs to the complainant and without retribution.

- 369. **Grievances for highly sensitive issues**. A single project GRM is used for both social and environmental grievances, however a separate mechanism will be required to handle any SEAH or GBV associated complaints or issues. Confidentiality is essential for capturing any grievances for highly sensitive cases that may arise in relation to GBV and/or SEAH. Such cases may also require anonymity on behalf of the victim/survivor, especially if the victim/survivor is a child, and complaints may be lodged through a third party on behalf of a victim/survivor.
- 370. Depending on the consent and/or preference of the victim/survivor, these cases may be directed to the police, as may be the result of criminal behavior, and the appropriate local support agency, without following the outlined steps of standard grievance resolution. While the grievance/complaint will be lodged in the GRM and SEP registers, **all correspondence related to the grievance must be kept confidentia**l and handled only by the person(s) designated as the focal(s) for the complaint.
- 371. The GRM and SEP register/database will reference the separate process for resolution and will only identify the responsible party for handling the complaint, for monitoring, reporting and learning purposes.
- 372. The ADB and WB will also be informed at lodgment of the grievance or complaint and will determine the process for handling the matter according to their guidelines<sup>5</sup>, requirements and accepted practice i.e. who the responsible parties within each institution will be, outline of the information to be reported to management<sup>6</sup>, whether an investigation is required and specialist investigators need to be recruited, reporting procedures, coordination with the police etc, and when the matter is closed.

# 5.3.1 Purpose of the GRM

- 373. The GRM is designed to deal with grievances from the public in relation to SW managed projects at all stages of the project cycle. To date, the GRM has been delivered in English. Awareness of the GRM has been made through consultations in English and Pidgin. Documentation is currently in English but can be provided in Pidgin in future.
- 374. The GRM will receive, evaluate, and facilitate the resolution of the affected people's concerns, complaints, and grievances about environmental and social performance at the subproject level. It will aim to resolve grievances and complaints in a timely and satisfactory manner. The detailed procedures of the GRM are set out in the SEP and will be disclosed to the public in the consultation meetings during the design phase of the subprojects before the start of and during the implementation of construction activities.
- 375. The mechanism allows affected parties to make known grievances as they arise and aims to provide a predictable, transparent, timely and credible process to all parties, resulting in outcomes that are fair, effective, and lasting. Inward communications to SW

<sup>&</sup>lt;sup>5</sup> ADB. 2023. Good Practice Note on Addressing SEAH in ADB-Financed Projects with Civil Works; and, WBG. 2022. ESF Good Practice Note: Addressing SEAH in Project Investment Financing involving Human Major Civil Works. Washington D.C, Unites States.

<sup>&</sup>lt;sup>6</sup> This is only to report that a SEAH or GBV related complaint has been received, the number, sex and age of people involved [alleged perpetrator(s) and victim(s)], and an outline of the process to resolve the matter, including whether an investigation is to be undertaken, it does not reveal any of the detailed nature of the complaint itself.

will be filtered at the initial query stage as being project specific or general enquiries by the customer relations team within SW. All external project communications and sites have project identifiers and unique names that allow customers to identify the potential project. Project specific queries will be dealt with confidentially by the community liaison officer (CLO) and a determination made as to the nature and whether a grievance need be raised. Generally, this will involve contacting the requestor.

- 376. The GRM will be highlighted to all employees of the contractor and shall be included in the site induction. Where third party agreements are reached with groups or individuals the GRM shall be highlighted, and the contact details of the SW Project Manager (PM) as well as the contractor will be communicated. It shall be noted that this is in addition to their rights under Solomon Islands Law which is applicable in all senses.
- 377. The SW PM for each subproject, as the delegated authority on the contracts, will be responsible for managing grievances within the PMU.

#### 5.3.2 SW's GRM process for the project

- 378. Prior to start of construction works, SW's PMU, ward representative, and the contractor will undertake the following in consultation with the communities:
  - Establish a first level GRM as described in this PER (contractor's responsibility), including the formation of the community advisory committees (CAC) as specified in the SW TOR and guidelines for CAC establishment
  - Implement the GRM as described in the SEP and this PER (PMU's responsibility)
  - Publicize the existence of the GRM through public awareness campaigns, billboards, public notifications, etc., and
  - Ensure that the names and contact numbers of representatives of the contractors, SW's PMU, the implementation consultants, and ward representative are placed on notice boards at the construction sites.
- 379. The SW GRM is a three-stage process during any stage of which the grievance may be considered, by both parties, to have been resolved and closed off. The grievance log information sheet associated with the GRM is provided as Appendix 3 of this document.
- 380. **Stage 1**. The CACs will be established to participate in the grievance redress process. All grievances will be made known to the SW PM in charge of the subproject being implemented. This may initially be verbally however a monitoring form must be prepared and signed off by the party raising the grievance support to filling in the form can be provided by SW to the aggrieved party. As per Section 5.3.3, many construction-related complaints will likely be resolved by the contractor, these will be communicated to the PM as being closed out.
- 381. On receipt of the grievance monitoring form (Appendix 3) the PM will hold a meeting with the aggrieved party to resolve the grievance within five working days of the grievance being raised. Following the discussion, the grievance may either be resolved or need to be escalated to Stage 2.
- 382. A Stage 1 grievance outcome form should be prepared by the PM confirming either:(i) the grievance has been resolved and the means of resolution; or (ii) the grievance has not been resolved; and outlining SW's position on the grievance.
- 383. The outcome form should be signed by both parties and a copy provided to the party raising the grievance. This form should include the next steps in the process if they consider the issue not to be resolved.
- 384. **Stage 2**. If the grievance is not resolved under Stage 1, the grievance should then be referred to the SW-General Manager (GM). The GM will be provided with the Stage 1 grievance outcome form and a meeting arranged with the aggrieved party within ten working days of issue of the form to discuss and try to resolve the grievance.
- 385. Based on the discussion the GM will issue a Stage 2 grievance outcome form confirming either: (i) the grievance has been resolved and the means of resolution; or (ii) the grievance has not been resolved and outlining the GM's position on the grievance.
- 386. The Stage 2 outcome form should be signed by both parties and a copy provided to the party raising the grievance. This should include next steps in the process if the issue has not been resolved.

- 387. **Stage 3**. If the grievance is not resolved under Stage 2 the grievance should then be referred to a three-member Grievance Tribunal<sup>7</sup> comprised of:
  - A member of the Board of SW.
  - The PS (or designate) of the MMERE; and,
  - Independent member selected by GM and Board Chairman.
- 388. All prior grievance outcome forms will be made available to the Tribunal; a meeting with the aggrieved party shall be held within ten working days of issue of the Stage 2 grievance outcome form. Within five working days of the Tribunal meeting a formal response will be issued to the aggrieved party outlining the Tribunal's decision on the grievance raised. The Tribunal's decision will be final.

# 5.3.3 Contractor's GRM

- 389. For each subproject, the contractor will be required to set out in their CESMP how they will implement the project's GRM in respect of issues and complaints raised in relation to construction activities. The contractor is required to recruit a community liaison officer (CLO) from the adjacent community. Concerns or complaints may be given either verbally or on a form to the contractor. These will be logged in the contractor's grievance register. The process will commence with an attempt to sort out the problem directly between the contractor and the complainant.
- 390. Most complaints arising during construction are expected to be minor concerning dust or noise, traffic congestion or access issues that should be able to be resolved quite easily. All complaints arriving at the contractor(s)'s site office are to be forwarded to the contractor(s) CLO and entered in the grievance register that is maintained by the contractor and kept at the site.
- 391. Details recorded will include date, name and contact address (unless the complainant wishes to be remain confidential), reason for the complaint, who registered the complaint, and eventually include the date and how the complaint was resolved (close-out date). A duplicate copy is given to the complainant for their record at the time of registering the complaint. The register will show when the issue is to be dealt with and who has been directed to deal with the complaint, the date that the complainant was informed of the decision and how the decision was conveyed to the complainant. The register is then signed off by the person who is responsible for the decision and dated accordingly.
- 392. If immediate resolution is achieved and the complainant is satisfied, the matter will be recorded in register and reported in the monthly report submitted to the PMU and considered closed. If an issue or a complaint cannot be resolved by the contractor then it will be referred to SW for resolution. The PM will log it in SW grievance register for tracking and reporting on resolution.
- 393. As experienced on phase 1 subprojects, most construction related complaints can be resolved by the contractor. Only those that are beyond their capacity to revolve are elevated to PMU. Nevertheless, all reported grievances are recorded and reported. The PMU will ensure to review the grievance register during site visits and inspections and confirm that SW's grievance register is up to date, including logging grievances from each subproject site (contractor's grievance register) and the stats of each complaint.

<sup>&</sup>lt;sup>7</sup> The composition of the Grievance Tribunal should ensure at least one member is female and where the complainant is female should consist of two female members and one member who is male.

# 6 Identification of Risks and Impacts

- 394. **Significance of impacts**: The anticipated environmental and social impacts of the project have been identified and their significance assessed. The duration of the impacts are assessed with reference to the project scope of works, the physical, biological and socioeconomic environment at the subproject site.
- 395. The subproject will create both usual/typical risks related to construction as well as site-specific impacts. The implementation of the subproject will involve pre-construction, construction and decommissioning of works followed by the operation of the facilities. During these phases there will be some potential disturbances to the physical, biological and social environment. Potential anticipated impacts from the activities are summarized in this chapter ensuring that it covers the appropriate mitigation measures specific to the HWMR subproject. Mitigation measures are designed to minimize each of the potential impacts to an acceptable level. The level of significance of residual impacts are identified.

# 6.1 **Pre-construction Impacts and Mitigation Measures**

- 396. During the design phase it is important to ensure that the proponent considers some vital components which must be addressed prior to the construction phase of the proposed sub-projects. This include: climate change vulnerability, updating of the ESMP based on the latest project design and components; integration of the ESMP and the DC conditions in the bid and contract document; update of the project SEP; grievance redress and management; identification of construction material sources, material extraction and application for BMP; biosecurity issues and potential for the introduction of invasive species of flora and fauna; identification of sensitive receptors; cultural resources identification; land access arrangements and unexploded ordnance (UXO) clearance.
- 397. All actions necessary to address preconstruction considerations that will be the responsibility of the contractor will be clearly identified in the tender documents and construction contract.

# 6.1.1 Climate risk and vulnerability

- 398. During the detailed design phase, it is important that the design sufficiently accommodates climate change vulnerability, projections, and effects by: (i) assessing the past and present climate trends and risks; (ii) assessing the future exposure to climate hazards and perturbations; (iii) assessing future sensitivity to climate change; and (iv) determining and projecting adaptive capacity to climate change. The climate change assessment identified the likely projected climate variables to be accommodated in the detailed design of the HWMR. Maximum flood levels were taken into consideration including the hydrology of the coast and coastal land area as well as the associated natural water ways in the subproject development areas.
- 399. Potential impacts on the streams and waterways flows and flooding including sea level rise will be accounted for and mitigated through design measures. No impacts are expected on associated marine and coastal habitats and their resources. However, minor impacts may occur during works at the Mataniko River, but these will be insignificant on habitats and resources.

Climate change	Potential risks and	Potential resilience	Complementary measures
Sea level rise	Rising sea levels and coastal erosion causes damage to water supply infrastructure. Saltwater intrusion into groundwater lens on low – lying and atoll islands.	Use non – corrosive materials. Use pumps to prevent saltwater intrusion. Find alternate and diverse sources of water. Desalination.	Demand side. Reduce pressure on coastal groundwater sources. Undertake regular water quality assessments.
Increase/decrease in rainfall	Water shortages. Water demand patterns may increase. Competition and conflict between different water users. Increased runoff can decrease water supplies by reduced infiltration into the groundwater.	There is a need to greatly improve both natural and artificial water storage, with an emphasis on smaller and more dispersed infrastructure. Improve water efficiency and water loss measures. Increase available resources.	Long term demand side management. Long term water availability studies and planning. Integrated multi – user assessments of supply needs. Intersectoral management of water resources. Ensuring groundwater recharge zones.
Cyclones	Damage to water infrastructure could undermine the quality and quantity of water	Design critical supply infrastructure for hazards	Contingency planning
Earthquake	Damage to water infrastructure could undermine the quality and quantity of water.	Design critical supply infrastructure for hazards.	Emergency water supplies planned.

Table 6.1: Summar	y of climate chang	e risks for water	resources and	infrastructure
	,			

Source: SW 30-Year Strategic Plan (2017)

- 400. The HWMR project will not create any impacts on rainfall or groundwater or create carbon emissions that could induce climate change. Changes in the intensity of extreme weather events as well as gradual changes in climate parameters such as precipitation may affect the existing and proposed water supply systems. Flooding hazard could affect the structural integrity of the proposed structures and may prevent the system from operating effectively, resulting to failure in delivering the required services. Flooding effects could also be compounded by the effects of sea level rise. Consequently, the need for climate change resilience must be addressed since Honiara is vulnerable to the effects of intense rainfall. Some sections of the mains are at medium to high vulnerability risk to flash floods and riverine floods and since Honiara is in a medium cyclone area the project is at moderate risks to tropical cyclone and earthquake.
- 401. To address the need for climate change resilience hydrology and flooding impacts as well as climate change impacts on the proposed project sites, the summary of impacts and resilience measures shall be considered in the detailed designs considering findings of previous studies undertaken for the UWSSSP and other studies and information for Honiara provided by MECDM. The DED report confirms that flooding studies, including 100-year flood events, have provided information to site the proposed facilities outside of exposed areas.
- 402. In addition to the design specifications, climate proofing measures for water supply projects are shown in Table 6.2.

Component	Climate-proofing measures	
Water supply	<ul> <li>Demand-side management with a view of decreasing water demand including reduction of nonrevenue water.</li> <li>Water metering and water tariffs (which can contribute to reducing water demand)</li> <li>Low water use application</li> <li>Diversification of water sources</li> <li>Enhancing storage capacity</li> <li>Aquifer recharge using recycled water</li> <li>Relocation of flooded infrastructure</li> <li>Impounding reservoir to store freshwater</li> </ul>	
Water treatment and quality	<ul> <li>Protection of the water source</li> <li>Integrated water resources management</li> <li>Prevention of saltwater intrusion into coastal zones</li> </ul>	
Water distribution	<ul> <li>Adjustment to operation below design capacity</li> <li>Undertake measures to address NRW to improve water security and reduce system losses</li> </ul>	

#### 6.1.2 Preparing tender documents and the CESMP

- 403. **Finalizing the PER and application for development consent**. The detailed design has been undertaken, reflecting the findings and recommendations of the draft technical studies and due diligence processes in respect of E&S risk avoidance or mitigation. Following a period of review and disclosure the PER will be finalized.<sup>8</sup> The PER will be used in support of the DC application to be made by SW. As noted in Section 2.1, SW has started the process and submitted the screening forms. The ECD has determined that under the CSS an EIS is not required for the subproject and a PER will be sufficient. The ADB and WB will accept the PER as equivalent to the assessment required under each of their safeguard policies and requirements.
- 404. **Tender and contract documents**. The SW will ensure that the finalized PER is incorporated into the bid and contract documents. Usually the project's clearance under the CSS (in this case the DC) would be attached to the bid documents. As it is likely that the subproject will go to market before the DC has been granted by the ECD, the bid documents will require a clear statement to the effect that the SW is in the process of applying for DC, and the contractor(s) will be required to construct the project in compliance with any and all conditions of the DC once it is issued.
- 405. The bid and contract documents will also clearly identify the need for the contractor to manage the risks around sourcing and supply of construction materials (see also Section 6.1.3). The bid documents will specify the project ESM requirements such as: (i) all mitigation and management measures identified in the PER and ESMP be incorporated into the plans to be developed by the contractor; (ii) contractor to engage a suitably qualified ESM specialist and OHS specialist to prepare the CESMP and sub-plans; (iii) the contractor designating a full-time environmental management officer (EMO) and health and safety officer (HSO) and deputy EMO and HSO and recruiting a CLO from the local community and the reporting/communication lines and channels; (iv) the monitoring and reporting requirements; and (v) delivery of induction, training and awareness sessions for workers and the community.

<sup>&</sup>lt;sup>8</sup> The finalization of the PER will address any comments or concerns raised during the public disclosure period.

- 406. **Completing the baseline and identifying sensitive receptors**. The project impact areas are those covered by the subproject and important sensitive areas shall be identified, recorded, and located during the design. These include residential areas, schools, churches, and clinics/ hospital as well as rivers, streams or springs or habitats of endangered and endemic flora and fauna species. The main trunks will be installed in existing pipe route areas which are in Honiara urban residential areas and will pass through the Mataniko River at Area 8 and a stream at Area 15 and 17. These areas have been developed and the river and stream are contaminated with anthropogenic wastes.
- 407. To avoid or mitigate the impacts during the construction phase, the residents and the responsible authorities has been informed during the detailed design phase about the impacts of the proposed development. Also, a schedule of the activities that will be undertaken during the construction and the impacts expected shall be presented to the affected people prior to commencement of works by the SW-PMU and the contractor.
- 408. Provided that the sensitive receptors are identified, and the plans are prepared, reviewed, implemented, and monitored for effectiveness, the impact should be low given the sites are located in a highly developed urban setting.
- 409. The contractor will undertake the noise and vibration baselines, and any traffic studies required, to develop the subplans that will form part of the CESMP.
- 410. **Development, submission and review of the CESMP**. Prior to any works commencing, including site establishment, clearance for surveys and investigations, associated laydown or materials stockpile areas or quarries, the contractor will prepare and submit the CESMP to the SW-PMU. The CESMP will be based on the project ESMP and detail the construction methodology and program to be undertaken, identify the risks associated with the contractor(s)'s specific work method statements, construction schedule/program and approach and detail mitigation measures to avoid or reduce the risks.
- 411. The CESMP will be developed by the environmental and OHS specialists engaged by the contractor. The CESMP will comply with the EHSG and other GIP in addition to any requirements of the CSS. The CESMP will include, as a minimum, a brief introduction to the project and the ESM performance standards with which it will comply; organizational structure and roles and responsibilities for ESM; worker code of conduct and measures to prevent sexual exploitation, abuse and harassment (SEAH), gender-based violence (GBV) and violence against children (VAC) (further described in Section 6.1.7); conduct of noise baseline and identification of sensitive rectors; risk assessment (or similar methodology); sub-plans and site-specific plans to address the risks and impacts including traffic management plan (TMP), water resources management plan, health and safety plan (HSP), erosion and sediment control plan, waste management plan, hazardous materials management plan, noise and dust control plan, biodiversity management requirements, materials sourcing and extraction plan, and a chance finds procedure. The CESMP will include a training and capacity development plan.
- 412. The CESMP will also include sections on how the contractor will meet the requirements of the SEP and GRM, and monitoring and reporting. Proposed checklists will be included in the annexes.
- 413. The HSP will be required to address both community and worker health and safety risks. The HSP will be based on completion of a project level risk assessment, and development of standard operating procedures and training packages for any high and catastrophic hazard activities.

- 414. The CESMP including its sub-plans, site-specific plans, work method statements, construction methodology for all key elements of the project, and will be submitted for review by SW-PMU, ADB and WB. Once the plan is satisfactory the SW will approve it in writing.
- 415. No construction activities (including any site establishment or clearance and grubbing activities) may commence prior to the contractor receiving notification of CESMP approval by the SW.
- 416. Once works commence, the EMO and HSO will conduct monitoring of compliance of activities with the approved CESMP and the PMU and CSC will undertake inspections and audits of the effectiveness of the contractor's implementation of the approved CESMP. The PMU and CSC will devise the checklist to be used for the inspections and audits and will consolidate the inspection/audit findings along with summaries of the contractor's monthly reporting. ADB will undertake review missions which will report on, inter alia, overall implementation of environmental safeguard requirements.
- 417. As early as practicable after commencement, the project will establish the GRM to address concerns and resolve complaints and issues raised on any aspect of project implementation (refer also to Section 5). Safeguards concerns will be addressed through the GRM. The CESMP will outline how the contractor will implement the relevant elements of the GRM and how and when they will provide information about construction activities and timing to the community. The contractor will be expected to provide information about the works, impacts and mitigation/control measures to the community in a timely and effective manner. The contractor's liaison and communication with the community, managed by the CLO, will be guided by the project's CPP. Workers and sub-contractors will be inducted to the site, and this will include awareness and training on the provisions and requirements of the CESMP and how it is to be implemented.
- 418. Procurement of consultants and equipment and plant for the project will comply with the prohibited investment activities list in the SPS.
- 419. Once works commence, the EMP and HSO will conduct monitoring of compliance of activities with the approved CESMP and the PMU will undertake inspections and audits of effectiveness of the contractor's implementation of the approved CESMP. The PMU will devise the checklist to be used for the inspections and audits and will consolidate the inspection/audit findings along with summaries of the contractor's monthly reporting. WB and ADB will undertake review missions which will report on, inter alia, overall implementation of environmental safeguard requirements.
- 420. Workers and subcontractors will be inducted to the site, and this will include awareness and training on the provisions and requirements of the CESMP and how it is to be implemented.
- 421. Section 7.3 provides the details for development of the CESMP.

#### 6.1.3 Sourcing construction materials

- 422. **Audit of existing suppliers**. Construction activities for the subproject will require soil, sand, aggregate/gravel and rocks. Materials will be crushed to required sizes according the engineering specification.
- 423. It is assumed that most of the construction materials can be supplied locally by existing suppliers. The contractor will be required to obtain these from an approved or

licensed supplier operating with required government permits such as a BMP from the MMERE and the DC from the ECD.

- 424. The contractor will undertake an E&S audit of the proposed suppliers verifying the permits and DC are valid, being complied with and operations are undertaken in accordance with GIP. The audit will be documented in the materials management plan (MMP) to be developed by the contractor as part of their CESMP.
- 425. **Opening of new sources**. In the event that the contractor cannot obtain a suitable volume and quality of materials from existing suppliers and they need to open a new source, they will seek approval to do so from SW.
- 426. Removal of river gravel for construction materials has the potential to interfere with aquatic ecology and hydrological conditions. Depending on the size of the river, rate of recharge, volume of material to be extracted, and where the material is to be obtained from, removal of gravel could affect riverbed and/or channel morphology including river widening and increased flow speeds causing bank instability or erosion. Therefore, sources other than new river extraction will be preferred.
- 427. Once the site for a source has been approved by the SW, the contractor will be required to obtain permission from the resource owners and undertake due diligence and consent and permit applications as required by the ECD and MMERE. The due diligence (E&S assessment and MMP to be included in CESMP) will be cleared by the PMU (and ADB and WB) prior to submission of documents including submission of applications etc to ECD or MMERE. As a minimum, the due diligence will address the issues set out in Table 6.3.

Торіс	Issues and matters to be addressed
CSS compliance and	Development consent and materials (mining/quarrying) permit
ADB and WBG	Process for due diligence (incl. consultations)
requirements	Identification of CSS, ADB and WB requirements
Air avality	
Air quality	Closest sensitive receptors
Topography and	Stability of site before, during and post materials extraction
deology and	Earthworks required
geology	Disposal sites
Ecology	Ecological values – terrestrial and aquatic
	Flora and fauna, species of interest, protection measures
	Confirmation of no impact on protected areas (including KBA or IBA)
Access	Agreements with resource owners
	Access between extraction sites and processing/work sites
	Transport routes
	Links to traffic management plan (haulage routes etc)
Community	Influx of workers
	Identify affected communities and acceptable performance levels (noise, dust,
	vibration, traffic, visual impacts, safety etc)
Health and safety	Adjacent communities
	workers (including drivers or trucks nauling materials)
Archaeology/physical	Risks to cultural/heritage items
cultural resources	Link to chance find procedures

#### Table 6.3: Matters to be addressed in materials extraction due diligence

428. As part of the due diligence, the contractor will be required to prepare a materials extraction plan(s) as part of the MMP which will include:

- Process for negotiation and consultation with resource owners (including the affected community and customary titleholders etc.)
- Payment of royalties
- E&S assessment covering the effects of extraction (see Table 6.3)
- A site development and extraction plan that shows the mining area, extent of overburden removal, and location of stockpile areas
- ESM measures such as cut-off drains, and siltation ponds, among other requirements and controls
- Health and safety measures, equipment including emergency facilities and equipment
- Protocols and arrangements for blasting (if required)
- Guidelines for vegetation removal, including a prior vegetation and habitat survey plan agreed and approved by the PMU, indicating vegetation and trees to be retained, and vegetation to be removed
- Overburden stripping and dust suppression, and
- Remediation of extraction sites and rehabilitation plan.
- 429. **Disposal of spoil**. The MMP will also cover the stockpiling and disposal of material and spoil. Construction activities of subprojects have the potential to generate excess excavation materials for the installation of water supply pipelines and other structures.
- 430. Improper disposal of excavation spoils can be avoided by addressing the issue prior to the start of construction activities. The PMU will require the contractor to submit a plan for the disposal of excess excavation spoils; and undertake inspection and approval of the contractor's suggested disposal sites prior to actual construction.
- 431. **Mitigation measures**. To mitigate the impacts of any new extraction site, quarries or borrow pits, the following will be implemented:
  - Any area or site identified as being part of a marine, coastal or terrestrial protected area (including the buffer zone of a protected area), a proposed protected area, or having conservation value, being habitat for rare or endangered aquatic or terrestrial species or birds, comprising part of the intertidal zone, comprising swamp or wetland, or including mangroves, will not be permitted to be used as sources of construction material
  - Estuarine, beach or coastal areas will not be permitted as areas of extraction for the project. The extraction or mining of reef rock for the project will not be permitted
  - Extraction from rivers/ streams will only be approved if there are no suitable land-based alternative sources
  - The contractor will undertake the requisite due diligence, apply for DC, BMP and any other permits as required, and prepare the MMP for review and approval by the PMU (including review by ADB and WB) before any extraction works (including site establishment and clearance etc) are undertaken
  - Access to extraction sites will be negotiated with resource owners and users, if an access is purposely built, should the owner not want to keep the access, the contractor will be responsible for reinstating the land to its pre-project condition

- Limits to the volume of material extracted from any one source will be set considering the ability of the source to regenerate and likely environmental impact as a result of the extraction
- Use of approved machinery for rock winning and gravel extraction (from areas and sources approved by the Engineer) such as excavator or backhoe. Dredging or similar operations will not be permitted
- Extraction activities adjacent to rivers will be managed through installation of a sediment settling pond to avoid a plume of disturbed water dissipating into the river and/or the use of a bund to prevent direct runoff
- Maximum volumes and rates of extraction will be governed by the extraction plan approved as part of the MMP
- Any extraction sites and borrow pit areas close to roads will be located at least 50m outside the right-of-way of roads, extraction from the sides of roads in a way that could undermine the roads will not be permitted
- Any topsoil excavated from sites and borrow pit areas will be saved and reused in re-vegetating the sites and pits to the satisfaction of the MMERE and SW-PMU
- Additional extraction sites and/or borrow pits will not be opened without the restoration of those areas no longer in use
- The excavation and restoration of sites and borrow pit areas, as well as their immediate surroundings, will be undertaken in an environmentally sound manner to the satisfaction of the ECD, MMERE and SW-PMU. Sign-off to this effect by PMU will be required before final acceptance and payment under the terms of the contract, and
- Site and borrow pit restoration will follow the completion of works in full compliance with all applicable standards and specifications.
- 432. The MMP will be prepared by the contractor during the mobilization phase (when quantities and type of materials have been specified) and will identify sources of materials. The draft due diligence and/or the MMP are to be submitted to SW-PMU (and development partners) for review prior to submission to MMERE and ECD as part of applications for clearance under the CSS. The PMU will monitor implementation of the MMP.
- 433. **Residual risk**. Provided the contractor implements the measures, and the measures are effective, the residual risk will be low for use of existing suppliers and moderate for opening a new source.

# 6.1.4 Unexploded ordnance

434. Technically WWII ordnance found in the Pacific Islands can be defined as either unexploded ordnance (UXO) or abandoned explosive ordnance.<sup>9</sup> Solomon Islands was the scene of many battles during World War II. While this was over 60 years ago, UXO is still being found around the country.

<sup>&</sup>lt;sup>9</sup> UXO is defined as explosive ordnance that has been primed, fused, armed, or otherwise prepared for use in armed conflict but has failed to explode. Abandoned explosive ordnance (AXO) is defined as explosive ordnance unused during an armed conflict and subsequently abandoned or left behind. UXO and AXO are defined collectively as explosive remnants of war.

- 435. Prior to commencing physical works the contractor will undertake a UXO survey in accordance with the existing procedures. Should UXO be discovered within the subproject site, the contractor is to immediately cordon off the area, arrange the evacuation of nearby residences and inform relevant division within the Royal Solomon Island Police Force (RSIPF) to remove the UXO. All UXO finds are reported to the RSIPF who arrange the collection, transport, storage, and ultimate disposal of the finds.
- 436. The contractor will include a chance UXO find procedure in their CESMP.

#### 6.1.5 Land access arrangements

- 437. For the HWMR, the subproject will utilize the existing road and/or SW pipeline easements for replacement of existing pipes and this will avoid, or at least minimize, the need for land acquisition and will not necessitate any involuntary resettlement.
- 438. The works will involve the removal of some trees, plants and relocation of some roadside structures. These impacts will be compensated, as per the LARF and as set out in the land due diligence report prepared for the project. There will also be need for temporary use, access or occupation of some areas of easement crossing private land. Prior to access, SW-PMU and the contractor's CLO will consult with the landowner to discuss and agree the duration and terms of any occupation required during the construction period.
- 439. Should any additional requirement for permanent access arise during the construction phase, the process will be governed by the LARF and as appropriate a resettlement plan or land due diligence report will be prepared and implemented, prior to access to the land being granted to the contractor.
- 440. **Residual risk**. Provided that the land due diligence report is implemented fully prior to commencement of any physical works, the residual risk will be low.

#### 6.1.6 Biosecurity

- 441. The mobilization of construction machinery/equipment and materials from a source country may result in the spread of existing invasive or alien species or accidental introduction of soil-borne weeds, pests and/or pathogens becoming established in Solomon Islands and/or on Guadalcanal including in adjacent river/stream and coastal environments within the subproject area. All construction machinery and equipment must be imported following the requirements of Biosecurity Solomon Islands who will issue a phytosanitary certificate, be steam cleaned and all organic material must be removed in the source country prior to deployment with an appropriate approved phyto-sanitary certificate issued supported by any other documentation required under Solomon Islands legislation.
- 442. **Mitigation measures**. The contractor will be required to conduct a risk assessment and prepare and implement an IAS management plan (ISMP) demonstrating how they will follow the procedures and requirements identified in Biosecurity Act 2013 (and its 2015 regulations), the IUCN *Guidelines for Invasive Species Management on Islands* (2018) and the six factsheets produced by Pacific Community's Regional Biosecurity Information

Facility<sup>10</sup> "Sending safe aid without harmful pests and diseases". The ISMP should include but not be limited to the following:

- An assessment of extant invasive species that could be favored, and increase in abundance, due to the project
- An assessment of invasive species not present, which are at risk of introduction due to the project (e.g. accidental introduction via construction equipment or materials
- Pre-construction management, if required based on the above assessments, to reduce risk of introduction and or proliferation, including timing and responsibility e.g. wash bays for construction machinery, staff biosecurity briefings
- Management during construction, including rapid revegetation of bared surfaces, and
- Monitoring during construction and operation to allow biosecurity risks to be identified and addressed.
- 443. **Residual risk**. Provided the contractor prepares and implements the measures, and the measures are effective, the residual biosecurity risk will be low-medium.

# 6.1.7 Risks associated with SEAH and GBV

- 444. The subproject will likely be tendered as an international procurement, even locally based international firms will still need to mobilize a certain number of foreign workers (if not entire subproject labor-force) to deliver the subproject on schedule. Mobilization of workers to an area will create a range of risks and impacts (discussed in detail in Section 6.4) including risks of SEAH, GBV and VAC.
- 445. The objectives of the ADB and WB standards and guidance on prevention of SEAH is that all project-affected populations, employees of executing and implementing agencies, and contractors working on projects financed or administered by ADB and/or WBG should feel safe from SEAH. During the 2018 *Safeguarding Summit on tackling SEAH* in the international aid sector, ten IFI, including ADB and WB, reaffirmed their commitment to preventing SEAH through the following seven principles:<sup>11</sup>
  - Foster a culture of respect and high standards of ethical behavior across institutions
  - Establish and maintain standards aimed at preventing sexual harassment, abuse, and exploitation and other forms of misconduct
  - Provide a safe and trusted environment for those affected by sexual harassment, abuse, and exploitation to step forward to report incidents and concerns, with the assurance that they will be treated respectfully and consistently

<sup>&</sup>lt;sup>10</sup> This program creates a regional biosecurity platform that ensures all member states are compliant with the latest biosecurity laws, in line with international standards. It is tasked to build the capacity of national biosecurity authorities, enabling the implementation of pre-border, border and post-border measures designed to combat transboundary pests and diseases that threaten the Pacific's flora and fauna and livelihoods.

<sup>&</sup>lt;sup>11</sup> 2018. IFI Update on the Joint Statement on Continuous Advancement of Standards to Prevent Sexual Harassment, Abuse, and Exploitation.

- Provide protection for those affected, as well as whistle-blowers and/or witnesses within their institutions, and take appropriate measures against any form of retaliation
- Maintain robust policy frameworks and clear institutional mechanisms that address how incidents and allegations will be handled should they arise
- Provide effective training programs so all staff understand the requirements and standards of behavior expected of them as international civil servants, and
- Support clients to develop and implement policies and mechanisms that address sexual harassment, abuse, and exploitation.
- 446. While executing and implementing agencies carry the project-wide responsibility for incorporating and monitoring of SEAH, GBV and VAC prevention, mitigation, and response measures, the civil works contractors are ultimately responsible for preventing, mitigating, and responding to SEAH and GBV risks for communities and workers. Within the PMU the PM/Engineer is responsible for ensuring that SEAH, GBV and VAC risks are properly addressed.
- 447. The CESMP will include any organizational SEAH policies of the contractor, worker code of conduct (WCOC) to be developed and included in the individual employee contracts, mechanisms for reporting and handling complaints, risk management, and leadership and accountability. The WCOC will establish the "rules" which will govern the conduct of all workers while they are at the site (including workers' accommodation) for the period of the contract. The WCOC will raise awareness about Solomon Island cultural for foreign workers and establish the expected behavior around women, children, and in communities, as well as the GRM and how complaints are to be handled. The WCOC will outline the restrictions and/or prohibitions to be implemented including on fraternization between workers and community members, drug and alcohol consumption, as well as on hunting, fishing, trapping, poaching, or killing any wildlife.
- 448. The contractor will be required to take appropriate action for employees or subcontractors, including suspension or termination of employment or contract, if any form of unethical or inappropriate behavior is identified. The contractor will provide training on the WLMP and WCOC to raise awareness on and prevent any form of bullying, misconduct, discrimination, or SEAH and promote respectful work environment. The contractor will keep records of the training and include details in the monthly reports.
- 449. **Mitigation measures**. To address the risk of SEAH, GBV and VAC, the following measures will be implemented:
  - The tender documents for each subproject will clearly set out the contractor's roles and responsibilities for preventing and/or addressing SEAH rand GBV risks
  - The contractor will develop and implement the WCOC. The WCOC will be written in plain language and signed by each worker to indicate that they have:
    - received a copy of the WCOC
    - had the code explained to them and they understand their obligations under the WCOC
    - > acknowledged that adherence to WCOC is a condition of employment

- understood that violations of the WCOC can result in serious consequences, up to and including dismissal, or referral to legal authorities, and
- undertaken the prerequisite training prior to commencing work on any site.
- The WCOC will prohibit all forms of SEAH, GBV and VAC and require all personnel participate in regular training and awareness raising activities
- SW and contractor(s) will develop, separate from the GRM, a comprehensive reporting system for managing and addressing issues related to SEAH and/or GBV. The system will include the option of anonymous reporting and whistleblowing. The system will be accessible to workers and community members who come into contact with contractor staff and workers
- For any SEAH or GBV related complaint, cases will not be handled by the CLO but will be reported immediately to the PMU who will advise ADB and WB (in case additional support is required) and refer the complaint (or survivor if the complaint is made on behalf of another person) to the Family Support Centre (in Honiara) and seek permission from the complainant and/or survivor to report the matter to the relevant police department. The PMU will notify ADB and WB (as per below) and determine, in coordination with ADB and WB the nature of investigation into the matter. Confidentiality will be assured in SEAH and GBV matters and the response will be survivor-focused to ensure they receive support and counselling as needed
- All incidents of SEAH reported to contractors should be reported to the SW via the PMU within 24 hours of the contractor receiving the report. The SW will inform ADB and WBG\ about all reported incidents of SEAH within 24 hours of receiving them from the contractor
- Contractors will be responsible for ensuring that subcontractors and suppliers comply with the SEAH prevention requirements set out in the PER's ESMP, and integrated into the approved CESMP
- In all monthly, quarterly and semi-annual and other project reports, the SW-PMU and contractor(s) should make a declaration that affirms that all allegations of SEAH have been reported and handled in accordance with the procedures and practices for case handling, agreed for the project
- Depending on the number and nature of SEAH incidents, SW, with support from the project, may hire an SEAH expert to handle incidents and reporting (subject to internal capacity), and
- The contractor(s) will be expected to identify lessons learned from each case reported and improve their prevention, mitigation, and response to SEAH accordingly within six months of case closure.
- 450. **Residual risk**. If managed as required by the PER and ESMP (and approved CESMP including the WCOC), the risk of SEAH will be moderate-high, based on previous experience with these type of projects, and requires monitoring by SW, ADB and WB.

# 6.2 Construction Stage Impacts on Physical Environment

- 451. **Overview**. This section will mainly entail the impacts and mitigation measures to be implemented during the construction phase of the water mains rehabilitation and improvement works. The construction phases of the project might result in several environmental, physical, and social aspects that are identified in this section. Activities that have been perceived as potential sources of impact are also discussed. These impacts may create temporary hazards of moderate significance to the subproject area during the project construction phase. However, if managed properly these activities will not pose any serious threat to the environment and its surroundings.
- 452. Considerations during this phase are mainly on site access and clearance disruption to other utilities (power and communication cables); soil erosion and sedimentation control; disposal of excavation spoils; oil and hazardous materials management; dust control; site waste management including demolition; construction noise and vibration; traffic management; community and occupational health and safety; potential social issues due to influx of workers; potential damage to cultural assets; and the decommissioning of existing mains.
- 453. The contractor will be required to implement their approved CESMP. The main responsibilities for mitigation during the construction phase of the project rest with the contractor appointed for the works while monitoring of the implementation of the mitigation measures is the responsibility of SW-PMU.

## 6.2.1 Earthworks: Localized air pollution, dust and vibration

- 454. The quality of air in the subproject area is typical of a residential area in an urban setting in the Solomon Island and is of good quality due to the limited and small-scale industry and relatively small vehicle fleet. Emissions from the vehicle fleet are generated by cars, small passenger vans and trucks, mini-buses, and trucks (construction vehicles). The dominant foreshore breeze and influx of southeasterly winds disperse locally polluted air. Dust levels vary throughout the project site dependent on existing conditions, traffic level and recent rainfall.
- 455. During construction, air pollution in the form of dust from earthworks and vehicle emissions will increase. Deterioration of air quality during pre-construction and construction works can be due to the following: (i) dust emissions during earthwork and from stockpiles; (ii) dust from loading, transportation and unloading of soil and other friable materials; (iii) emissions from operation of construction machinery, crushing plant, concrete batching plant, etc.; and (iv) dust and emissions from onsite and offsite traffic, vehicles moving across unpaved or dusty surfaces.
- 456. Dust is a problem for a variety of reasons, including:
  - Inconvenience to local people, including re-wash of laundry put outdoors to dry, re-wash of windows, curtains and vehicles. Dust can contaminate food left in the open air in homes and shops and be ingested during meals.
  - Health and safety. Dust may affect health by irritating eyes and worsening the health of people with bronchial conditions (e.g. asthma). Dust can reduce visibility for drivers on roads, creating a road safety issue.
  - Crop damage. Even low concentrations of dust can affect plant and fruit growth. Plant growth is particularly susceptible to dusts that are highly alkaline, for example limestone and cement dust. Dust deposited during light rainfall can cause the soil surface to form a crust increasing run-off.

- Impact on ecology. Dust blowing onto watercourses may damage ecology by increasing sedimentation, reducing sunlight and suffocating marine fauna. It may also affect plant growth and change the species of plants growing in an area.
- Damage to plant and equipment. Within the construction site, dust can cause mechanical or electrical problems in sensitive equipment, such as computers. It can also increase abrasion of moving parts in equipment and clogging of air filters.
- 457. The amounts of vehicle-emitted pollutants will depend on the technical condition of the contractor's vehicles, fuel quality and travel speed. Older vehicles usually have lower fuel consumption efficiency and cause higher emissions of combustion by-products. Increasing speed of the vehicle demands higher fuel supply and therefore results in larger amounts of emitted pollutants. The contractor should pay attention to the age and status of technical maintenance of vehicles/machinery used during construction.
- 458. The scale of dust and exhaust emissions related impacts will depend on the prevailing wind direction in the project area, traffic speed and the status of technical maintenance of the vehicles/machinery and organization of works.
- 459. **Mitigation measures**. Dust-suppression measures aimed at prevention of air pollution will include watering of construction access roads, site roads and construction sites. Regular water spraying and enforcement of reasonable vehicle speeds during construction will alleviate dust impacts. The capacity of available water supplies will need to be checked to confirm sufficient water is available for watering, and that existing supplies used by downstream users will not be adversely affected. It will also need to comply with the measures in the water management plan. Dust at construction sites will be minimized by using closed / covered trucks for transportation of construction materials (especially loose construction materials such as gravel, sand, soil, etc.) and debris.
- 460. The general requirements for air quality mitigation are identified in the ESMP section of this PER. The precise mechanisms will be identified in the CESMP but will include the following management plans: dust and vibration control plan (NVCP), water resources management plan, waste management plan (WMP), and the TMP.
- 461. Additionally, location specific mitigation measures will be covered by the required plans for these operations, including: (i) laydown and camp management plan; (ii) concrete production management plans (if required); (iii) construction plans and method statements; and (iv) method statements for temporary activities. These method statements will include sections relating to the management of air quality, including dust control. The method statements will be reviewed by the contractor's EMO before submittal to the PMU and supervising engineer for review and approval. All method statements must be prepared and approved before any works can start in the planned areas. The method statements shall also include a record of consultations undertaken with all neighboring land users including their agreements for the use of these areas.
- 462. Other measures planned to maintain good air quality include locating crushing plants, concrete mixing sites and stockpiles at least 1 km from sensitive receptors, as well as confining working vehicles to designated routes away from sensitive receptors. Stockpiles will be covered or dampened if local conditions (e.g. strong winds) give rise to significant dust emissions. All plant will be maintained in good working order, including any dust suppression / collection equipment (filters, etc.) that is fitted.

463. **Residual risk**. The post mitigation risk is assessed as low, and the effect is not considered significant.

## 6.2.2 Earthworks: Soil erosion and sedimentation

- 464. There is potential for works to create increased erosion and sedimentation in the area of works and into the surrounding environments via runoff to natural and existing drainage systems. Potential sources of erosion and sedimentation runoff are vegetation clearance, excavations, and stockpiles of aggregates, ground leveling and pipe laying.
- 465. During construction, excavated areas will need to be assessed for soil erosion potential and protection arranged as necessary to avoid discharge or sediment into watercourses and onto adjoining areas including the worksite.
- 466. Large expanses of open ground (site establishment, excavations and embankments) are not visually attractive and can lead to high volumes of silt laden run-off impacting on the existing streams and the aquatic ecology and communities downstream. When undertaking earth works and levelling areas anti-erosive measures should be implemented, and speedy re-cultivation should be followed to stabilize the soil. This can include: (i) directing upslope clean water around construction areas so that it does not become contaminated by earth and forming a silty runoff; and (ii) collecting downslope discharges and filtering / settling them before they enter the waterbody.
- 467. During construction period, there will be potential impact on the quality of river (Mataniko) and stream crossings temporarily due to a temporary increase in suspended sediments (SS). The issue with the SS will likely be more prevalent in the immediate area of works but may gradually improve further downstream as the sediments settle onto the riverbed.
- 468. The contractor will be required to install sediment or silt traps, and clean water diversion bunds should be constructed around any excavation or cleared vegetation to prevent the ingress of runoff from surrounding areas or prevent runoff from the work area to dissipate into the surrounding environment. Any ponding which may occur within an excavated area shall either be allowed to percolate into the subsoil or pumped out to a settling pond or used for dust suppression. Excavations should be kept to a manageable size to reduce the time of exposure.
- 469. Sediment basins and other sediment controls devices shall be operated and maintained in a manner that minimizes the risk of environmental harm. The sediment storage zone shall be always maintained with the accumulated sediment removed in a manner that does not allow the sediment to be conveyed into a watercourse or offsite. Where coagulants or flocculants are used to treat stormwater, they must not cause harm to the receiving waters or environment.
- 470. Any stockpiles will need to be on an impermeable geotextile or hardstand surface and runoff directed to permeable land. Stockpiles of any fine-grain materials (e.g., sand and topsoil) must be covered with silt traps installed around it to prevent dust and sediment-laden runoff during rain events.
- 471. As part of CESMP the contractor will develop a specific soil erosion and sedimentation/runoff control plan (SECP) to manage topsoil and minimize fine sediment generated from the construction process entering watercourses and manage turbidity for in-stream works. Soil erosion and sediment control may include (but is not limited to)

windrows of logging slash, rock berms, sediment catchment basins, straw bales, sediment/silt fences and/or booms, etc. Specific processes include:

- Office, works yard and compound areas a storm water drainage system is required to discharge all surface run off from the camp site to a silt retention pond. Silt ponds shall be maintained in an efficient condition for use throughout the construction period with trapped silt and soil particles being regularly removed and transported to an approved disposal location to maintain settlement efficiency
- Construction areas clean water from upstream of a construction area shall be directed around the construction areas or disturbed areas with ditches, berms, check structures, live grass barriers, or rock as required.
- Any silty material generated within the construction areas or disturbed area shall be contained by ditches, berms, check structures, live grass barriers, or rock and directed to settlement ponds before discharge. Settlement ponds shall be regularly emptied of accumulated silt to an approved disposal location to maintain settlement efficiency
- Stockpiles slopes will not exceed a horizontal to vertical ratio of 5H:1V, and will be surrounded by sediment control structures, such as deeply anchored sediment fences, ditches, or berms around the stockpile.
- Water quality and habitat monitoring, and the supervision and monitoring of erosion and sediment control measures during construction, will assist with identifying and responding to the risks associated with sediment discharges.

472. **Mitigation measures**. The contractor will be required to implement the following measures:

- Schedule excavation activities nearest to the waterbodies and coastal marine area during the drier months of the year (June October), where practicable
- Establish erosion and sediment controls, such as silt fences on land, and silt curtains in watercourses and the coastal marine area, and site drainage such that runoff is directed to sediment traps that is adequately sized for a heavy rainfall (1 in 100-year rainfall event) before discharge to watercourses. This should include installation of cut-off drains above excavated areas on steep slopes to reduce erosion
- Temporary construction working areas that require clearing will be clearly demarcated on the ground, using marker posts at regular intervals. The contractor will take measures to ensure the construction works are restricted to the demarcated construction working areas.
- During land clearing operations, topsoil will be collected, preserved, stored using good practice measures, and reused as a base for turfing of embankment slopes or development of barren areas.
- After completion of construction areas of temporary works shall be restored to a standard that is of equal quality to its original condition. Plant species that are native to the project area shall be used
- Consider the timing of works with regards to seasons and tides so that sediment generation and potential sediment transport is minimized

 The need for on-site environmental action to minimize soil erosion are identified in Section 7 of this PER. The precise mechanisms will be identified in the CESMP, but contractors will be required to develop and implement the following management plans, which will be approved and monitored during construction by the SW-PMU and supervising engineer: (i) soil erosion control plan; and (ii) waste management plan; and (iii) materials management plan (particularly with regards to stockpiles and borrow pits)

- Site-specific mitigation measures will be covered by specifications and work method statements including: (i) construction area management; (ii) concrete production management (if required); (iii) construction activity methods; and (iv) temporary activities method statements.
- The contractor will be required to develop and implement a drainage, SECP as part of their CESMP requiring:
  - Arrange to limit the area that is being excavated and use temporary stormwater control devices and associated cut off drains/bunds to minimize sediment transport into watercourses.
  - To avoid loss of the productive soil layer, all suitable topsoil and other material shall be saved and stockpiled separately for the future recultivation of the area.
  - Stockpiles of removed topsoil must be properly covered, shaped and protected.
  - Slopes of embankment will be protected from erosion by vegetation and slope drainage.
  - > Any disturbed vegetation must be replanted and/or stabilized immediately after the construction finishes in that area.
  - If sediment transport into watercourses may be a significant issue and it is impracticable to pass discharge over a grassed area prior to discharge to a watercourse then silt ponds/traps should be used.
  - Stockpiles are to be located at least 50m away from watercourses and where possible toe drains can be constructed around the stockpile to minimize runoff of sediment to watercourses or surrounding land.
  - At the completion of work, all disturbed areas will be stabilized by re-vegetation techniques as soon as practicable.
- 473. **Residual risk**. With mitigation in place the post mitigation risk is assessed as low, and in effect is not considered significant.

# 6.2.3 River, stream and creek crossings

- 474. The pipelines rehabilitation works will pass under or across culverts or crossings particularly at Area 8 and the flood prone areas of Vara Creek which is within the Mataniko River flood plain. During construction it will be necessary to carry out excavation works on the Mataniko riverbank and floodplain.
- 475. Where pipe replacements are close to the river there will be a need to carry out regular monitoring of the works. Such activities can destabilize the existing structure of the riverbank, resulting in a higher risk of channel shifts and erosion during floods.
- 476. Stockpiled materials including gravel, sand, cement, and hazardous substances if located within the floodplain, may be eroded, and dispersed into the water ways and may alter existing habitats. While storage of heavy equipment may contribute to destabilization of the riverbank or flood plain and may contribute to altering patterns of water movements during normal river and flood flows.

- 477. Movements of machinery and other activities can be expected to impact riparian fauna and flora. However, because the river and streams on site are highly polluted and disturbed ecosystem that are subjected to flooding and all the works are restricted to the existing routes and work areas impacts are likely to be minimal.
- 478. Potential impacts on the structure of the habitats, waterways and channels, banks and floodplains will be mitigated by:
  - Material stockpiles will not be located within riverbeds similarly, they will not be located within the current area of floodplain in areas subject to regular flooding (i.e., once per year or more).
  - Prior to works commencing at or near any water crossing, the contractor will prepare a site and activity specific plan identifying the staging of works and necessary measures to protect the river environment.
  - Movements of vehicles and machinery, and hence disturbance, within the flood plain will always be minimized.
  - If the contractor causes damage to the riverbank or other structural parts of a river, the contractor is solely responsible for repairing the damage and/or paying compensation.
  - The side slopes of embankments, including the riverbank areas, will be protected and designs used that protect soils as included in the project specifications to reduce erosion.
  - Activities will be monitored during construction for signs of erosion.
  - Re-vegetation of slope areas with local fast-growing species, or other plants in consultation with the residents, SW-PMU, will be carried out incrementally and as quickly as possible after work within the areas has been completed.
  - Spoils, rubbish, or any material will not be disposed of within any river system including riverbeds, banks or floodplain areas. Suitable dumpsites will be designated in consultation with the HCC and SW-PMU; and,
  - All disturbed land will be rehabilitated to its original or better condition upon completion of the project works.
- 479. **Residual risk**. The post mitigation risk is assessed as low and the effect is not considered significant.

# 6.2.4 Generation of waste

- 480. The construction activities and procurement of materials and equipment will generate waste. All waste collected will be disposed of only at a site/s approved by HCC, ECD, and SW-PMU. Construction activities are expected to generate solid wastes including used wood materials, steel works cuttings, paint, and solvents containers, used packaging materials, on-site office solid wastes, used oil from equipment, unused aggregates, and surplus earth materials. These solid wastes may cause aesthetic problems and be potential sources of contaminants for surface runoff and pollution of nearby water bodies. In addition, improper closure of temporary work sites may create impacts following subproject completion.
- 481. Solid waste will be generated on the sites as a result of demolition of existing infrastructure, clearance of vegetation, excavations, and from construction personnel

(such as packaging and food), as well as unused or excess building materials, packaging, and use and maintenance of plant and vehicles. This waste can impact the environment through pollution and have a social impact, such as from odor, if not properly managed and disposed appropriately. The construction phase of the project will generate wastes including the following anticipated waste streams:

- Green waste will be generated during site clearance
- Wastewater treatment sludges from operation of camp sewage treatment plants. If wastewater from these plants does not meet acceptable discharge standards, this may also become classified as a waste
- Hazardous wastes, including oils, lubricants, oil filters, absorbents and rages, paints / solvents, and batteries
- Soil polluted with petroleum hydrocarbons from fuel / oil spills or leaks
- Tyres
- Scrap metal
- Potentially recyclable materials (cardboard, plastics, etc.), and
- Mixed municipal wastes from construction camps and worksites.
- 482. Poorly managed solid and / or liquid waste can result in contamination impacts on the water environment and soil, leading to impact on flora and fauna and health risks to local residents. After completion of work activities, contractors will be required to remove construction wastes from sites, implement the required restoration of disturbed sites, and ensure the proper closure of construction sites.
- 483. **Mitigation measures**. Contractors will be responsible for maintaining these contracts and ensuring that all wastes are disposed in an environmentally responsible manner in accordance with the waste management plan (WMP) and requirements of the CSS. The contractor shall audit waste disposal companies used to dispose of wastes from the project.
- 484. All work sites (laydown areas, yard, offices, and worker accommodations) will be governed by the provisions set out in the CESMP. There are no waste disposal facilities for hazardous wastes present in the project area, and there is limited provision for the management of hazardous waste disposal in Solomon Islands, so this category of waste must be handed over to an authorised contractor for disposal. Any hazardous waste agreement with a company authorised for treatment (deactivation, incineration) or re-use in other technological processes must be signed and made available to the engineer for approval. Treatment, utilisation, disposal of waste shall be carried out only by authorised contractors.
- 485. The WMP requires the adherence to the waste hierarchy<sup>12</sup> to prevent or reduce the generation of waste where possible, and then to reuse / recycle wastes where possible, in preference to disposal. Agreements / contracts will be signed and maintained with the appropriate authority/authorised company to ensure timely transportation and disposal of waste. To mitigate the anticipated impact from solid wastes generated from the works the contractor shall be required to:

<sup>&</sup>lt;sup>12</sup> Waste prevention  $\rightarrow$  Reuse  $\rightarrow$  Recycling  $\rightarrow$  Other recovery  $\rightarrow$  Disposal

- Prepare and implement a WMP developed in accordance with the waste prevention hierarchy
- The WMP shall include details on how different types of solid waste will be segregated, with separate areas for recoverable waste such as recyclables
- Waste generation will be minimized through the implementation of the waste hierarchy (avoidance, reduce, reuse, recycle)
- No litter will be observed within the work sites or immediate surrounds as a result of construction activities
- Quick resolution, and monitoring of, any complaints received regarding waste generation and management
- Development and implementation of a hazardous substances management plan (see also Section 6.2.5)
- Storage of waste shall occur at least 50m from watercourses and the coastal marine area
- Construction offices and facilities shall be provided with garbage bins
- Burning of construction and domestic wastes shall be prohibited
- All solid waste will be collected and removed from the work areas and disposed in local authorized waste disposal sites as identified by the WMP and approved prior to construction commencing, and
- Regular monitoring and reporting on effectiveness of mitigation.
- Waste will not be disposed of by roadside, streams/channels, garden land or in areas used for livelihood production including keep access roads free of construction materials or wastes
- The contractor will provide garbage bins and facilities within the project site for temporary storage of construction waste and domestic solid waste
- As per Section 6.2.5, separate solid waste into hazardous, non-hazardous, and reusable waste streams and store temporarily on-site in secure facilities with weatherproof flooring and roofing, and
- Regularly dispose of wastes, debris and rubbish generated from the works at the approved disposal site and encourage reuse if excavated excess soil.
- 486. **Residual risk**. While the waste impacts could be considered undesirable the risk severity is considered moderate and the likelihood of the event happening likely to certain. The post mitigation risk is assessed as low, and the effect is not considered significant.

#### 6.2.5 Transportation, use and storage of hazardous materials

- 487. The use, storage, transportation and disposal of hazardous substances during construction at all sites can impact on physical soil and water resources if they accidentally spill or leak into the environment and if hazardous materials are not properly disposed of.
- 488. The use of oil products and other hazardous materials may be used in the construction activities of the proposed project. Fuel, oil, grease, paints, and solvents associated with the operation of heavy equipment and vehicles may accidentally be

released to the environment during construction and adversely affect water quality and aquatic life.

- 489. Hazardous substances that will be stored as part of construction will mostly be machinery fuels and oil. Hazardous waste in the form of used batteries, fuel drums, and oily wastes will also require disposal as part of the construction works.
- 490. **Mitigation measures**. The area allocated for temporary storage of hazardous waste, shall have special preventive measures implemented, in particular, containers shall have secondary containment and no mixing of hazardous waste with any other waste shall be allowed. Hazardous waste containers shall be checked for tightness. The staff involved in hazardous waste management shall be trained in waste management and safety issues.
- 491. If there are no suitable disposal options available for hazardous waste, then there may be a need to manage this waste on-site, though interment in lined pits. However, this is not a recommended option and would only be used if all other options were unfeasible. In this case, any proposed location will require adequate environmental assessment, design and management. Any approach must be designed, reported in the CESMP and approved before any construction work commences.
- 492. The contractor will be required to prepare and implement a hazardous substances management plan (HSMP) which will cover the following matters:
  - Hydrocarbons and toxic material will be stored in adequately protected sites consistent with international best practices and the EHSG to prevent soil and water contamination
  - The HSMP will link with the emergency response plan (ERP) spill prevention and management measures and will identify the measures to clean-up and for handling of contaminated materials will include:
    - o immediate clean-up of spills,
    - oil-stained wastes and used oil to be collected and disposed of through recyclers / authorized waste handlers and disposal in authorized waste facilities,
    - o ensure availability of spill cleanup materials such as absorbent pads,
    - restoration of temporary work sites will include removal, treatment, and proper disposal of oil contaminated soils,
    - discharge of oil contaminated water into the environment is prohibited; and,
    - construction personnel designated to handle fuels/hazardous substances to be trained particularly in spill control procedures.
  - All areas intended for storage of hazardous materials will be contained within a covered bunded area that has a capacity of at least 110% of the volume stored
  - Segregate hazardous wastes (oily wastes, used batteries, fuel drums) and ensure that storage, transport, and disposal does not cause pollution and is undertaken consistent with national and international best practice
  - Ensure all storage containers are in good condition with proper labelling
  - Regularly check containers for leakage and undertake necessary repair or replacement

- Store hazardous materials above possible flood level (although it is noted construction works are to occur during the dry season when floods are less likely)
- Used oil and other toxic and hazardous materials will be disposed of off-site at a facility authorized by permit
- All refueling areas shall be bunded and no refueling of vehicles shall occur within 50m of a watercourse
- Spill kits are to be provided at all locations where pollution causing materials are held and/or used (including mobile tankers)
- Personnel will be trained in spill response and clean-up
- Spillage, if any, will be immediately cleaned
- A log of incidents, identifying date, the nature of the incident/complaint and action taken is to be maintained. Any discharges shall be immediately reported to SW and ECD. Photographs will be taken as a record, and
- Any spilled material is to be collected for disposal, by a licensed waste contractor, in an appropriate registered waste container. A log of waste removal showing date, waste type, quantity and destination is to be maintained.
- 493. **Residual risk**. Given the proximity of sensitive receptors, the residual risk is considered moderate.

#### 6.2.6 Replacement of existing water pipe mains

- 494. The proposed trunk main subproject will include replacement of existing water mains in the selected areas in Honiara. It is anticipated that there will be impacts to the water supply operation during decommissioning of the existing mains and the commissioning of the mains.
- 495. During decommissioning, access and mobility at the site will be restricted. SW will agree to a work schedule with the contractor before decommissioning activities commence. To mitigate or avoid risks to operation during decommissioning of the existing mains the contractor will ensure that the structures to be decommissioned are physically disconnected from the operating structures and that there will be no stagnant water that will support the growth of biofilms.

## 6.3 Construction Stage Impacts on Biological Environment

- 496. The subprojects risks and impacts on the biological environment related to invasive species will be mitigated by the measures out in Section 6.1.6.
- 497. Habitat fragmentation occurs when an ecosystem is disturbed, the water mains has existed for more than 20 years now and if its original construction caused habitat fragmentation, ecosystems have re-established albeit as altered and /or smaller units around the areas. The water supply network easement is likely to have been part of the original fragmentation. It is unlikely that the proposed mains rehabilitation will add significantly to any habitat fragmentation that has occurred in the past. The areas have been colonized by weeds, scrub, ground cover, invasive species, and in some cases garden crops.

- 498. The main ecological habitats existing in Honiara that are relevant to the subproject are terrestrial habitats (forest and grassland) and aquatic habitats (freshwater and marine). There are no red listed terrestrial or aquatic species, and no protected areas, within the subproject area. No areas of mangrove will be affected.
- 499. Construction activities will not involve alteration of important terrestrial habitats since the sites are already highly modified and the subproject will not require any large scale vegetation clearance or tree removal. Any remaining land cleared, and not required for construction, will be seeded with grass or native plants as required as part of the revegetation program to stabilize the areas from erosion.
- 500. Clearing of vegetation along the pipeline route (river crossings will be developed but passing underneath the creeks) for 10km and up to 1.5 m wide will be required for the mains. After the pipeline has been laid and backfilled, the site will be regularly maintained for access. During stream crossings, mitigation measures adopted by the contractor will include temporary works to ensure flow continuity, by providing bypasses for water flow and avoiding construction during rainy season so as not to exacerbate the flood risk etc. Silt curtains downstream may be used to reduce sediment loads during construction.
- 501. Mitigation measures include:
  - An ISMP will be developed and implemented with the aim to prevent or manage invasive species introductions
  - Ensure vegetation clearance is restricted to within the subproject site boundary and is the minimum practically required for the proposed works. The proposed site boundary will be approved by PMU and engineer prior to the commencement of any clearing
  - The contractor will develop a vegetation clearance plan as part of their CESMP. The plan will be approved by the PMU and engineer prior to the commencement of any clearing. The plan will clearly identify all vegetation and trees to be removed, and these will be marked on the ground and indicated by hi-vis tape or paint. Only vegetation identified on the plan and marked on the ground will be removed
  - Cleared vegetation will be removed from the subproject site and disposed of at a location approved of the engineer (noting cleared vegetation includes weeds and potentially weed seeds). Vegetation will not be permanently stockpiled on site, pushed into existing vegetation adjacent to the site or pushed over banks or slopes
  - All practical measures must be taken to prevent cement and cement products entering flowing water, including but not limited to a) avoiding flowing water coming into contact with the concrete until the concrete is firmly set; b) using boxing or other similar devices to contain wet cement during construction of the structure; c) if any concrete is spilled beyond the boxing, pouring of concrete must stop immediately and all concrete must be removed from the watercourse; and d) no equipment used in the pouring of concrete should be washed out onsite
  - Provide temporary fencing to retained vegetation, and,
  - Promote restoration of damaged or destroyed vegetation by planting appropriate to the area, grass and tree seedlings.

# 6.4 Construction Stage Impacts on Socio-economic Environment

#### 6.4.1 Presences of workers and influx of labor

- 502. The construction activities and presence of workers (including from outside of the area and/or Solomon Islands) pose a number of risks.
- 503. **Temporary use of land and risk of property damage**. During construction the contractor will need to sue areas of land, on a temporary basis, for laydown areas, stockpiles and the like. The contractor will be responsible for negotiating access arrangements (short-term lease and rental) with land owners. This process can be supported and facilitated by SW who has plenty of experience in facilitating short-term land access arrangements.
- 504. There is a risk that construction activities damage property. The contractor will be responsible for remediating and/or compensating, as required, any such damage. The eligibility and entitlement principles established in the LARF will be used to guide the contractor in remediation and compensation.
- 505. **Risk of social conflict**. There is also potential for conflicts and adverse impacts arising from an influx of workers to an area. Currently, it is not yet known whether there will be a need for worker camps to be established at each site. However it is probable that there will be a need for additional workers to be bought to the project sites for the completion of works. It is possible that these workers are likely to be from both overseas and other areas of Solomon Islands. The contractor must therefore be aware of the potential impacts that this influx of outside labor can have on local communities and manage these impacts and interactions appropriately. Conflicts may arise between the local community and the construction workers, which may be related to religious, cultural or ethnic differences, perceived inappropriate interactions with young local women, or based on competition for resources. Tensions mays also arise between different groups within the labor force, and pre-existing conflicts in the local community may be exacerbated.
- 506. **Increased risk of illicit behaviors and crime**. The influx of workers and service providers into communities may increase the rate of crimes and/or a perception of insecurity by the local community. Such illicit behavior or crime can include theft, physical assaults, substance abuse, prostitution, and human trafficking. Local law enforcement may not be sufficiently equipped to deal with the temporary increase in local population.
- 507. **Impacts on community dynamics**. Depending on the number of incoming workers and their engagement with the communities, the community dynamics may change significantly. Pre-existing social conflicts may intensify as a result of such changes.
- 508. **Local inflation of prices**. A significant increase in demand for goods and services due to labor influx may lead to local price hikes and/or crowding out of local residents.
- 509. **Fraternization and SEAH.** Construction workers are predominantly younger males. Those who are away from their home on construction jobs are typically separated from their families and act outside of their normal social context. This can lead to inappropriate or illegal behavior such as sexual harassment of women and girls, exploitative sexual relationships, and illicit sexual relations with minors from the local community in exchange of money.

- 510. An influx of male labor may also lead to an increase in exploitative sexual relationships, particularly due to the often-higher income levels of workers which enable them to purchase transactional sex or makes them seen as good candidates for marriage. This risk has been discussed in Section 6.1.7.
- 511. **Communicable diseases**. The influx of people may bring communicable diseases to communities, including sexually transmitted infections (STI) such as HIV/AIDS, or the incoming workers may be exposed to diseases to which they have low resistance.
- 512. In terms of the vulnerability of the communities within the subproject area to external influences during the construction phase, these communities are considered medium risk due to the pre-existing culture on the commodification of women and children and the low level of perceived vulnerability by this targeted group.
- 513. The following measures are proposed to mitigate the adverse social risks and impacts identified above:
  - Before construction commences the contractor will conduct training for all workers on their requirements to engage with the local community and ensure national laws are complied with
  - As noted in Section 6.1.7, the contractor will be required to develop a WCOC which will include cultural protocols (including appropriate clothing and no work on religious appropriate days for religious members), management and restricting of visitors to the worker accommodation/site office etc, visitor curfews, expected behaviors for noise, consumption of alcohol or drugs, gift giving and receiving, disciplinary actions
  - The WCOC will also set out the expected behaviors of workers in relation to the local communities, social and cultural sensitivities, and around women, children, and the elderly. The WCOC will be explicit on prohibition of SEAH and GBV
  - The WCOC will contain obligations on all contractor's personnel (including subcontractors and day workers) and will be agreed with ADB, WB, SW-PMU, prior to construction commencing
  - Priority be given to accommodating workers in existing hotels, motels, dormitories and the like and construction of a camp for workers only in the instance suitable existing accommodation is not available
  - No child labor will be employed in the project; the contractor must ensure that all workers are adults above the age of 18 years. The PMU will require the contractor to provide daily records of workers by age, sex, type of employment (casual, full-time etc), work undertaken and wages paid, and will monitor risks of child labor and raise community awareness of harm caused by children dropping out of school to work
  - Child and/or trafficked labor will be strictly prohibited for any activities associated with the subproject
  - The contractor is required to maximize the employment of local workers from the respective communities in close proximity to the work sites. Preference should be given to a local recruitment process, only relying on workers from other areas or from overseas for vacancies, which cannot be filled locally. The contractor will be required to provide justification for any roles not filled locally.

Work permits will only be granted for workers with skills unavailable in the Solomon Islands

- The contractor shall establish a local recruitment and employment procedure by developing a plan through consultation with relevant stakeholders, including government authorities and local villagers. This will ensure that job opportunities are made available to the local community
- SW and the contractor shall inform local villagers promptly about available job opportunities, while local businesses will receive timely information regarding potential contracting opportunities related to the project
- Induction of all workers on project requirements regarding safeguards, CESMP, WCOC, GRM and SEP requirements
- Should the contractor wish to establish a temporary camp for workers, preference will be for locations that are away from local communities to minimize potential social conflicts arising from resource competition and access to basic amenities such as water supply. The contractor will be required to negotiate with the landowner undertake the required due diligence (including E&S assessment) and obtain all necessary permits and consents
- Encourage the employment of women in various roles within the project, fostering gender equality and diversity in the workforce
- Maximize the procurement of goods and services from local commercial enterprises, supporting local businesses and contributing to the economic development of the area
- The contractor will recruit an approved service provider to deliver a communicable diseases awareness and prevention program to the workers and the adjacent communities,
- There will be zero tolerance of GBV, VAC and SEAH associated with the subproject, and
- The CESMP will provide a training plan which will cover all aspects of ESM including WCOC, prevention of SEAH, GBV and VAC, awareness and prevention of spread of communicable diseases. Training will be provided as induction (prior to works starting) and as refreshers throughout the construction period.
- 514. **Residual risk**. There are many mitigation and management measures required to be put in place to reduce anticipated social impacts. To ensure effectivity a number of people are required to participate in implementation and monitoring of the measures. Even with full and effective implementation, to err on the side of caution given the significance of social impacts if they do occur, the residual risk is considered medium-substantial and will require vigilance from SW, ADB and WBG.

# 6.4.2 Occupational health and safety

515. The contractor will be required to develop a health and safety plan (HSP) as part of their CESMP, in compliance with the EHSG and GIP. The HSP will be based on health and safety risk assessment addressing, at a minimum, hazards noted below. The HSP will include mitigation and management measures and an occupational health and safety (OHS) training plan (see below). Construction is inherently hazardous, due to the types of activities it involves, and the constantly changing nature of operations, work locations, site conditions and number of people engaged at any site at any one time.

- 516. Risks to worker health and safety can occur due to non-compliance with good practice health and safety measures and may lead to injuries and accidents.
- 517. Hazards associated with construction activities include:
  - Construction traffic and mobile work equipment including Interaction between vehicles and pedestrians
  - Risk of silicosis from dust
  - Earthworks and excavations including working in trenches
  - Potential for falls (excavations and trenches)
  - High hazard activities such use of mobile plant and equipment
  - Repetitive motion stress or injury and exposure to noise, dust, and vibration
  - Lifting operations
  - Exposure to hazardous chemicals and substances including fuels and bitumen
  - Heat exposure and working in the sun and high temperature conditions, and
  - Use of electrical and other equipment and risk of electrocution as a result of striking overhead electricity lines by construction vehicles. In addition, vehicles or grounded metal objects in close proximity with overhead electricity lines, can result in arcing between the lines and the object, without actual contact.
- 518. **Health and safety plan**. Failure to implement robust safety procedures and develop a positive safety culture could lead to injury and illness and therefore health and safety will require robust management by though the contractor though the measures in the HSP and the ERP. Based on experience with other projects, and given it is highly likely that local workers will have low capacity on OHS, the contractor will include an OHS training plan as part of their HSP. The HSP will include the following:
  - Risk assessment of all activities to identify the spectrum of hazards including for 'non-standard' tasks where there is no standard operating procedure or for when there is a change
  - Identification of management and mitigation measures to address risks and hazards identified
  - Training and OHS standard operating procedures (including establishing minimum standards for the HSO, supervisors and workers)
  - Engagement of a consultant to complete an independent OHS audit and provide recommendations.
  - Appropriate personal protective equipment (PPE) and safety equipment for all workers including temporary workers from local community
  - Minimum requirements for the TMP including barricades and hard barriers, speed controls and temporary speed management measures (bumps and traffic lights), and
  - H&S monitoring plan that will require supervisors and management to complete safety inspections and safety interactions (as well as the HSO) to promote frontline leadership.
- 519. All OHS controls will be integrated into CESMP implementation cost. The SW may consider including a provisional sum for 'specific training and audits.
- 520. **Mitigation measures**. To avoid health and safety impacts contractors must comply with the Safety at Work Act 1982 (and regulations). The EHSG also apply to the project and the contractor is expected to follow GIP standards. Implementation will be enforced by a suitably qualified HSO and by robust monitoring of the required measures. On-site support from the PMU will provide additional technical support and advice and build the capacity of the contractor.
- 521. The HSP will be linked to the ERP which will include measures and resources for prevention, mitigation and response to all foreseeable emergency scenarios (road traffic accidents, spills, fire, etc.) associated with construction activities, and should consider the suitable response resources (medical, fire-fighting, etc) for all related foreseeable emergencies, which are necessary to mitigate the remote location of the work sites and consequent increased response times. The ERP will also include the measures required to manage and respond to disasters and/or civil emergencies beyond and unrelated to the work sites but for which the workers and contractor personnel must respond.
- 522. The contractor will provide (PPE and appropriate safety equipment to construction workers suitable for civil work such as safety boots, helmets, gloves, high visibility vests, protective clothes, goggles, and ear protection at no cost to the workers. Appropriate first aid facilities (equipment and trained workers) will be available to all workers. The contractor will also prepare and implement HSP instructing workers in health and safety matters. This plan is to be approved in writing by the SW-PMU one month prior to starting works. All workers will receive training from the contractor(s) on the HSP as well as general environmental, safety and environmental hygiene.
- 523. The actions and measures to be implemented include:
  - The contractor will be required to facilitate a healthy, safe and respectful working environment based on a culture of health and safety good practice and wellbeing
  - In developing the HSP, the contractor will undertake a risk assessment (or similar) based on the construction approach, program and specific activities and jobs, work method statements, and job safety analysis. The HSP will cover on-site and off-site and training and toolbox talks (activity specific, use of equipment and PPE, communicable diseases awareness and prevention etc)
  - The contractor will recruit an HSO to assist with implementation and monitoring of the HSP. The HSP will include awareness and prevention of communicable diseases (including COVID-19, STIs and HIV/AIDS), a program for which will be delivered by an approved serviced provider recruited by the contractor
  - Development and implementation of an ERP, covering evacuation procedures, routes to hospital for worker-related emergencies or accidents, non-emergency critical situations and natural disaster response and spill management and clean-up
  - The contractor will provide a program of training (including regular and refresher training) in use of all PPE and safety equipment (including spill kits), training will include induction when workers first arrive on site, daily toolbox talks specific to activities to be undertaken that day, and refresher courses through the construction period

- The contractor will provide PPE and safety equipment to workers, free of charge, which is suitable for their tasks and activities undertaken to minimize exposure to a variety of hazards
- The contractor will ensure that a properly equipped and resourced first aid station is always available.
- The contractor will provide potable water and adequate sanitation facilities including hand washing stations. The contractor will ensure that workers, at all work sites, have access to first aid facilities and medical equipment, shade and rest areas, at least 2 liters of water per worker per day
- The contractor will provide adequate accommodations, including any camps established for the subproject. Accommodation will be well-ventilated camps, provide clean eating areas, and provide separate sleeping quarters for male and female workers
- The contractor will provide fire-fighting equipment and fire extinguishers in workshops, fuel storage facilities, construction camps, and any sites where fire hazard and risk are present.
- The contractor will ensure that all workers are aware of emergency response and medical evacuation procedures
- Safety signage will be erected in advance of works and around and within all work sites
- The TMP, as noted at Section 6.4.4, will outline the measures and actions required to ensure safety while working on or using roads. This will include use of flaggers and spotters as necessary
- All excavations >1m deep will be sufficiently benched, shored and barricaded and/or secured to ensure that people and animals cannot fall into the excavation
- The contractor will maintain an accident and incident register, this will include close calls and near misses to help prevent incidents and improve H&S performance. The contractor will report incidents and accidents to the SW within 24 hours and will follow up with a written report within 72 hours. The written report will include a full analysis of the incident (when, what and how it occurred), lessons learned, and additional measures to be included in the HSP and CESMP to prevent future occurrence
- The contractor will ensure that workers, at all work sites, have access to first aid facilities and medical equipment, shade and rest areas, at least 2 liters of water per worker per day, and
- The work sites will be securely fenced with sufficient signage and provided with one controlled access point to reduce risk of unauthorized access. Unauthorized people will not be permitted to access work sites. Any visitors permitted to access the site must go through site induction which outlines their obligations for behavior while on the site in respect of health and safety.
- 524. **Residual risk**. Based on experience on other projects and the nature of H&S incidents which have occurred, even with implementation of the HSP (and associated plans such as the ERP and TMP) the residual risk is assessed as substantial-high. In addition to the contractor compliance, H&S will require particular attention by SW-PMU in the monitoring of H&S risks and will be properly documented in reports.

#### 6.4.3 Community health and safety

- 525. The most significant risks to community health and safety will be addressed during the pre-construction phase with development of the WCOC, and the communicable diseases awareness and prevention plan. These plans and codes will be implemented from outset of construction to avoid and/or handle risks associated with SEAH, GBV and VAC, and risk of spread of communicable diseases (including STI and HIV/AIDS). However, it is likely that construction activities and presence of equipment and open working areas could result in other risks to health, safety and security of the community due to noise, dust, vibration, emissions from earthmoving and operation of equipment and vehicles, and access to work sites.
- 526. Hazardous construction activities that have potential to affect communities near and at work sites, materials sources and/or haulage routes include:
  - Contamination of local water supplies by high levels of sedimentation or potential contaminants such as fuel products and lubricants
  - Air pollution from exhaust fumes and dust giving rise to respiratory conditions
  - Spread of communicable diseases (including STI, HIV.AIDS)
  - Accidents and incidents associated with construction traffic (vehicles and mobile work plant and equipment)
  - The movement of construction vehicles, trench excavations, and various activities may pose hazards to the public, particularly to the residents in the project area. Deep excavations may also pose hazards to the public
  - Potential for accident or injury due to earthworks and excavations
  - Increased exposure to pollution from noise, dust, and vibration
  - Contamination of water, soil or human health effects from spills of hazardous substances and materials, including fuels and bitumen and other chemicals, and
  - Exposure to risks from unauthorized access to work sites a particular hazard for children who are attracted to construction machinery and especially in work sites spread over a large area.
- 527. **Mitigation measures**. In addition to implementation of the WCOC, to avoid other community health and safety impacts the contractor must comply with the approved CESMP which will include the HSP, ERP and TMP. The actions and measures to be implemented include:
  - The contractor's HSP will contain a section on specific community health and safety risks and mitigations
  - The contractor will implement the communicable diseases prevention plan which will include the requirement to engage an approved service provider to deliver the communicable diseases awareness and prevention training to both workers and adjacent communities
  - Provide prior notification to the community on schedule of construction activities
  - Development and implementation of an ERP (which includes accidental spill management and clean-up procedures)

- Safety signage will be erected in advance of works and around and within all work sites
- The TMP will outline the measures and actions required to ensure safety while working on or using roads. This will include use of flaggers and spotters as necessary
- All excavations >1m deep will be sufficiently barricaded and/or secured to ensure that people and animals cannot fall into the excavation
- The contractor will maintain and report on an accident and incident register
- The work sites will be securely fenced and provided with one controlled access point to reduce risk of unauthorized access. Any visitors permitted to access the site must go through site induction which outlines their obligations for behavior while on the site in respect of health and safety, and
- As described in Section 6.4.5, the contractor will be required to develop and implement a NVCP.
- 528. **Residual risk**. With implementation of the HSP (and associated plans such as the ERP, NVCP and TMP) the residual risk for community health and safety is considered to be low-medium.

#### 6.4.4 Traffic management and impacts on public access

- 529. The subproject area is accessed by road transport and people living in the area including market stalls on site. It is anticipated that disruptions on local movement at the sites would occur during the land-clearing and construction phases. The potential impacts are expected to include:
  - Impacts on capacity of existing carriageways through shoulder/lane narrowing, intersection closures and detours, realignments, and temporary speed limits during works
  - Impacts arising along roads from site access locations with escorted entry/exit maneuvers, where necessary
  - Impacts on public transport provision through traffic management and bus stop closures/ relocations
  - Impacts on pedestrians, cyclists, and mobility routes or crossings through footpath closures/detours/realignments during works
  - Impacts on property access, parking, and maneuvering through removal of roadside car parking, construction of temporary property access and reduction/closure of site maneuvering areas
  - Possible damage to roads from heavy vehicle movements, and
  - Inconvenience from traffic management measures including changing road layouts at intersections and localized congestion.
- 530. Associated traffic nuisance impacts including dust, emissions/fumes, health and safety, noise and vibration have been assessed separately in foregoing sections.

531. The contractor will seek approval from MID and HCC for any road closure or rerouting of traffic; these will be set out in the TMP. The exact timing and duration of temporary and

partial closures and the overall impacts will be assessed by the contractor as part of the development of their TMP.

- 532. The contractor will also need to identify site laydown and construction yard and/or worker camps in the CESMP for approval by SW prior to construction works commencing. Construction traffic accessing these areas has the potential to generate adverse impacts in the form of nuisance impacts from increased traffic, congestion, queuing around the access points and increased degradation of the local road surface. Potential measures to reduce, or better manage, construction traffic numbers shall be set out in the CESMP and include carpooling and minibuses for worker transport, active management of shift changeovers, and awareness and planning around traffic peak periods including school hours.
- 533. The impact of light and heavy vehicles travelling to and from site offices will be minor and is considered able to be accommodated within the existing road network.
- 534. **Mitigation measures.** The contractor will be required to submit their construction methodology with the CESMP, which shall include a TMP for review and approval by SW, ADB, and WB. The TMP will detail the type and number of vehicles, number of movements, required signage and traffic control measures, and proposed routes for movements. While the construction disruptions and impacts will be temporary, the impacts can be further mitigated as follows:
  - The contractor will develop, implement and monitor effectiveness of the TMP
  - SW and the contractor will inform the public regarding need for detours and possible traffic disruptions etc via social media, newspaper, and radio, and via notices at bridge sites and letter drops to residents in communities, prior to those activities commencing
  - Install variable messaging signs displaying upcoming construction works, including timeframes for construction, at least one week prior to works commencing so alternative arrangements for travel by users can be considered in advance
  - Ensure clear signage and flaggers/spotters, including speed restriction signs and detour markings, is placed to redirect traffic
  - Provision of safe pedestrian crossings and refuges or controlled crossing points where footpaths are closed, or detours are in place. Convenient pedestrian detour routes shall be in place at least one week in advance of the closure to provide safe and convenient crossing and awareness to users
  - Provision of safe and marked temporary pedestrian access shall be provided to all properties within the construction corridor
  - Installation of warning signage for road users to warn of pedestrian crossing location changes, where necessary
  - The contractor shall manage and schedule works appropriately to avoid works during peak hours and periods when children are going to and from school, where practicable
  - Review and optimization of traffic signals on detour and alternative routes where necessary
  - Provision of access via a temporary corridor within the closure for residents and businesses within construction corridor, where possible

- Limiting site access movements / plant deliveries to off-peak periods or nighttime, where practicable, timed to avoid impacts on local residents and businesses, and
- During the construction phase emergency vehicles should be granted priority for traffic access.
- 535. **Residual risk**. The residual risk is considered to be low-medium.

## 6.4.5 Construction noise and vibration

- 536. Noise. The WHO specifies an allowable noise level threshold of 55 dB (A) and 30 dB (A) for daytime and nighttime noise levels respectively. Noise can be a nuisance to people's working, resting, and sleeping time, including when people wanted to communicate. It can harm hearing and induce other psychological, physiological, and possibly pathological reactions.<sup>13</sup> The ambient noise level in the area is that of most residences in Honiara with sources from music, people and vehicles or road traffic is the main source of community noise that may disturb large segments of the urban population.
- 537. Trucks and construction equipment, which can generate noise of 80 dB(A) from 30 meters are potential sources of noise during construction. The issue is mostly applicable along the roads where water pipelines will be replaced and installed. Construction noise will largely increase the daytime noise levels of the roads which can be expected to be around 60 dB(A) during peak hours based on experience. Significant vibration from construction activities is not expected since pipeline installation will not involve heavy compaction activities.
- 538. The construction activities, which will likely increase the existing noise level include excavation, loading, transportation, loading/unloading of materials and operation of construction equipment and various construction machinery. The equipment to be used for the construction will be mostly powered by internal combustion engines including earth moving equipment, handling materials and stationary equipment.
- 539. Noise generation and amplified noise levels are a negative and unavoidable impact of the project although it will be temporary in nature and easily mitigated. At most of the construction sites, there are no major environmentally sensitive receptors except for residents, schools and clinics that will be temporarily affected by noise.
- 540. It is projected that noise levels could reach 65 to 85dB(A) at peak times of construction. Therefore, construction works will be undertaken only during daytime hours of 7am to 5pm.
- 541. **Noise mitigation measures**. To mitigate nuisance and issues that may arise from construction noise and vibration the following mitigation measures:
  - Prior to commencement of any construction activities, the contractor will be required to establish the noise baseline within the subproject area and conduct a noise assessment to determine the risk level based on the specific activities to be undertaken
  - The contractor will identify the closest sensitive receptors to the works and propose measures to control and manage the impacts of noise and vibration

<sup>&</sup>lt;sup>13</sup> WHO. Night Noise Guidelines for Europe. 2009

- The contractor will develop and implement a NVCP. Mitigation measures will comply with the EHSG and GIP
- Based on the baseline and noise assessment, the contractor will develop and implement the NVCP which <u>for noise</u> will include, but not be limited to setting out:
  - The roles and responsibilities of contractor personnel with regard to managing and monitoring noise effects
  - Specific hours of operations (identifying specific activities and likely noise generation)
  - Construction machinery and equipment to be used and their operating noise levels
  - Identification of construction activities that reasonable likelihood of creating adverse noise effects if un-mitigated and the location of these in the construction site areas
  - The timing of construction activities that reasonable likelihood of creating an adverse noise effect if un-mitigated
  - The proximity of neighbouring noise sensitive areas
  - Process of community liaison and consultation
  - Induction and training procedures for construction personnel
  - Methods and measures to mitigate adverse noise effects including, but not limited to, structural mitigation such as barriers and enclosures, the scheduling of high noise construction, use of low noise machinery, temporary relocation of affected receivers or any other measures.
- The operation of heavy equipment and other machinery will likewise be limited to daytime hours.
- Prior notification will be made to sensitive receptors within 100m of work sites
- Vehicles, heavy equipment, and machinery shall always be properly maintained and fitted with noise abatement accessories or mufflers to the extent possible so that excessive noise can be minimized
- All vehicles will be equipped with exhaust mufflers and regularly inspected to ensure they are operating efficiently. In addition, works sites will only operate during daytime hours
- The NVCP will define working hours as Monday to Saturday from 0730 to 1730. Night-time working and working on Sunday or public holidays is not foreseen
- In the event that night-time operations are required, they will only be permitted with concurrence of the community and approval by SW. Any night works will not include noisy activities that are likely to affect the sleep of residents. Night works will be subject to development of a SESMP to be submitted and approved by SW prior to commencement of any activities at night
- Position stationary equipment that produces elevated noise levels, such as diesel generators and air compressors, as far as practicable from houses and other receptors.
- For protection of workers, earplugs will be provided to those working very close to the noise generating machinery.

- locate concrete batching plants, and rock crushing plant at a reasonable distance away from inhabited areas and sensitive receptors.
- 542. The contractor will be required to exert extra efforts in reducing the noise generation from their activities near residential areas and other sensitive receptors.
- 543. **Vibration**. Some activities, such as compaction, rolling, pile driving, jack-hammering and the like, will create vibration impacts. While the vibration received within the nearest buildings and structures will depend largely on the equipment used, the ground conditions, how and when the plant is operated, the separation distance, and the condition of the buildings and structures will also determine the effect of vibration-causing activities. The operation of heavy plant (including tracked excavators, compaction rollers etc) in proximity to these buildings has the potential to generate vibration that may be perceptible within the building and exceed the most stringent 2 mm/sec criteria if mitigation is not applied.
- 544. The vibration standard to be applied during construction will need to be agreed.
- 545. As vibration generating activities will be undertaken at both sites and there are buildings and structures that could be damaged by vibration within the influence area, the contractor will be required to undertake pre and post construction activity building and structure conditions surveys.
- 546. The methodology and survey sites will be agreed with the PMU, PM/engineer and the contractor. The surveys will be undertaken before any vibration activity begins and will itemise (documentation and photographs or video) the precondition number and type and condition of buildings and structures within 20m, 15m and 10m of the activities and mark the same on a plan to be used as part of the NVCP.
- 547. **Vibration mitigation measures**. The following vibration attenuation measures will implemented:
  - The SW, PMU, engineer and contractor will agree the vibration standard to be applied to the project
  - The contractor will undertake a preconstruction condition survey of identified buildings and structures, as agreed with the engineer and PMU
  - Based on the baseline (condition survey) and vibration assessment, the contractor will develop and implement the NVCP which <u>for vibration</u> will include, but not be limited to setting out:
    - The roles and responsibilities of the personnel in the contractor team with regard to managing and monitoring vibration effects
    - Specific hours of operations (identifying specific activities and likely vibration generation)
    - Construction machinery and equipment to be used and their operating vibration levels
    - Identification of construction activities that reasonable likelihood of creating adverse vibration effects if un-mitigated and the location of these in the construction site areas
    - How the vibration levels will be monitored and recorded (what type of accelerometer will be used etc)
    - The timing of construction activities that reasonable likelihood of creating an adverse vibration effect if un-mitigated

- The proximity of neighbouring vibration sensitive buildings, structures or wildlife
- Process of community liaison and consultation
- Induction and training procedures for construction personnel
- Methods and measures to mitigate vibration noise effects including, but not limited to, structural mitigation such as barriers and enclosures, the scheduling of high vibration construction, use of low vibration machinery, temporary relocation of affected receivers or any other measures.
- If the methodology changes and higher vibration activities are required on site, or if the results of vibration monitoring determine that the agreed standard limits may be exceeded, the NVCP will be updated as required
- Any identified high vibration activities will not be undertaken within 20m of a building or structure unless this is unavoidable and additional measures are agreed and implemented
- If any building/s will be occupied during works that will exceed 2 mm/s, the owners/occupiers of the buildings must be made aware and provided with alternative measures (including temporary relocation if required) before the works are undertaken
- Where tracked plant items are to be used the lightest model practicable will be selected for the work to minimise vibration
- Where works with an excavator are required within 10m of an occupied building, a 5t excavator will be used
- Where compaction works are required within 15m of an occupied building, a static roller will be used. If this is not practicable to meet the required specifications, vibration monitoring will be undertaken at the first use of the vibratory roller to determine whether additional mitigation measures are required to maintain compliance with the consented vibration limits
- Wheeled plant will be selected in preference to tracked plant where practicable
- Excavator operators will avoid banging buckets on the ground and will track the machines as slowly as is practicable, (fast tracking across a site can generate high vibration levels). This is particularly important within 10m of an occupied building
- Workers will be made aware of the impacts of vibration and the methods that can be used to minimise its generation, before works begin on site, and
- All plant on site will be operated in accordance with the NVMP to ensure vibration levels comply with the permitted limits at all times.
- 548. **Residual risks**. Given experience on other SW projects in residential and commercial areas, the noise impacts are likely to be medium generally and possibly substantial at certain and intermittent times when particularly noisy activities are undertaken. Provide the NVCP is implemented, and noise-related grievances are resolved as quickly as possible, the residual risk is assessed as low-medium.
- 549. Any damage that occurs to buildings or structures as a result of vibration-generating construction activities, must be remedied by the contractor at their own cost. Until the preconstruction condition survey is undertaken it is unknown how many buildings or

structures within the vicinity of the two bridges could be susceptible to vibration impacts. To err on the side of caution, the residual risk is assessed as medium.

#### 6.4.6 Impacts on cultural resources

- 550. The consultations and surveys undertaken did not identify any cultural assets that would be impacted by the subproject. However, as th subproject include earthworks and excavations there is the possibility that historic or cultural resources may be unearthed or discovered during the works.
- 551. **Mitigation measures**. Precautions to avoid potential damage to any archaeological and cultural assets include:
  - inclusion of a chance finds procedure in the ESMP; and
  - inclusion of provisions in tender and contract documents requiring the contractors to immediately stop excavation activities and promptly inform the local authorities and the Solomon Island National Museum on the presence of any unknown archaeological and cultural assets.
- 552. **Residual risk**. Provided the mitigation measures are implemented, the residual risk is considered low.

#### 6.4.7 Relocation of utilities and services

- 553. The proposed subproject may have the potential to disrupt existing utilities such as the water supply and sewer, power, and telecommunication lines during construction since the water mains will be installed at the existing routes at the specific sites. Therefore, these disruptions and possible disruptions are considered in the design to avoid or mitigate the probable impact it will have on the residents during the construction or implementation of the project.
- 554. **Mitigation measures**. Prior to the start of construction activities, SW and the contractors will:
  - Coordinate with other utility providers to obtain information about locations of built environment.
  - coordinate with the other utility companies regarding the potential disruptions.
  - make provisions to preserve the operation of current facilities; and
  - Affected households and establishments will be notified well in advance of such disruptions.
- 555. The project's GRM can also be used to settle any disputes that may arise.
- 556. **Residual risk**. Provided the mitigation measures are implemented, the residual risk is considered low.

#### 6.5 **Operation Impacts and Mitigation Measures**

557. Operational phase impacts are those related to the operation of the water supply networks mains. Based on the analysis carried out for the PER, operation of the subproject will not produce any significant negative E&S impacts.

#### 6.5.1 Health and safety

- 558. Operational considerations of the water supply will include health and safety risks during operation and maintenance e.g., handling and storage of chlorine. Operational impacts will be addressed by incorporating the necessary measures, such as a water safety plan, use of appropriate operational procedures and ensure effective mitigation and monitoring plan for the project.
- 559. The SW's in-house H&S procedures will be applied and monitored.

#### 6.5.2 Generation and disposal of waste

- 560. During operation, it is anticipated to generate solid and liquid waste from storage and office.
- 561. All solid and liquid waste generated from storage and office will be collected and disposed of in an approved manner and in an approved location. Such disposal will not be permitted to cause either pollution or nuisance.
- 562. The SW's in-house waste management procedures will be applied and monitored.

#### 6.5.3 Health risks due to delivery of poor quality water

- 563. Contamination in water sources may be due to the presence of bacteria, viruses, protozoa, or chemicals. It will result in unplanned delivery to customers of poor water quality from Project facilities.
- 564. The unplanned delivery to customers of poor water quality from project facilities can be prevented in a broader scale by:
  - Implementing SW's water safety plan as advocated by the WHO. The water safety plan enables SW to (i) prevent contamination of its water sources, (ii) treat the water to reduce or remove contamination that could be present to the extent necessary to meet the water quality targets, and (iii) prevent recontamination during storage, distribution, and handling of drinking water. It is a best practice approach in ensuring delivery of potable water to consumers. SW has updated its water safety plan to conform with WHO requirements; and,
  - SW will continue to practice water chlorination and ensure that adequate residual disinfection will be maintained to control microbial contamination.

#### 6.5.4 Unplanned outages

- 565. Unplanned outages and emergencies in the water supply system will cause loss of adequate water pressure in the network or in the worst cases will result to no water being delivered to customers. This may affect public health due to the lack of potable water.
- 566. There is also the risk of bacterial contamination of the water supply network from contaminated seepages when water pressure is low or no water at all in the pipelines. Seepages may enter the water supply network through leaks, cracks, faulty seals, and other openings. When a significant quantity of pathogens has entered the water supply network, chlorine residual normally sustained in the water supply network may not be enough to maintain the necessary water disinfection level. This will have adverse health effects to the consumers and in the worst cases will result in an outbreak of waterborne

disease. Most common causes of unplanned outages and emergencies are lack of adequate backup power supplies, equipment failure, damage to WTP, reservoirs, water pipelines and appurtenances, and accidents.

- 567. To address the unplanned outages and emergencies of the water supply system:
  - Identification of potential causes of unplanned outages and emergencies shall be conducted during operation of the water supply system and updated as necessary.
  - Written management procedures for unplanned outages and emergencies as required by the water safety plan implementation (advocated by WHO).
  - Regular inspection and maintenance of the backup power supplies and the associated automatic transfer switch of the backup power to ensure uninterrupted operation during power failure.
  - Regular inspection and maintenance of pumping systems and emergency backup systems to ensure that these are in good working conditions.
  - Implement flushing and disinfection, as necessary, during unplanned outages and emergencies to prevent microbial contamination of the water supply system.
  - Written standard operating procedures manual to be available at the facilities to provide guidance to the water supply system's staff on how to handle unplanned outages and emergencies.
  - Regular training of water supply system's staff on how to handle unplanned outages and emergencies.

#### 6.5.5 Managing emergencies

- 568. It is anticipated that there will be unforeseen events in the future due to extreme weather events.
- 569. SW will develop an emergency response plan in response to natural disasters. SW's staff including communities nearby will be trained on all standard operating procedures associated with disaster management and implementation of the plan.

# 7 Environmental and Social Management Plan

## 7.1 Purpose and Objectives

- 570. The purpose of the ESMP is to outline the mitigation measures to be considered during project implementation and operation to avoid or control adverse environmental and social impacts and the actions deemed necessary to implement these measures. The objectives of the ESMP, including the management and monitoring plans, are:
  - To ensure project components are conducted in compliance with the national laws and regulations as well as the ESM requirements of the ADB and WB
  - To measure the success of proposed mitigation measures in minimizing and/or reducing potential environmental, health, safety and social impacts
  - To continuously control the changes to baseline environmental, health, safety and social conditions during pre-construction, construction and operation activities
  - To facilitate a continual review of activities based on performance data and consultation feedback, and
  - To implement corrective actions or new adaptive management programs, as required.
- 571. The assessment conducted for the PER has determined that the subproject will have low significant impacts on the environment. Social impacts are not expected to be significant and resettlement or involuntary resettlement impacts are avoided. The subproject can be implemented in an environmentally acceptable manner if mitigation measures to avoid or reduce the environmental impacts are provided. This ESMP includes: (i) implementation arrangements - institutional roles and responsibilities during pre-construction, construction, and operation phases; (ii) mitigating measures to be implemented i.e. the ESMP matrix; and (iii) required monitoring associated with implementation of the mitigation measures and reporting of the same.

## 7.2 Institutional Arrangements

572. **Overview**. Implementation of environmental safeguards including environmental management provisions and requirements for the subproject is a joint responsibility between the SW-PMU and contractor. The MOFT is the executing agency and will have the overall responsibility for ensuring that the project activities comply with the project agreements and covenants. The SW-PMU, on behalf of MOFT, will implement the project including managing consultants and the contractor, according to the requirements.

## 7.2.1 Solomon Water and its PMU

573. SW has established a PMU to prepare and implement the project. The PMU includes international and national safeguard specialists. The PMU is supported by SW's environment safeguards officer (ESO) and members of the Land Management Unit.

- 574. The PMU is responsible for clearing the due diligence documents (PERs and land due diligence reports) prepared by the design consultant, applying for the DC from ECD, implementing the land due diligence requirements, reviewing and approving the contractor's CESMP prior to any works commencing, and monitoring/inspecting the subproject's compliance with the approved documents and instruments.
- 575. SW will increase numbers as required during implementation including E&S inspectors during the works.

#### 7.2.2 Civil works contractor

- 576. The contractor undertaking the works will be responsible for ensuring that their activities comply with the E&S requirements of the contract including the technical specifications and this PER. The contractor will prepare a CESMP with relevant subplans for review and approval by the SW-PMU prior to any physical work.
- 577. The CESMP will be activity, site and project-specific and detail how the contractor intends to meet the environmental and social management requirements identified in the ESMP. It will be designed to ensure that appropriate environmental and social management practices are applied throughout the construction period. The CESMP will include all the site-specific and sub-plans necessary to meet the standards and targets set out in the ESMP. The contractor will be required to employ a full-time health and safety officer and an environmental officer as necessary to ensure compliance with all requirements concerning environmental, health, safety, social and labor regulations during construction.
- 578. A summary of the E&S management responsibilities for the subproject is presented in Table 7.1.

Party	E&S management roles and responsibilities
Ministry of Finance and Treasury	Guide and monitor overall project execution.
(executing agency)	Financial oversight
	• Ensure flow of funds to the implementing agency and the timely availability
	of counterpart funding
Solomon Islands Water Authority	• Responsible for overall project implementation and monitoring at the
(implementing agency)	implementing agency level.
	<ul> <li>Ensure adequate funding available for the PMU.</li> </ul>
	Submit semi-annual and annual monitoring reports to ADB and WB
	<ul> <li>Assist in resolving complaints brought through the GRM that have not been resolved at lower levels.</li> </ul>
SW - Project Management Unit	Responsible for overall project management, implementation, and
	monitoring
	• Responsible for SW's application for a DC and ensuring required
	government permits and clearances are acquired by SW prior to actual construction activities
	Update the PER following public disclosure as required
	• Ensure PER is incorporated in the bidding documents and civil works
	contracts
	<ul> <li>Disclose safeguard documents, as appropriate</li> </ul>
	Conduct awareness and consultations as per the SEP
	Submit monthly, guarterly, semi-annual, and annual monitoring reports to
	SW Management, ADB and WB
	• Review, and once satisfactory, approve the contractor's CESMP. Prior to
	issuing approval, the PMU will share the CESMP with ADB and WB for
	<ul> <li>Implement the GRM and maintain records of complaints/grievances</li> </ul>
	Ensure the contractor implements the GRM requirements

Table 7.1: Roles and res	ponsibilities for subpro	ject E&S management
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Party	E&S management roles and responsibilities
	<ul> <li>Ensure contractor compliance with required resources for mitigation measures as reflected in the CESMP</li> <li>Issue the CAC guidelines to the contractor at award</li> <li>Review contractor's monthly reports.</li> </ul>
	<ul> <li>As required, provide training for contractor to ensure all workers understand the PER/ESMP and CESMP requirements</li> <li>During construction, conduct monthly and additional ad hoc site visits as necessary and coordinate with the project engineers to ensure that required environmental and social mitigation measures are implemented at the construction sites</li> </ul>
Contractor(s)	<ul> <li>Prior to undertaking any physical works (including site establishment, clearing and grubbing), prepare and submit the CESMP for review and approval by the PMU.</li> <li>Understand the ESMP requirements and allocate necessary resources for implementation</li> <li>Employ a full-time EMO and HSO to ensure compliance with all requirements concerning environmental, health, safety, social and labor regulations during construction</li> <li>The EMO and HSO will provide training for workers on CESMP requirements as needed</li> <li>Implement construction activities with the required mitigation measures</li> <li>Conduct environmental and social monitoring as required by PER's ESMP and approved CESMP</li> <li>Act promptly on complaints and grievances concerning the construction activities in accordance with the project's GRM</li> <li>Publish notices in local media and distribute the notice to affected community members prior to the commencement of construction notice</li> </ul>
	<ul> <li>Hold a minimum of three CAC meetings at during the construction works</li> <li>Advise SW and PMU promptly of any accidents or incidents and follow up with a written report within 72 hours</li> <li>Submit monthly progress reports including a section on CESMP implementation (also covering accidents and incidents and grievances) to PMU</li> </ul>
Regulatory agencies – ECD- MECDM and DOL-MLHS	<ul> <li>Review and approve PER as required by the government and issue the DC</li> <li>Review and clear the land due diligence report, if required</li> <li>Undertake monitoring of the project's environmental performance based on the ECD mandate, PER and development consent conditions</li> </ul>
Project Steering Committee (PSC)	<ul> <li>Responsible for oversight and providing guidance and strategic direction to SW with respect to project implementation.</li> <li>Ensure that the PMU is provided with the necessary resources to effectively carry out its duties and responsibilities</li> </ul>
Financiers - Asian Development Bank and World Bank	<ul> <li>Review and clear PER</li> <li>Review bidding documents</li> <li>Review executing agency and implementing agency's submissions for procurement of goods, equipment, works and services.</li> <li>Conducts project review missions, midterm review mission and project completion review mission to assess project implementation progress of all outputs, compliance of project to covenants including safeguards requirements.</li> <li>Provide environmental and social safeguards capacity building to the PMU during missions and remotely as required</li> <li>Review semi-annual and annual environmental and social monitoring report</li> </ul>

# 7.3 Development of the Construction ESMP

- 579. The contractor is required to prepare a CESMP with relevant subplans, which will be in line with the ESMP in this PER and the technical specifications of the bid documents. The contractor shall not commence physical works under the contract prior to receipt in writing from the subproject's PM that the CESMP has been reviewed and approved by SW.
- 580. The CESMP will contain the contractor(s)'s methodology and plan for adhering to the financiers' safeguard's requirements and the CSS. It will also detail the contractor's safeguards personnel and other key personnel as per the contract. SW must ensure that the contractor will include sufficient financial provision to ensure that the CESMP can be developed, implemented, and monitored.
- 581. It shall also identify the internal procedure that the contractor will follow when a noncompliance has been identified during the daily monitoring. Procedure will include notification responsibilities, rectification timeframe and reporting obligations and will cover the process the contractor will follow when non-compliances are reported by the person undertaking monitoring and inspections. Including identifying how the contractor will provide corrective action to any disciplinary or training requirements following the noncompliance.
- 582. If there is any anticipated change of circumstances the CESMP must be reviewed, updated and resubmitted to SW-PMU for approval. Circumstances that may require updating of the CESMP include substantial design changes with environmental or social implications, changes to specific approved plans, new activities not contemplated in this report, or changes to the area of influence. No changes will be made to the subproject until it has either been confirmed by the SW-PMU that an update to the CESMP is not needed, or the update has been made and approved by the SW-PMU. The CESMP must also be updated where it is deemed that the mitigation measures are not adequate to mitigate the E&S risks.

## 7.3.1 Development and implementation of the CESMP

- 583. The CESMP is ideally prepared by a qualified environmental practitioner with at least 10 years' experience. If the contractor does not have such a person in their employ, they will be required to engage one, a provisional sum has been included in the subproject costs in case this is required.
- 584. Preparation of the CESMP must comply with the requirements of the bid document, the conditions of permits, and approvals from the MECDM. The document should reflect contemporary good practice; be balanced, objective and concise; and be written in a way that is easily understood by other parties. All commitments must be specific and auditable with measurable outcomes and clear timeframes. The CESMP must cover all activities within the project's area of influence. The area of influence includes the active worksites, laydown areas (materials and machineries storage areas), haul routes, and materials sources.
- 585. The content of the CESMP will include:
  - Introduction. Provide a summary of the project as this provides context for the subproject and the plan. The location of all works should be summarized with a clear definition of the works' area of influence. Basic and relevant information on the environment at these locations can be summarized in an annex. A

schedule of intended commencement and completion dates should be provided. If works are undertaken in stages, the stages should be identified in the schedule

- **Objectives.** The environmental outcomes of the plan should be defined. These should be tailored to the environmental issues outlined in the CESMP.
- **Document version control and change management procedure**. The EMO and HSO, as contractor's designated E&S personnel will have responsibility for the CESMP and document version control. This can be a simple system that ensures that details of all key changes to the document over time are properly recorded. The change management procedure will be agreed with SW, ADB and WB and will apply to any design changes or modifications or any proposed changes in procedure as agreed
- **ESM roles and responsibilities.** The CESMP should also outline the roles and responsibilities of personnels that will ensure the requirements of the ESMP is implemented and monitored. The roles and responsibilities of each relevant personnel should be documented. The names of the responsible personnel do not need to be included. If the roles and responsibilities are expected to change over time the long-term variations should also be documented.
- Stakeholder engagement and GRM. Stakeholders' engagement should outline the relevant project stakeholders, how often the contractor is planning to share information or updates with them, and modes of communication. This should be based on the UWSSSP SEP. The GRM should include the relevant information provided in this report and based on SW GRM and include the Contractor' internal GRM.
- **Risk assessment.** Potential impacts should include any relevant information previously provided in the ESMP. It should also identify the location of sensitive receptors. Impacts from relevant stages of the contractor(s)' works should be defined in this section and should reflect the relevant conditions of approval. The CESMP should clearly state how the potential impacts of the works will be specifically managed based on the content of the ESMP and the measures that the contractor(s) will undertake to implement these mitigations. The CESMP will propose management measures on the issues identified and will identify the party responsible for the management measures. This section vill also identify the site-specific ESMPs and subplans (refer to Section 7.3.2) that are also part of the CESMP but developed as stand-alone documents
- **Training and capacity building.** All people involved with the project should receive relevant environmental training to ensure they understand their responsibilities when implementing the CESMP. People to be trained include those at the site/s of all project activities and operations, including contractor(s)s, subcontractor(s)s and visitors. The training should be tailored to the role of the individual in the project. The CESMP will include a list of the training needed and the plan for undertaking this training. The CESMP will also identify the resources to conduct this training (internal/external).

**Emergency contacts and procedures.** The CESMP shall identify the key emergency contacts responsible for managing environmental emergencies associated with the project and their contact details. These personnel should have the power to stop and direct work so that they can manage emergencies effectively. In addition, the plan should establish procedures for managing environmental emergencies and ensure that those procedures are implemented and maintained. This section of the CESMP will be linked to the ERP, and

- **Monitoring and reporting.** The description of reporting requirements should include: a list of required reports including where appropriate monitoring, environmental incidents, non-compliance, corrective action and auditing; a description of the standard report content; the schedule or triggers for preparing a report; who the report is provided to; and document control procedures.
- The CESMP must detail how the CESMP will be monitored and shall include a weekly monitoring checklist that the Contractor will use to check compliance and non-compliance. The monitoring plan will include what is to be monitored, how it will be monitored, the parameters (standards) that it will be monitored against, who will monitor, where will be monitored and the cost of the monitoring plan. This should form part of the contractors monthly report.

#### 7.3.2 CESMP subplans and site-specific plans

- 586. The contractor is required to prepare the following CESMP subplans for management of specific aspects of the construction activities, these will be attached as annexes to, and considered part of, the CESMP.
  - Health and safety plan. The HSP will adhere to the requirements of the ESMP and will also be considered as a standalone document that will be implemented and monitored by the contractors OHS key personnel. This subplan is focused on the key principles involved in ensuring the health and safety of workers is protected and shall also include relevant roles and responsibilities of responsible personnels in implementing this plan. It should also include a job safety analysis and a UXO chance find procedure. The HSP will also cover community health and safety. The contractor will apply the requirements of the EHSG as available at www.ifc.org/ehsguidelines
  - **Traffic management plan.** A traffic management plan is required to detail how the safety of the public and vehicles will be maintained throughout the duration of work. Separation of the public and heavy machinery and work area is of high priority. The TMP will demonstrate how this will be achieved and will detail how the public will be informed of these measurements. Additionally, the TMP will include management of traffic including international and domestic transport of equipment and machinery. It should also include haulage routes.
  - Waste management plan. The WMP should identify the waste streams and gives guidance to the contractor on how to implement waste segregation, storage and disposal. The contractor shall identify the types of wastes that will be generated and estimate the approximate amount or volume of materials and carry out inventory of the materials that can be disposed, reused, recycled or recovered. The WMP shall identify an appropriate site for disposal of the waste streams generated and include how the waste management system (sorting and storage) will work on-site, including bin placement and access. Also determine the requirements for provision of waste bins for waste segregation and will ensure that waste bins are clearly marked and easily accessible by workers, and that waste storage areas are clearly sign posted; ensure that the waste storage site; detail how hazardous waste materials will be stored; ensure that the site appears orderly and will not raise concern from local residents or businesses; and include how often waste will be disposed and

establish a collection or delivery plan for waste and recyclable materials generated on-site.

- This plan shall also include responsible personnel for implementing the requirements and ensure those involved in the project are aware of their responsibilities in relation to the construction waste management plan. The plan will also detail training for clarity on how the various elements of the WMP will be implemented and monitoring to ensure the plan is being implemented
- **Hazardous materials management plan**. The HMMP is linked with the WMP and the ERP. The plan will outline all of the requirements for safe storage, handling, transportation and disposal of hazardous materials in accordance with the EHSG and GIP
- Erosion and sediment control plan. The ESCP is required to be prepared prior to use or disturbance of areas including auxiliary areas under the control of the contractor such as stockpile and storage areas, waterway crossing, trenching and borrow areas, compound areas, and material processing areas. Vegetation clearing and trenching shall not start until the ESCP is approved. This plan shall clearly detail how the contractor will manage excavated areas and materials (spoil), works in slopy and hilly areas, works close to or within water ways including drainage
- The contractor is responsible for the design, installation, and maintenance of erosion and sediment control works based on the following principles: (i) erosion and sediment controls are integrated with construction planning; (ii) effective and flexible erosion and sediment control plans are developed based on soil type and weather; (iii) construction conditions and the receiving environment; (iv) the extent and duration of soil exposure and soil erosion is minimized; (v) water movement through the site is controlled in particular, clean water is diverted around the site; (vi) disturbed areas are promptly stabilized; (vii) sediment retention on site is maximized using appropriate methods and materials; (viii) controls are maintained in proper working order at all times, and, (xi) The site is monitored, and control practices modified to maintain the required performance standard
- **Materials management plan.** It is most likely that the contractor will source the required materials for this subproject from existing suppliers and will undertake an E&S audit of proposed suppliers as part of the MMP. If the contractor will open a source to provide materials to the project, they will require the approval of the SW and the engineer and will undertake consultation and due diligence as required under the CSS and EARF. The E&S assessment (including materials extraction plan) and applications will be reviewed by SW, ADB and WB prior to submission to the ECD and MMERE. The materials extraction plan will prescribe the OHS requirements for the development and operation of the source as well as to define procedures and works that shall be used to mitigate against adverse E&S effects. It will also include the location of the source site(s), description of the environment, haulage routes, permitting requirements under the CSS, how material will be extracted, volume of material that will be extracted and machineries or equipment that will be used for the activity
- **Emergency response plan.** The ERP will include emergency procedures and contingency plans, including spill prevention and response. The plan will be developed to ensure that any accidental spill or leaks of hazardous material such as fuel, oil or lubricants used are contained, collected, treated, and disposed of.

- The plan will: (i) identify areas that are sensitive to spills and releases of hazardous materials; (ii) outline responsibilities for managing spills, releases, and other pollution incidents, including reporting and alerting mechanisms to ensure any spillage is reported promptly to the relevant parties; (iii) Include provision of specialized oil spill response equipment; (iv) include regular training schedules and simulated spill incident and response exercise for response personnel in spill alert and reporting procedures, the deployment of spill control equipment, and the emergency care/treatment of people or wildlife impacted by the spill, and; (v) measures for clean-up and restoration of the environment following any accidents.
- It will also detail the Contractors processes for dealing with emergencies including but not limited to medical, injury, social conflict, extreme rain events, storm events, severe earthquake, or tsunami. The plan will cover measures to protect and manage staff as well as measures to protect and manage the project and environment. Training on this plan will be described along with communication methods (posters, etc.) and the roles and responsibilities of the Contractors team, and
- **Contractor demobilization and rehabilitation plan.** The contractor is required to provide a demobilization and site rehabilitation Plan as part of the CESMP to indicate the timeframes for decommissioning and restoring of sites after works, the process of removing all project equipment and materials, the likely sites which will need restoration and the methods of planned restoration to the 'same or better' standard as before works commenced, considering all requirements of this PER. The plan will also clearly describe the roles and responsibilities.

## 7.4 Mitigation and Management Measures: ESMP Matrix

587. The ESMP matrix, developed form the risk assessment, is presented in Table 7.2. The matrix identifies the key subproject activities, risks or impacts, mitigation measures and responsibility for implementing the measures during the pre-construction, construction, and operation phases. The matrix also describes in general terms how the contractor will meet the specified contractual, regulatory, and statutory requirements during construction phase and how SW-PMU will meet the requirements during pre-construction phases of the project. The contractor will provide a detailed and site-specific methodology and risk assessment in their CESMP.

# 7.5 Monitoring and Reporting

## 7.5.1 Monitoring

- 588. The E&S monitoring is required across all phases of subproject implementation. The monitoring meets two objectives to ensure: (i) that mitigation measures are effective in reducing/managing impacts, and identify any corrective actions as required; and (ii) that the ESM requirements identified in the PER (including its ESMP) and the covenants and requirements included in the project loan agreements are being complied with by the executing and implementing agencies (including by parties reporting to SW).
- 589. **Pre-construction monitoring**. It is in the pre-construction phase where requirements for E&S monitoring during the construction phase are incorporated into the

documents making them legally binding, through placing specific provisions, reflecting the ESMP requirements, in the: (i) technical specifications, (ii) bidding documents, and (iii) construction contracts. Relevant aspects of the ESMP shall be incorporated in these documents and the PER is appended to both the bidding document and the contract, making it an integral part of those documents. The PMU will verify this process.

- 590. During the pre-construction phase any gaps in the baseline will be filled. For this subproject, the contractor is required to establish the noise and vibration baseline by identifying the sensitive receptors and vulnerable structures and determine what measures can be implemented during construction activities to reduce noise and vibration risks and impacts. This will be documented in the noise and vibration control plan. The PMU (through the Engineer) will approve the plan including the site plan indicating the locations for noise and vibration monitoring.
- 591. **Construction monitoring**. The contractor will implement the approved CESMP. The contractor's CESMP will detail the monitoring plan (based on the subproject ESMP) with details on staff, resources, implementation schedules, and monitoring procedures (parameters, frequency etc.).
- 592. Compliance with the approved CESMP will be the basis for inspections and audits by PMU and the ADB and WB. The bidding document will include provisions requiring the contractor to submit their CESMP which will include a section on monitoring which should be linked to allocation of budget and staff for implementation.
- 593. **Operation monitoring**. This will largely be the responsibility of SW as O&M activities will likely be undertaken in-house. If SW does contract out or out-source O&M activities, it will agree with the contractor the monitoring and reporting program, in accordance with the project's ESMP.
- 594. The environmental monitoring plan has been integrated into the ESMP matrix for ease of reference and implementation (Table 7.2). For each activity and corresponding mitigations, the monitoring plan component of the ESMP matrix identifies what the indicators or parameters are, how (method), when and how frequently the monitoring will take place, and who has responsibility for the monitoring and reporting.

## 7.5.2 Reporting

- 595. Overall, the project has established a system of reporting. The contractor will prepare monthly reports which will include a section on compliance with the approved CESMP, corrective actions, training, and the like. This will also record any grievances lodged and project communications undertaken by the contractor.
- 596. The PMU will review and consolidate information from the monthly reports of all subprojects. The quarterly progress report (QPR) prepared by the PMU will include a section on safeguards implementation summarizing the monthly reports (including training and capacity development activities).
- 597. A semi-annual safeguard monitoring report (SMR) will be submitted to ADB and WB. This report will be based on QPR and will include the environmental performance of each subproject/component.

#### Table 7.2: Risks, impacts and mitigation measures - ESMP matrix

		MITIGATION		MONITORING			
Activity	Risk or impact	Proposed measures	Responsibility	Location	Indicator/ parameters	Means of verification and frequency	Responsibility
PRE-CONSTRUCTION	I						
Subproject location and works	Climate change vulnerability	<ul> <li>Climate change adaptation measures are:         <ul> <li>conduct of hydrology and onsite flooding study</li> <li>engineering assessment on potential site erosion</li> <li>appropriate erosion protection for the trunk mains will be determined</li> </ul> </li> </ul>	SW-PMU Design consultant	Entire subproject area and all components	Engineering drawings and specifications	Verification of engineering drawings and specifications Once	SW-PMU
Submission of application for development consent	Non-compliance with CSS and/or financiers' requirements	<ul> <li>SW will submit the DC application accompanied by this PER to the ECD</li> <li>SW will include the DC in the tender documents</li> <li>SW will share a copy of the DC with ADB and WB</li> </ul>	SW-PMU ECD-MECDM	Subproject area	Issue of DC	Submission of copy of DC to ADB and WB Once	SW ECD
Tendering and procurement of a contractor	Tender documents do not adequately cover ESM requirements Contractor is inexperienced with GIP standard ESM	<ul> <li>SW to integrate ESM requirements of the PER into the tender documents</li> <li>SW to append PER and DC to both tender documents and eventual contract</li> <li>Contractor will not commence any physical works (incl. site establishment and clearing and grubbing) until SW has approved in writing the CESMP</li> <li>CESMP to include WCOC, subplans, SESMPs and monitoring checklists</li> <li>Contractor to develop CESMP based on PER's ESMP and elaborated reflecting contractor's construction schedule and approach</li> <li>Contractor to submit draft CESMP to SW-PMU for review and approval. ADB and WB to review and provide comments</li> <li>SW to issue no objection to commencement of works following agreement with ADB and WB that CESMP is satisfactory</li> </ul>	SW-PMU Contractor	Entire subproject area and all components incl. any subcontractors	Specifications Reviewed CESMP drafts	Tender documents Approved CESMP Monitoring checklists Inspection audits	SW-PMU
Sourcing construction materials	Buying materials from unlicensed suppliers	<ul> <li>The contractor will provide sufficient information about the source of construction materials to be used in the subproject in their materials management plan (MMP)</li> </ul>	Contractor SW-PMU	Supply sites and sources	Approved MMP Government permits, license of	Visual inspection of sources and suppliers	Contractor SW-PMU

		MITIGATION		MONITORING			
Activity	Risk or impact	Proposed measures	Responsibility	Location	Indicator/ parameters	Means of verification and frequency	Responsibility
		<ul> <li>The MMP will be approved by the Engineer</li> <li>The MMP will contain an E&amp;S audit of the suppliers the contractor proposes to source material from</li> <li>Only suppliers with valid BMP from MMERE and DC from ECD will be used for the subproject</li> <li>Only suppliers operating in accordance with good internal practice (incl. OHS matters) will be used for the subproject</li> <li>The MMP will be linked with the traffic management plan to identify haulage routes and days/times when haulage will be undertaken</li> </ul>			quarries and borrow pits Audit report approved	Review and validation of audit report	
	Contractor opening a new source for the subproject	<ul> <li>Contractor will only open a new source if approval is granted by SW</li> <li>If SW approves opening of a new source, no extraction will take place until the contractor has:         <ul> <li>Undertaken consultation and due diligence and prepares E&amp;S assessment</li> <li>Submits draft applications and E&amp;S assessment for SW, ADB and WB review and comment</li> <li>Revised applications and E&amp;S assessment in line with comments from SW, ADB and WB and submitted the same to ECD and MMERE</li> </ul> </li> <li>Once the DC and BMP has been issued, the contractor may commence extraction activities provided that the contractor:         <ul> <li>Undertakes extraction in accordance with the MMP and CESMP</li> <li>Covered by required government permits</li> <li>Ensures that activities are located at least 300 m of sensitive receptors</li> </ul> </li> </ul>	Contractor SW-PMU	New sources	SW approval, and ADB and WB clearance, of E&S assessment Issue of DC and BMP	As identified in DC and BMP	Contractor SW-PMU

		MITIGATION		MONITORING			
Activity	Risk or impact	Proposed measures	Responsibility	Location	Indicator/ parameters	Means of verification and frequency	Responsibility
		<ul> <li>Provides adequate drainage and sediment flow controls</li> </ul>					
Subproject construction activities	Complaints due to subproject-related impacts not resolved	<ul> <li>The contractor will:         <ul> <li>establish their complaints handling system based on the project's GRM</li> <li>publicize the existence of the project's GRM through campaigns, websites, billboards etc incl how to access GRM</li> <li>ensure that the contact details of the CLO and others are placed on notice boards and/or website</li> <li>summarize grievances and include in monthly report submitted to SW-PMU</li> </ul> </li> </ul>	Contractor	Subproject area – selected communities	Consultation meetings Tender documents and contract GRM activated and CACs established	Tender documents (ref to CACs) Grievance register incl. close outs Meeting minutes Monthly reports	SW-PMU
Land access arrangements	Impacts on individual households	<ul> <li>SW will use existing land and road easement to avoid or at least minimize involuntary settlement impact. Land acquisition will be avoided through successful negotiation with an FTE holder to provide an easement</li> <li>SW to implement the land due diligence report prior to commence of physical works</li> <li>Costs for additional connections and replacement of illegal connections will be provided by subproject as a compensation to affected persons.</li> </ul>	SW-PMU	Subproject area	As per land due diligence report	As per land due diligence report	SW
Earthworks and excavations	Risk of uncovering UXO	<ul> <li>The contractor will engage the appropriate authority i.e. RSIPF, to undertake a UXO survey prior to undertaking any physical works</li> <li>Coordinate, as required, with SW and RSIPF in the event that UXO are discovered and require disposal</li> <li>Include a UXO chance finds procedure in the CESMP</li> </ul>	Contractor RSIPF	Subproject area	Survey carried out by approved authority	Certificate showing the project area is UXO free	Contractor RSIPF SW
Mobilization of plant, equipment and materials	Biosecurity risks and introduction and/or spread of invasive alien species	<ul> <li>Contractor will prepare and implement an ISMP</li> <li>The ISMP will include but not be limited to the following:         <ul> <li>An assessment of extant invasive species that could be favored, and</li> </ul> </li> </ul>	Contractor	Point of arrival, subproject area	Phytosanitary certificates from Biosecurity Solomon Islands	Verification of certificates Approved ISMP and completed monitoring checklists	SW Biosecurity SI

Activity		MITIGATION		MONITORING			
	Risk or impact	Proposed measures	Responsibility	Location	Indicator/ parameters	Means of verification and frequency	Responsibility
Influx of labor/workers	Risk of SEAH, GBV and VAC	<ul> <li>increase in abundance, due to the project</li> <li>An assessment of invasive species not present, which are at risk of introduction due to the project (e.g. accidental introduction via construction equipment or materials</li> <li>Pre-construction management, if required based on the above assessments, to reduce risk of introduction and or proliferation, including timing and responsibility e.g. wash bays for construction machinery, staff biosecurity briefings</li> <li>Management during construction, including rapid revegetation of bared surfaces</li> <li>Monitoring during construction and operation to allow biosecurity risks to be identified and addressed.</li> <li>All imported equipment and materials, including the vessels, will be subjected to clearance procedures under Biosecurity Act and Regulations and require issuance of phytosanitary certificates</li> <li>The tender documents will clearly set out the contractor's roles and responsibilities for preventing and/or addressing SEAH and GBV risks</li> <li>The contractor will develop and implement the WCOC. The WCOC will be written in plain language and signed by each worker to indicate that they have: <ul> <li>received a copy of the WCOC</li> <li>had the code explained to them and they understand their obligations under the WCOC</li> </ul> </li> </ul>	Contractor	All workers (incl. management) – subproject area	WCOC developed and included in employment contracts	Signed WCOC GRM No. of referrals	SW
		<ul> <li>understood that violations of the WCOC can result in serious consequences, up to and including dismissal, or referral to legal authorities, and</li> </ul>					

		MITIGATION		MONITORING			
Activity	Risk or impact	Proposed measures	Responsibility	Location	Indicator/ parameters	Means of verification and frequency	Responsibility
		<ul> <li>undertaken the prerequisite training prior to commencing work on any site.</li> <li>The WCOC will prohibit all forms of SEAH, GBV and VAC and require all personnel participate in regular training and awareness raising activities</li> <li>SW and contractor(s) will develop, separate from the GRM, a comprehensive reporting system for managing and addressing issues related to SEAH and/or GBV. The system will include the option of anonymous reporting and whistle-blowing. The system will be accessible to workers and community members who come into contact with contractor staff and workers</li> <li>For any SEAH or GBV related complaint, cases will not be handled by the CLO but will be reported immediately to the PMU who will advise ADB and WB (in case additional support is required) and refer the complaint (or survivor if the complaint is made on behalf of another person) to the Family Support Centre (in Honiara) and seek permission from the complainant and/or survivor to report the matter to the relevant police department. The PMU will notify ADB and WB (as per below) and determine, in coordination with ADB and WB the nature of investigation into the matter. Confidentiality will be assured in SEAH and GBV matters and the response will be survivor-focused to ensure they receive support and counselling as needed</li> <li>All incidents of SEAH reported to the SW via the PMU within 24 hours of the contractor should be reported to the SW via the PMU within 24 hours of the contractors will be responsible for ensuring that subcontractors and suppliers comply with the SEAH prevention requirements set</li> </ul>					

		MITIGATION		MONITORING			
Activity	Risk or impact	Proposed measures	Responsibility	Location	Indicator/ parameters	Means of verification and frequency	Responsibility
		<ul> <li>out in the PER's ESMP, and integrated into the approved CESMP</li> <li>In all monthly, quarterly and semi-annual and other project reports, the SW-PMU and contractor(s) should make a declaration that affirms that all allegations of SEAH have been reported and handled in accordance with the procedures and practices for case handling, agreed for the project</li> <li>Depending on the number and nature of SEAH incidents, SW, with support from the project, may hire an SEAH expert to handle incidents and reporting (subject to internal capacity), and</li> <li>The contractor(s) will be expected to identify lessons learned from each case reported and improve their prevention, mitigation, and response to SEAH accordingly within six months of case closure.</li> </ul>					
CONSTRUCTION							
Engagement of subcontractors	Sub-contractors unaware of project ESM requirements and their obligations thereunder	<ul> <li>The contractor shall ensure that:</li> <li>Provisions will be incorporated into all subcontracts to ensure compliance with project ESMP, approved CESMP ADB and WB ESM requirements, and the CSS</li> <li>All relevant requirements of the CESMP and sub-plans must be communicated to sub-contractors. The contractor will provide training and capacity development to sub-contractors as required to strengthen and improve their ESM performance</li> <li>All ESM requirements for the contractor will apply to the sub-contractors. This will be secured via contracts.</li> <li>Contractor's EMO and HSO monitor subcontractor activities and implementation of CESMP</li> <li>They audit sub-contractors and ensure compliance</li> </ul>	Contractor, subcontractors	All sites where subcontractors are working Throughout subcontractor activities	Subcontractor awareness and understanding of ESM requirements Subcontractor recruitment of EMO and HSO	Sub-contractor agreements All plans and contracts approved by the relevant parties Training records Information included in reports to SW, ADB+WB	SW-PMU, ADB, WB

Activity Construction activities		MITIGATION		MONITORING			
Activity	Risk or impact	Proposed measures	Responsibility	Location	Indicator/ parameters	Means of verification and frequency	Responsibility
Construction activities	E&S impacts on the sensitive receptors (households, churches, schools, hospitals, etc.)	<ul> <li>All subproject subcontractors will be supplied with copies of the approved CESMP, and subplans</li> <li>All subcontractors will be required to appoint EMO and HSO who will be available on the site throughout the period of the respective subcontract, unless the Engineer/PM has approved in writing the contractor's EMP and HSO to undertake take this role</li> <li>Implementation and monitoring of approved CESMP</li> <li>Use of right construction methodology which results in lesser disruption to public specially the sensitive receptors</li> <li>Work method statements (WMS) incl. work approved by the engineer/PM</li> </ul>	Contractor – EMO and HSO	Subproject area	Contractors' construction methodology Notification of affected stakeholders especially sensitive receptors	Verification of construction methodology Approved WMS Coordination meetings and notifications Monitoring checklists	SW-PMU
Earthworks, excavations, new pipe laying	Disruption of utilities and services	<ul> <li>SW-PMU and contractor will:         <ul> <li>coordinate with the utility companies regarding the potential disruptions</li> <li>make provisions to preserve the operation of current facilities</li> <li>provide prior notification to affected households and establishments</li> <li>re-establish water services once old networks are disconnected.</li> </ul> </li> </ul>	Contractor SW-PMU	Subproject area	Coordination with the service providers and utility companies Notification of affected households and establishments	Verification of coordination meetings and notifications After completion of meetings and notifications	SW-PMU
Earthworks, excavations,	Soil erosion and sedimentation control	<ul> <li>The contractor will prepare and implement a SECP as part of their CESMP</li> <li>Earthworks and area to be exposed carefully planned</li> <li>Temporary construction working areas that require clearing will be clearly demarcated on the ground, using marker posts at regular intervals. The contractor will take measures to ensure the construction works are restricted to the demarcated construction working areas.</li> <li>During land clearing operations, topsoil will be collected, preserved, stored using good practice measures, and reused as a base</li> </ul>	Contractor	Subproject area	Disturbed sites Use of appropriate sediment controls	Approved SECP And monitoring checklists Visual inspection of sites Verification of plans Daily during earthworks and following rainy periods	SW-PMU

		MITIGATION		MONITORING			
Activity	Risk or impact	Proposed measures	Responsibility	Location	Indicator/ parameters	Means of verification and frequency	Responsibility
		<ul> <li>for turfing of embankment slopes or development of barren areas.</li> <li>After completion of construction areas of temporary works shall be restored to a standard that is of equal quality to its original condition. Plant species that are native to the project area shall be used</li> <li>To avoid loss of the productive soil layer, all suitable topsoil and other material shall be saved and stockpiled separately for the future recultivation of the area.</li> <li>Stockpiles of removed topsoil must be properly covered, shaped and protected.</li> <li>Slopes of embankment will be protected from erosion by vegetation and slope drainage.</li> <li>Any disturbed vegetation must be replanted and/or stabilized immediately after the construction finishes in that area.</li> <li>If sediment transport into watercourses may be a significant issue and it is impracticable to pass discharge over a grassed area prior to discharge to a watercourses and where possible toe drains can be constructed around the stockpile to minimize runoff of sediment to watercourses or surrounding land.</li> <li>At the completion of work, all disturbed areas will be stabilized by re-vegetation techniques as soon as practicable.</li> <li>Measures to divert surface runoff away from the exposed areas and to prevent sediments from moving offsite may include: <ul> <li>small interceptor dikes</li> <li>pipe slope drain</li> <li>grass bale barrier</li> <li>silt fence</li> <li>sediment traps</li> <li>temporary sediment basins</li> <li>replanting disturbed areas</li> </ul> </li> </ul>					

		MITIGATION		MONITORING			
Activity	Risk or impact	Proposed measures	Responsibility	Location	Indicator/ parameters	Means of verification and frequency	Responsibility
Laying of new pipes	River and creek crossings	<ul> <li>The contractor will implement the relevant subplans and measures as set out in the CESMP</li> <li>The contractor will be required to carry out temporary works to ensure flow continuity. In addition, temporary bypasses will be provided.</li> <li>The contractor will avoid construction during the rainy season so as not to exacerbate the flood risk</li> <li>Silt curtains downstream to be used to reduce sediment loads during construction.</li> <li>The contractor will:         <ul> <li>Clearly identify and mark on a</li> </ul> </li> </ul>	Contractor	PMU Subproject area – zones with	Temporary facility to ensure flow continuity. Construction schedule during rainy season Disturbed sites Approved	Visual inspection of sites Verification of plans Daily during rainy periods Visual inspection of sites	SW-PMU SW-PMU
		<ul> <li>Clearly identify and mark on a vegetation clearance plan any vegetation and trees to be removed</li> <li>Submit the vegetation clearance plan to the engineer/PM for approval</li> <li>Mark on the ground with hi-vis tape or paint vegetation to be cleared and trees to be removed</li> <li>Ensure that excavator operators understand limits of the vegetation clearance plan</li> <li>Ensure that vegetation clearance is limited to the extent necessary</li> <li>Provide temporary fencing to protect retained vegetation</li> <li>As necessary, secure tree cutting permit</li> <li>Promote restoration by planting trees near the subproject site</li> </ul>		- Zones with vegetation clearance and/or tree removal	Plans and permits and clearances	Verification of plans and permitting requirements	
Materials supply, earthworks, excavations	Stockpiling and disposal of spoil	<ul> <li>The contractor will prepare and implement a MMP as part of their CESMP</li> <li>The contractor will only stockpile materials in designated areas as approved by the engineer/PM</li> </ul>	Contractor	Subproject area incl all work sites	Approved plan showing designated stockpile areas Contractor's disposal plan	Inspection of stockpiles and disposal sites Completed monitoring checklists	SW-PMU
Construction activities	Generation of waste	The contractor will prepare and implement a     WMP and MMP	Contractor	Subproject area incl.	Approved WMP as part of CESMP	Inspection of waste taken to disposal	SW-PMU

		MITIGATION	MONITORING				
Activity	Risk or impact	Proposed measures	Responsibility	Location	Indicator/ parameters	Means of verification and frequency	Responsibility
		<ul> <li>The WMP shall include details on how different types of solid waste will be segregated, with separate areas for recoverable waste such as recyclables</li> <li>Waste generation will be minimized through the implementation of the waste hierarchy (avoidance, reduce, reuse, recycle)</li> <li>No litter will be observed within the work sites or immediate surrounds as a result of construction activities</li> <li>Quick resolution, and monitoring of, any complaints received regarding waste generation and management</li> <li>Development and implementation of a HSMP</li> <li>Storage of waste shall occur at least 50m from watercourses and the coastal marine area</li> <li>Construction offices and facilities shall be provided with garbage bins</li> <li>Burning of construction and domestic wastes shall be prohibited</li> <li>All solid waste will be collected and removed from the work areas and disposed in local authorized waste disposal sites as identified by the WMP and approved prior to construction commencing, and</li> <li>Regular monitoring and reporting on effectiveness of mitigation.</li> </ul>		contractor's office and works yard etc and waste disposal sites	Approved waste permit	site (photographed) Number of trucks of waste per week WMP monitoring checklists completed	
construction activities including maintenance and refueling of equipment and plant	use, storage, transportation and disposal of hazardous substances (oil, petrol/diesel, paint etc) Accidental spills	<ul> <li>The contractor will prepare and implement a HSMP which will cover:</li> <li>Hydrocarbons and toxic material will be stored in adequately protected sites consistent with international best practices and the EHSG to prevent soil and water contamination</li> <li>All areas intended for storage of hazardous materials will be contained within a covered bunded area that has a capacity of at least 110% of the volume stored</li> </ul>	Contractor	supproject area incl. contractor's office and works yard etc and waste disposal sites	Neasures required to prevent accidental releases Records of accidental releases Measures for clean- up and handling of contaminated materials	Approved HSMP and ERP Spill and containment kits Visual inspection of storage area and labeling system Verification of records	Sw-PMU

		MITIGATION		MONITORING	MONITORING           Location         Indicator/ parameters         Means verification frequency         of and requency         Responsibili           Training records of personnel hazardous materials         Daily and as necessary         as         Indicator/ requency         Indicator/ parameters         Indicator/ requency         Indicator/ and         Responsibili		
Activity	Risk or impact	Proposed measures	Responsibility	Location		Responsibility	
		<ul> <li>Segregate hazardous wastes (oily wastes, used batteries, fuel drums) and ensure that storage, transport, and disposal does not cause pollution and is undertaken consistent with national and international best practice</li> <li>Ensure all storage containers are in good condition with proper labelling</li> <li>Regularly check containers for leakage and undertake necessary repair or replacement</li> <li>Store hazardous materials above possible flood level (although it is noted construction works are to occur during the dry season when floods are less likely).</li> <li>Used oil and other toxic and hazardous materials will be disposed of off-site at a facility authorized by permit</li> <li>All refueling areas shall be bunded and no refueling of vehicles shall occur within 50m of a watercourse</li> <li>Spill kits are to be provided at all locations where pollution causing materials are held and/or used (including mobile tankers)</li> <li>Personnel will be trained in spill response and clean-up</li> <li>Spillage, if any, will be immediately cleaned</li> <li>A log of incidents, identifying date, the nature of the incident/complaint and action taken is to be maintained. Any discharges shall be immediately reported to SW and ECD. Photographs will be taken as a record, and</li> <li>Any spilled material is to be collected for disposal, by a licensed waste contractor, in an appropriate registered waste container. A log of waste removal showing date, waste type, quantity and destination is to be maintained.</li> </ul>			Training records of personnel for hazardous materials	Daily and as necessary	

		MITIGATION		MONITORING			
Activity	Risk or impact	Proposed measures	Responsibility	Location	Indicator/ parameters	Means of verification and frequency	Responsibility
Construction activities generating dust and particulates	Impacts on air quality	<ul> <li>Implementation and monitoring of management plans: dust control plan, TMP, MMP, WMP</li> <li>The contractor will ensure that:         <ul> <li>Regular water spraying and enforcement of vehicle speeds as per the TMP during construction will alleviate dust impacts.</li> <li>The capacity of available water supplies is confirmed and sufficient water is available for watering, and that existing supplies used by downstream users will not be adversely affected</li> <li>Dust is controlled at construction sites by using closed / covered trucks for transportation of construction materials (especially loose construction materials such as gravel, sand, soil, etc.) and debris.</li> <li>Location specific mitigation measures are implemented including: (i) laydown and camp management plans (if required); (iii) construction plans and method statements; and (iv) method statements for temporary activities.</li> <li>Good air quality is maintained include locating crushing plants, concrete mixing sites and stockpiles at least 1 km from sensitive receptors, as well as confining working vehicles to designated routes away from sensitive receptors.</li> <li>Stockpiles will be covered or dampened if local conditions (e.g. strong winds) give rise to significant dust emissions.</li> <li>All plant will be maintained in good working order, including any dust suppression / collection equipment (filters, etc.) that is fitted.</li> </ul> </li> </ul>	Contractor	Subproject area – main roads, accessways, exposed areas, contractor's works yard	Dust generation Smoke emitting equipment, Open burning of materials	Approved NVCP Visual inspection of sites Completed monitoring checklists Daily	SW-PMU
activities and use of plant and machinery	sensitive receptors	an NVCP based on a noise assessment	Contractor	– all areas at all times			300-PIVIU

		MITIGATION	IGATION MONITORING					
Activity	Risk or impact	Proposed measures	Responsibility	Location	Indicator/ parameters	Means verification frequencyof and 		
		<ul> <li>and will outline the measures and actions to mitigate noise</li> <li>Prior to commencement of any construction activities, the contractor will be required to establish the noise baseline within the influence areas of the bridge sites and conduct a noise assessment to determine the risk level based on the specific activities to be undertaken at each bridge site. The contractor's assessment will need to determine the significance of the effects and what specific mitigation would be required.</li> <li>The baseline will identify the nearest sensitive receptors and ecological values and will comprise a number of measurement/sampling sites to be agreed with the PMU and engineer</li> <li>During noisy activities the contractor shall minimize noise impact by use of natural topographic barriers or by placing physical barriers between noise generating activities and sensitive uses and only work during daytime hours, unless dispensation is arranged (see below). To minimize noise impacts on nearby residents all vehicles will be equipped with exhaust mufflers and regularly inspected to ensure they are operating efficiently. In addition, works sites will only operate during daytime hours.</li> <li>Normal working hours are from Monday to Saturday from 7.30 am to 5.30 pm. Night-time working and working on Sunday or public holidays is not foreseen, but if required may only take place with consent from the adjacent community, additional measures are approved by the engineer and included in the NVCP and CESMP, an additional team of workers is used, additional supervision resources are agreed with SW</li> </ul>			Normal operation schedule	Completed monitoring checklists Noise meter Daily / necessary	as	

		MITIGATION		MONITORING			
Activity	Risk or impact	Proposed measures	Responsibility	Location	Indicator/ parameters	Means of verification and frequency	Responsibility
		<ul> <li>Based on the baseline and noise assessment, the contractor will develop and implement the NVCP which for noise will include, but not be limited to setting out:         <ul> <li>The roles and responsibilities of contractor personnel with regard to managing and monitoring noise effects</li> <li>Specific hours of operations (identifying specific activities and likely noise generation)</li> <li>Construction machinery and equipment to be used and their operating noise levels</li> <li>Identification of construction activities that reasonable likelihood of creating adverse noise effects if un-mitigated and the location of these in the construction site areas</li> <li>The timing of construction activities that reasonable likelihood of creating an adverse noise effect if un-mitigated</li> <li>The proximity of neighbouring noise sensitive areas</li> <li>Process of community liaison and consultation</li> <li>Induction and training procedures for construction personnel</li> <li>Methods and measures to mitigate adverse noise effects including, but not limited to, structural mitigation such as barriers and enclosures, the scheduling of high noise construction, use of low noise machinery, temporary relocation of affected receivers or any other measures.</li> </ul> </li> <li>The location of stationary plant and equipment should be selected to be sufficiently distanced from sensitive receptors, or if distance is not possible installation of suitable noise barriers</li> </ul>					

Activity		MITIGATION	MONITORING				
	Risk or impact	Proposed measures	Responsibility	Location	Indicator/ parameters	Means of verification and frequency	Responsibility
Construction		<ul> <li>Upon arrival at the site, the machinery and plant will be checked and modified, if necessary, to ensure that it is not generating unnecessary noise</li> <li>When machinery or plant is not required to be running, it will be switched off and not left idling</li> <li>Noisy plant and machinery will be strategically positioned on the site to reduce the effects on neighbours where practicable.</li> <li>Where practicable, all plant and equipment will use broadband reverse alarms in place of traditional pure tone 'beepers'</li> <li>The tail gates of trucks will be closed with care and not slammed or allowed to fall closed and cause unnecessary noise</li> <li>Horns will only be used in the case of an emergency</li> <li>Any radios or music played on site will be inaudible at the nearest dwellings</li> <li>All workers on site will be familiar with the provisions of the NVCP and made aware of the impacts of noise and the above methods that can be used to minimise noise emissions</li> <li>Workers operating noisy equipment and machinery will be provided with ear-plugs and/or ear-muffs to reduce risk of ear/hearing damage, and</li> <li>All location specific noise mitigation measures will be covered by the NVCP including construction plans and method statements.</li> </ul>	Contractor			SW/DMI1	
activities and use of plant and machinery	risk of adjacent buildings cracking and structures becoming unstable	<ul> <li>The SW-FMO, engineer/FM and contractor will agree the vibration standard to be applied to the project</li> <li>The contractor will undertake a preconstruction condition survey of identified buildings and structures, as agreed with the engineer and PMU</li> </ul>	Contractor	in work areas adjacent to sensitive receptors and identified buildings/struct ures	Approved NVCP Grievances		
		MITIGATION	MONITORING				
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Activity	Risk or impact	Proposed measures	Responsibility	Location	Indicator/ parameters	Means of verification and frequency	Responsibility
		<ul> <li>Based on the baseline (condition survey) and vibration assessment, the contractor will develop and implement the NVCP which for vibration will include, but not be limited to setting out:         <ul> <li>The roles and responsibilities of the personnel in the contractor team with regard to managing and monitoring vibration effects</li> <li>Specific hours of operations (identifying specific activities and likely vibration generation)</li> <li>Construction machinery and equipment to be used and their operating vibration levels</li> <li>Identification of construction activities that reasonable likelihood of creating adverse vibration effects if unmitigated and the location of these in the construction site areas</li> <li>How the vibration levels will be monitored and recorded (what type of accelerometer will be used etc)</li> <li>The timing of construction activities that reasonable likelihood of creating an adverse vibration effect if unmitigated</li> <li>The proximity of neighbouring vibration sensitive buildings, structures or wildlife</li> <li>Process of community liaison and consultation</li> <li>Induction and training procedures for construction personnel</li> <li>Methods and measures to mitigate vibration noise effects including, but not limited to, structural mitigation such as barriers and enclosures, the scheduling of high vibration construction, use of low vibration machinery, temporary relocation of affected receivers or any other measures.</li> </ul> </li> </ul>		Throughout construction period			

		MITIGATION		MONITORING			
Activity	Risk or impact	Proposed measures	Responsibility	Location	Indicator/ parameters	Means of verification and frequency	Responsibility
		<ul> <li>If the methodology changes and higher vibration activities are required on site, or if the results of vibration monitoring determine that the agreed standard limits may be exceeded, the NVCP will be updated as required</li> <li>Any identified high vibration activities will not be undertaken within 20m of a building or structure unless this is unavoidable and additional measures are agreed and implemented</li> <li>If any building/s will be occupied during works that will exceed 2 mm/s, the owners/occupiers of the buildings must be made aware and provided with alternative measures (including temporary relocation if required) before the works are undertaken</li> <li>Where tracked plant items are to be used the lightest model practicable will be selected for the work to minimise vibration</li> <li>Where compaction works are required within 10m of an occupied building, a 5t excavator will be used.</li> <li>Where compaction works are required within 15m of an occupied building, a static roller will be used. If this is not practicable to meet the required specifications, vibration monitoring will be undertaken at the first use of the vibratory roller to determine whether additional mitigation measures are required to maintain compliance with the consented vibration limits</li> <li>Wheeled plant will be selected in preference to tracked plant where practicable</li> <li>Excavator operators will avoid banging buckets on the ground and will track the machines as slowly as is practicable, (fast tracking across a site can generate high vibration levels). This is particularly</li> </ul>					

		MITIGATION	MONITORING				
Activity	Risk or impact	Proposed measures	Responsibility	Location	Indicator/ parameters	Means of verification and frequency	Responsibility
Construction activities incl. haulage	Road safety during works	<ul> <li>important within 10m of an occupied building</li> <li>Workers will be made aware of the impacts of vibration and the methods that can be used to minimise its generation, before works begin on site, and</li> <li>All plant on site will be operated in accordance with the NVCP to ensure vibration levels comply with the permitted limits at all times.</li> <li>The contractor will be required a TMP for review and approval by SW</li> </ul>	Contractor	Subproject area	Traffic signs, barricades safe	Approved TMP	SW-PMU
of materials and equipment	congestion hindrance to public access, constriction vehicles increasing risk of accidents	<ul> <li>The TMP will detail the type and number of vehicles, number of movements, required signage and traffic control measures, and proposed routes for movements.</li> <li>The contractor will implement and monitor effectiveness of the TMP</li> <li>SW and the contractor will inform the public regarding need for detours and possible traffic disruptions etc via social media, newspaper, and radio, and via notices at worksites and letter drops to residents in communities, prior to those activities commencing</li> <li>Install variable messaging signs displaying upcoming construction works, including timeframes for construction, at least one week prior to works commencing so alternative arrangements for travel by users can be considered in advance</li> <li>Ensure clear signage and flaggers/spotters, including speed restriction signs and detour markings, is placed to redirect traffic</li> <li>Provision of safe pedestrian crossings and refuges or controlled crossing points where footpaths are closed, or detours are in place. Convenient pedestrian detour routes shall be in place at least one week in advance of the closure to provide safe</li> </ul>		routes	pedestrian access in vicinity of construction sites Schedule of festivities, processions, parades, etc.	Visual inspection of sites Grievances Daily	

		MITIGATION	MONITORING	ING			
Activity	Risk or impact	Proposed measures	Responsibility	Location	Indicator/ parameters	Means of verification and frequency	Responsibility
		<ul> <li>Provision of safe and marked temporary pedestrian access shall be provided to all properties within the construction corridor</li> <li>Installation of warning signage for road users to warn of pedestrian crossing location changes, where necessary</li> <li>The contractor shall manage and schedule works appropriately to avoid works during peak hours and periods when children are going to and from school, where practicable</li> <li>Review and optimization of traffic signals on detour and alternative routes where necessary</li> <li>Provision of access via a temporary corridor within the closure for residents and businesses within construction corridor, where possible</li> <li>Limiting site access movements / plant deliveries to off-peak periods or night-time, where practicable, but timed to avoid impacts on local residents and businesses, and</li> <li>During the construction phase emergency vehicles should be granted priority for traffic access.</li> </ul>					
All construction activities incl. haulage	Worker health and safety	<ul> <li>The contractor will be required to facilitate a healthy, safe and respectful working environment based on a culture of health and safety good practice and wellbeing</li> <li>In developing the HSP, the contractor will undertake a risk assessment (or similar) based on the construction approach, program and specific activities and jobs, work method statements, and job safety analysis. The HSP will cover on-site and off-site and training and toolbox talks (activity specific, use of equipment and PPE, communicable diseases awareness and prevention etc)</li> </ul>	Contractor	Subproject area – all work sites incl. contractor office, works yard and worker accommodation	First aid station, PPE, safety and emergency response equipment and sanitation facilities Health and safety records (near miss, first aide, lost time accident) Recruitment of approved service provider	Approved HSP Verification of health and safety record Training records Visual inspection of site Daily	SW-PMU

		MITIGATION	MONITORING				
Activity	Risk or impact	Proposed measures	Responsibility	Location	Indicator/ parameters	Means of verification and frequency	Responsibility
		<ul> <li>The contractor will recruit an HSO to assist with implementation and monitoring of the HSP. The HSP will include awareness and prevention of communicable diseases (including COVID-19, STIs and HIV/AIDS), a program for which will be delivered by an approved serviced provider recruited by the contractor</li> <li>The communicable diseases prevention plan will identify measures that are aligned with available guidance and which focuses on the need for employers to implement engineering, administrative, and work practice controls and PPE to avoid and control spread of communicable diseases</li> <li>Development and implementation of an ERP, covering evacuation procedures, routes to hospital for worker-related emergencies or accidents, non-emergency critical situations and natural disaster response and spill management and clean-up</li> <li>The contractor will provide a program of training in use of all PPE and safety equipment (including spill kits), training will include induction when workers first arrive on site, daily toolbox talks specific to activities to be undertaken that day, and refresher courses through the construction period</li> <li>The contractor will provide PPE and safety equipment to workers, free of charge, which is suitable for their tasks and activities</li> <li>Safety signage will be erected in advance of works and around and within all work sites</li> <li>The TMP will outline the measures and actions required to ensure safety while working on or using roads. This will include use of flaggers and spotters as necessary</li> <li>All excavations &gt;1m deep will be sufficiently barricaded and/or secured to</li> </ul>					

		MITIGATION	MONITORING				
Activity	Risk or impact	Proposed measures	Responsibility	Location	Indicator/ parameters	Means of verification and frequency	Responsibility
All construction activities	Community health and safety Unauthorized access to work sites	<ul> <li>ensure that people and animals cannot fall into the excavation</li> <li>The contractor will maintain and report on an accident and incident register</li> <li>The contractor will ensure that workers, at all work sites, have access to first aid facilities and medical equipment, shade and rest areas, at least 2 liters of water per worker per day, and</li> <li>The work sites will be securely fenced with sufficient signage and provided with one controlled access point to reduce risk of unauthorized access. Unauthorized people will not be permitted to access the site must go through site induction which outlines their obligations for behavior while on the site in respect of health and safety.</li> <li>The contractor's HSP will contain a section on specific community health and safety risks and mitigations</li> <li>The contractor will implement the communicable diseases prevention plan which will include the requirement to engage an approved service provider to deliver the communicable diseases awareness and prevention training to both workers and adjacent communities</li> <li>Development and implementation of an ERP (which includes accidental spill management and clean-up procedures)</li> <li>Safety signage will be erected in advance of works and around and within all work sites</li> <li>The TMP will outline the measures and actions required to ensure safety while working on or using roads. This will include use of flaggers and spotters as necessary</li> <li>All excavations &gt;1m deep will be sufficiently barricaded and/or secured to ensure that people and animals cannot fall into the excavation</li> </ul>	Contractor	Subproject area – all work sites incl. contractor office, works yard, worker accommodation and haulage routes	Construction safety policy Hazards in the area Safety control such as signages, lightings, and barriers Health and safety records (near miss, first aide, lost time accident)	Approved HSP Verification of construction safety policy and health and safety record CD awareness and prevention training and records Visual inspection of site Daily	SW-PMU

		MITIGATION	MONITORING				
Activity	Risk or impact	Proposed measures	Responsibility	Location	Indicator/ parameters	Means of verification and frequency	Responsibility
Presence of workers	Potential social issues due to influx of workers Social risks and impacts including social conflict, fraternization, spread of communicable diseases etc	<ul> <li>Proposed measures</li> <li>The contractor will maintain and report on an accident and incident register</li> <li>The work sites will be securely fenced and provided with one controlled access point to reduce risk of unauthorized access. Any visitors permitted to access the site must go through site induction which outlines their obligations for behavior while on the site in respect of health and safety, and</li> <li>The contractor will be required to develop and implement a NVCP</li> <li>The contractor will be required to prepare and implement WCOC as part of the CESMP</li> <li>The contractor is required to maximize the employment of local workers from the respective communities in close proximity to the bridge sites.</li> <li>The contractor shall establish a local recruitment and employment procedure by developing a plan through consultation with relevant stakeholders, including government authorities and local villagers. This will ensure that job opportunities are made available to the local community</li> <li>SW and the contractor shall inform local villagers promptly about available job opportunities, while local businesses will receive timely information regarding potential contracting opportunities related to the project</li> </ul>	Contractor	Location Subproject area	Implementation of workers induction, required protocols, and disease awareness and prevention program Records of workers	verificationand frequencyApprovedHSP, TMP, NVCP and ERPRecruitmentof approved service providerVerificationof training recordsCompleted monitoring checklistsVisual of siteAt start of work Monthly	Responsibility SW-PMU
		<ul> <li>Should the contractor wish to establish a temporary camp for workers, preference will be for locations that are away from local communities to minimize potential social conflicts arising from resource competition and access to basic amenities such as water supply. The contractor will be required to negotiate with the landowner and obtain all necessary permits and consents</li> </ul>					

k or impact						
	Proposed measures	Responsibility	Location	Indicator/ parameters	Means of verification and frequency	Responsibility
	<ul> <li>Encourage the employment of women in various roles within the project, fostering gender equality and diversity in the workforce.</li> <li>Maximize the procurement of goods and services from local commercial enterprises, supporting local businesses and contributing to the economic development of the area</li> <li>The contractor will develop and implement a WCOC which will include cultural protocols (including appropriate clothing and no work on religious appropriate days for religious members), management and restricting of visitors to the worker camps, visitor curfews, expected behaviors for noise, consumption of alcohol or drugs, gift giving and receiving, disciplinary actions</li> <li>The contractor will provide a training plan which will cover all aspects of ESM including WCOC, prevention of SEAH and GBV, awareness and prevention of spread of communicable diseases.</li> <li>Training will be provided as induction (prior to works starting) and as refreshers throughout the construction period.</li> </ul>					
roper closure of struction sites after project completion	<ul> <li>Site restoration and removal of all temporary facilities, excess materials, equipment, plant and excavated materials on site; all dumping shall be to approved locations.</li> <li>Replanting of disturbed sites in accordance with replanting plan</li> <li>SW to issue closure report as validation for final payment</li> </ul>	Contractor	Subproject area	Cleared and remediated sites incl. all disturbed sites, staging areas and worker accommodation	Visual inspection of sites Review and "clear" site remediation through issue of certificate Closure report Once when all site work is complete	SW-PMU
rro	per closure of ruction sites after oject completion	<ul> <li>Encourage the employment of women in various roles within the project, fostering gender equality and diversity in the workforce.</li> <li>Maximize the procurement of goods and services from local commercial enterprises, supporting local businesses and contributing to the economic development of the area</li> <li>The contractor will develop and implement a WCOC which will include cultural protocols (including appropriate clothing and no work on religious appropriate days for religious members), management and restricting of visitors to the worker camps, visitor curfews, expected behaviors for noise, consumption of alcohol or drugs, gift giving and receiving, disciplinary actions</li> <li>The contractor will recruit an approved service provider to deliver a communicable diseases awareness and prevention program, and</li> <li>The CESMP will provide a training plan which will cover all aspects of ESM including WCOC, prevention of SEAH and GBV, awareness and prevention of spread of communicable diseases.</li> <li>Training will be provided as induction (prior to works starting) and as refreshers throughout the construction period.</li> <li>Site restoration and removal of all temporary facilities, excess materials, equipment, plant and excavated materials on site; all dumping shall be to approved locations.</li> <li>Replanting of disturbed sites in accordance with replanting plan</li> <li>SW to issue closure report as validation for final payment</li> </ul>	Proposed measures     Responsibility     Contractor     Proposed measures     Encourage the employment of women in various roles within the project, fostering gender equality and diversity in the workforce.     Maximize the procurement of goods and services from local commercial enterprises, supporting local businesses and contributing to the economic development of the area     The contractor will develop and implement a WCOC which will include cultural protocols (including appropriate clothing and no work on religious appropriate days for religious members), management and restricting of visitors to the worker camps, visitor curfews, expected behaviors for noise, consumption of alcohol or drugs, gift giving and receiving, disciplinary actions     The contractor will recruit an approved service provider to deliver a communicable diseases awareness and prevention program, and     The CESMP will provide a training plan which will cover all aspects of ESM including WCOC, prevention of SEAH and GBV, awareness and prevention of spread of communicable diseases.     Training will be provided as induction (prior to works starting) and as refreshers throughout the construction period.     Site restoration and removal of all temporary facilities, excess materials on site; all dumping shall be to approved locations.     Replanting of disturbed sites in accordance with replanting plan     SW to issue closure report as validation for final payment	Proposed measures     Responsibility     Location     Contractor     Contrac	Proposed measures     Responsibility     Location     parameters       • Encourage the employment of women in various roles within the project, fostering gender equality and diversity in the workforce.     • Maximize the procurement of goods and services from local commercial enterprises, supporting local businesses and contributing to the economic development of the area     • The contractor will develop and implement a WCCC which will include cultural protocols (including appropriate days for religious members), management and restricting of visitors to the worker camps, visitor curfews, expected behaviors for noise, consumption of alcohol or drugs, gift giving and receiving, disciplinary actions     • The contractor will recruit an approved service provider to deliver a communicable diseases awareness and prevention program, and     • The contractor will recruit an approved service provider to deliver a communicable diseases.     • The CESMP will provide a training plan which will cover all aspects of ESM including WCOC, prevention of SEAH and GBV, awareness and prevention of spread of communicable diseases.     Contractor     Subproject area     Cleared and remediated sites including training plan which will construction period.       per closure of ruction sites after oject completion     • Subproject area     Cleared and remediated sites in accordance with replanting plan       per closure of ruction sites after oject completion     • Subproject area     Cleared and remediated sites in accordance with replanting plan       • W to issue closure report as validation for final payment     • Subtroine provided as induction provide as and worker	Proposed measures         Responsionly         Location         parameters         Verification and frequency           •         Encourage the employment of women in various roles within the project, fostering gender equality and diversity in the workforce.         •         Maximize the procurement of goods and services from local connercial enterprises, supporting tocal businesses and contributing to the economic development of the area         •         The contractor will develop and implement a WCOC which will include cultural protocols (including appropriate days for religious members), management and restricting of visitors to the worker camps, visitor curfews, expected behaviors for moles consumption of alcohol or drugs, gift giving and receiving, disciplinary actions         Che contractor will recruit an approved service provider to deliver a communicable deseases awareness and prevention program, and         Contractor         Subproject area         Cleared and remediated sites ind. all disturbed sites, staging areas and worker accommodation         Visual inspection of sites.           per closure of ruction sites after oject completion         •         The restoration period.         Contractor         Subproject area cloared sites, staging areas and worker accommodation         Visual inspection of sites.           •         •         The restoration and removal of all temporary facilities, excess materials, on site, all dumping shall be to approved locations.         Contractor         Subproject area commodation         Visual inspection of sites or contractive temporary for final payment

		MITIGATION					
Activity	Risk or impact	Proposed measures	Responsibility	Location	Indicator/ parameters	Means of verification and frequency	Responsibility
Periodic maintenance and repair of leaks	Generation of dust and particulates Generation of waste	<ul> <li>SW to develop and implement dust control plan and SECP as part of routine maintenance program</li> <li>SW to develop and implement accidental spill procedure to manage and clean-up after spillage of contaminants on road or into river or marine environment</li> <li>SW to develop and implement maintenance WMP</li> <li>Regular clean-up of pipe network areas</li> <li>Preservation and maintenance of roadside vegetation to minimize changes associated with new infrastructure, and</li> <li>Implementation of relevant mitigation measures carried forward from the preconstruction and construction stages during maintenance activities.</li> </ul>	SW (in-house) or maintenance contractor	All areas with newly laid pipe	Observed air quality (dust, emissions) Observed waste or litter Complaints or grievances lodged	Management procedures Standard operating procedures	SW
Periodic maintenance	Health and safety risks during operation and maintenance	<ul> <li>Mitigating measures include:</li> <li>Identification of potential causes</li> <li>Provision of written management procedures</li> <li>Provision of written standard operating procedures (SOPs)</li> </ul>	SW's Operations Dept.	SW's Operations Dept. Mgt	Written management procedures SOPs	Verification of management procedures, SOPs and records Weekly verification Implementation of SOPs	SW
Unplanned outages or event	Health hazard due to unplanned delivery of poor water quality	<ul> <li>Implementation of WSP to:</li> <li>prevent contamination of the water sources,</li> <li>treat the water to meet the water quality targets, and</li> <li>prevent re-contamination during storage, distribution and handling of drinking water</li> </ul>	SW's Operations Department	SW's Operations Dept. Mgt.	WSP Physical, Chemical and Biological parameters	Verification of WSP implementation Water sampling and laboratory test Monthly for plan and for bacteria; Annual for physical and chemical	SW

# 8 Conclusions and Recommendations

- 598. **Conclusions**. The proposed subproject, to rehabilitate and upgrade the existing water supply pipe network, is the first of four or five subprojects of phase 2 of SW's Urban Water Supply and Sanitation Development Sector Project. The project overall will offer huge benefits to the city by ensuring adequate supply of potable water and improvement of the sewerage and sanitation situations. These are all part of an overall development plan for implementing high priority components identified in SW's 30-Year Strategic Plan and a 5-Year Action Plan. This subproject is one of the planned improvements and is an integral component of the project.
- 599. The E&S screening process has considered that the HWMR subproject area lies within the urban environment of greater Honiara. This area has long been disturbed by human activities as indicated by the roads, houses, community facilities and markets, and commercial developments. Generally, the subproject area is a highly modified habitat and is largely residential including some informal settlements. The area is within the jurisdiction of the HCC with some outlying supply zones located in Guadalcanal Province. Currently, some of the households in the area do not have access to the SW reticulated water supply and will benefit greatly from the project.
- 600. The PER prepared for the subproject has identified the risks and potential impacts associated with the pipe rehabilitation works across the nine supply zones. The subproject will create a range of low-moderate risks and impacts on the existing physical, biological and socio-economic environments, largely during the construction stage. Most of these risks are well known, typical of construction projects, and can be managed and mitigated to acceptable levels, resulting in negligible or low residual risks. The subproject will not create any substantial or high negative impacts and risks.
- 601. Stakeholder engagement and consultations did not reveal any significant concerns or issues. Communities and households alike welcome the project and can see direct and tangible benefits. Some questions around land access were raised, and the process of developing and implementing the LARP was explained. The subproject does not require any land acquisition. The contractor will require access and use of land on a temporary basis, and these arrangements will be made in the spirit of the LARF and ADB and WB policies covering land access and involuntary resettlement. A LADDR has been prepared which sets out the process and identifies any households or individuals which may be affected by the temporary or permanent loss of access to their property, loss of crops or trees and/or loss or relocation of small structures (fences, walls etc).
- 602. The PER contains an ESMP, which will be implemented by SW. The ESMP will be used by the contractor as the basis of their CESMP, which will be developed and submitted to SW for review and approval prior to the commencement of any physical works (including site establishment, clearing and grubbing).
- 603. **Recommendation**. It is the recommendation of this PER that the HWMR subproject maybe given development consent and be implemented provided that the following actions are undertaken:
  - SW's PMU staff, contractor(s) and consultants shall adopt the measures set out in this PER for any modifications to the subproject design

- The tendering process will be based on environmentally responsible procurement by ensuring the inclusion of the PER as an appendix and ESM provisions reflected in the specifications of the bidding and construction contract documents
- The tender and contract documents will require the contractor develop, submit for review, and implement their CESMP
- Tender and contract provisions will include requirement for the creation and operation of the CACs
- Public consultation and information disclosure will continue through the subproject implementation in accordance with the project's SEP, and
- SW will monitor and report on the environmental performance of the subproject. ADB and WB will disclose the monitoring reports.

# References

Australian Bureau of Meteorology and CSIRO. 2011. *Climate Change in the Pacific: Scientific Assessment and New Research. Volume 2: Country Reports.* 

Australian Bureau of Meteorology and CSIRO. 2014. Climate Variability, Extremes and Change in the Western Tropical Pacific: New Science and Updated Country Reports. Pacific-Australia Climate Change Science and Adaptation Planning Program Technical Report. Melbourne.

Asian Development Bank. 2019. Regional: Supporting Environmental Safeguards in the Central and West Asia Region (TA)

Dilley, M and others. 2005. Natural Disaster Hotspots – A Global Risk Analysis. The International Bank for Reconstruction and Development / The World Bank and Columbia University. Washington, DC.

Hackman, B.D. 1979. Geology of the Honiara Area. Ministry of Natural Resources. Solomon Islands Government. Honiara

Haines, P. and McGuire, S. (2014) Climate Change Adaptation Plan: Choiseul Bay Township – Solomon Islands BMT WBM Pty Ltd, Spring Hill, Queensland

Honiara City Council. 2015. Honiara Local Planning Scheme 2015. SIG, Honiara

International Finance Corporation. 2017. General EHS Guidelines: Environmental, Air Emissions, and Ambient Air Quality. Washington, DC.

Japan International Cooperation Agency (JICA). 2006. The Study Rehabilitation and Improvement of Solomon Islands Water Authority's Water Supply and Sewerage Systems – Part B: Honiara Water Supply and Sewerage.

Japan International Cooperation Agency (JICA). 2013. The Second Preparatory Survey Report for Outline Design on the Project for Improvement of Honiara Port Facilities in Solomon Islands.

Japan International Cooperation Agency (JICA). 2020. Preparatory Survey for Kukum Highway Upgrade Project in the Solomon Island

McKenzie, L. Campbell, S & Lasi, F. 2006. CRC Reef/Department Primary Industries & Fisheries, Wildlife Conservation Society, The Nature Conservancy, Solomon Islands

MECDM. 2016. The National Biodiversity Strategic Action Plan 2016-2020. Solomon Islands

MECDM. 2010. Solomon Islands EIA Guidelines. SIG. Honiara

MECDM.2008. Solomon Islands State of Environment Report, SIG. Honiara

MECDM.2019. Solomon Islands State of Environment Report, SIG. Honiara

MID, 2020, Transport Sector Project Development Facility (TSPDF): Initial Examination Report-B1-B5 Roads, Honiara

Nordlund, B. 2008. Designing Fish Screens for Fish Protection at Water Diversions. National Marine Fisheries Service. Lacey.

NAPA. https://unfccc.int/files/adaptation/napas/application/pdf/solomon\_islands.pdf

Pacific Islands Applied Geoscience Commission (SOPAC). 2007. National Integrated Water Resource Management Diagnostic Report – Solomon Islands.

Pauku, R. 2009. Solomon Islands Forestry Outlook Study. FAO Regional Office for Asia and the Pacific. Bangkok.

Polhemus, D.A, Englund, R. A, Allen, G. R, Boseto, D and Polhemus, J.T. 2008. Freshwater Biotas of the Solomon Islands: Analysis of Richness, Endemism and Threats. Honolulu, Hawaii

Roy, P. S. 1990. Quaternary Geology of the Guadalcanal Coastal Plains and Adjacent Seabed, Solomon Islands

Sheppard, P and R. Walter. 2006. Revised Model of Solomon Islands Culture History. Research Gate.

SMEC. 2022. Prioritization Report – Water Supply Pipeline Rehabilitation, Honiara (SP1). Solomon Islands Urban Water Supply and Sanitation Sector Project. Honiara.

SMEC. 2022. Basis of Design Report (Technical) – Water Supply Network Expansion, Honiara (SP3). Solomon Islands Urban Water Supply and Sanitation Sector Project. Honiara.

SMEC. 2022. Prioritization Report – Sewer System Rehabilitation, Honiara (SP4). Solomon Islands Urban Water Supply and Sanitation Sector Project. Honiara.

Solomon Islands National Statistics Office (SINSO). 2010. Report on 2009 Population and Housing Census – Guadalcanal Province. Honiara

Solomon Islands National Statistics Office (SINSO). 2010. Report on 2009 Population and Housing Census – Honiara. Honiara

Solomon Islands National Statistics Office (SINSO). 2010. Report on 2009 Population and Housing Census – Solomon Islands. Honiara

Solomon Water, 2019. Final Initial Environmental Examination (IEE). Solomon Islands Urban water supply and sanitation sector project: Honiara city urban water supply and sanitation subprojects. Honiara

Solomon Water, 2021, Solomon Islands Urban Water Supply and Sanitation Sector Project: Initial Environmental Examination for Honiara Water Supply Components, Guadalcanal, Solomon Islands

Solomon Water, 2017. 30 Year Strategic Plan (2017-2047) and 5 Year Action Plan (2017-2022). Honiara, Solomon Islands

Solomon Water, 2017. 30 Year Strategic Plan (2017 – 2047): Main Report. Honiara, Solomon Islands

SPREP 2018. Planning for ecosystem-based adaptation in Honiara, Solomon Islands. A synthesis report by the Secretariat of the Pacific Regional Environment Programme, Apia, Samoa.

Sullivan, C.A. and Guglielmi, F., 2007, Pacific Islands water resources: An overview of East Timor, Kiribati, Solomon Islands, Tuvalu and Vanuatu, AWFR working paper, Pacific Water Resources: An overview.

The Nature Conservancy. 2010. Ridges to Reefs Conservation Plan for Choiseul Province, Solomon Islands.

Trustrum, N.A., Whitehouse, I.E., and Blaschke, P.M. 1989. Flood and Landslide Hazard – Northern Guadalcanal, Solomon Islands. United Nations Technical Cooperation for Development. New York.

UN Office for the Coordination of Humanitarian Affairs (OCHA). 2016. Map of Major National Hazards in Asia and the Pacific. Bangkok.

United Nations Human Settlement Program (UN-Habitat). 2012. Solomon Island: Honiara Urban Profile. Nairobi.

US National Geospatial-Intelligence Agency. 2017. Sailing Directions (enroute) – Pacific Islands. 12<sup>th</sup> Edition. Pub.126.

WACOP (2014). Wave Climate Report Honiara. Wave and Coast in the Pacific, http://wacop.gsd.spc.int/Atlas/Regional/Pdf/SO/Honiara.pdf

Walter, R and R. Hamilton. 2014. A Cultural Landscape Approach to Community-based Conservation in Solomon Islands). Ecology and Society 19(4): 41.

World Health Organization. 2011. Guidelines for Drinking-Water Quality. 4<sup>th</sup> Edition. Geneva.

## **APPENDICES**

- Appendix 1: Determination Letter from ECD
- Appendix 2: International Agreements Ratified by Solomon Islands
- Appendix 3: Grievance Register Template
- Appendix 4: Subproject Information Brochure
- Appendix 5: Meeting Minutes and Summary of Issues
- Appendix 6: Community Meeting Attendance Sheets
- Appendix 7: Outline worker Code of Conduct

# Appendix 1: Determination Letter from ECD

	Our File Ref: Date: 20 <sup>th</sup> December 2022
	To: Managing Director
	Solomon Water P.O. Box 1407
7	Honiara
	Dear Sir/Madam,
TO-LEAD-IS-TO-SERVE	SUBJECT: DECOMMENDATIONS ON THE DEVIEW OF THE DRODOCAL
	APPLICATION FOR HONIARA SUBPROJECT
Solomon Islands Government	I refer to the above subject matter
linistry of Environment,	Following review of the proposal applications for Honiara Subproject
llimate Change, Disaster Management & Meteorology	the following recommendations have been advised;
	1. Prepare and submit a Public Environment Report (PER) for the Honiara Subproject
0	Please see attached quidelines for preparation of PEP. Do opgage an
V	approved EIA practitioner to prepare the report. The list of approved
P.O Box 21,	persons can be obtained from our office.
Honiara, Solomon Islands.	Should you have any questions do not hesitate to ask. We look forward
	to receiving your development application soon.
	Thank you.
3	Yours Sincerely,
Fax:	There a la start the
(677) 28054	Debra Kereseka
Phone: (677) 23031 / 23032	Deputy Director Environment
	For: Director of Environment & Conservation Division
	Ministry of Environment Climate Change Disaster Management & Mataoralam
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## **Appendix 2: International Agreements Ratifies by Solomon Islands**

Solomon Island has been a party to some international agreements on the principles and actions necessary for sustainable development and environmental protection. This include international agreements with environmental and conservation implications as well as for the protection, promotion and safeguarding of cultural heritage and traditional knowledge.

**Regional agreements** include: (i) Pollution Protocol for Dumping. Ratified 1998. Prevention of pollution of the South Pacific region by dumping, (ii) Pollution Protocol for Emergencies. Ratified 1998. Co-operation in combating pollution emergencies in the South Pacific region, (iii) Natural Resources & Environment of South Pacific Region (SPREP Convention). Ratified 1998, and (iv) Waigani Convention on Hazardous & Radioactive Wastes 1995. Ratified 1998. Bans the importation and the trans-boundary movement and management of hazardous wastes within the South Pacific region.

**International agreements on chemicals, wastes, and pollution** include: (i) Liability for Oil Pollution Damage. Ratified. Liability of ship owner for pollution damage, (ii) (Marine Pollution Convention (London). Ratified. Prevention of marine pollution by dumping of wastes, (iii) POPs Convention (Stockholm). 2004. Bans use of persistent organic pollutants.

**International agreements on biodiversity** include: (i) CITES, ratified 1998. Regulates trade in wild animals and plants, (ii) World Heritage Convention. Acceded 1992. Protection of sites of Outstanding Universal Values, (ii) Desertification (UNCCD). Acceded 1999. Agreement to combat desertification and drought, (iii) Convention on Biological Diversity (UNCBD). Ratified 1995, and (iv) Cartegena Protocol on Biosafety. Acceded 2004. Protection of human health and the environment from possible adverse effects of modern biotechnology.

**International agreements on climate change** include: (i) Montreal Protocol. Acceded 1993. Phase out of substances that deplete the ozone layer, (ii) Ozone Layer Convention (Vienna). Acceded 1993. Protection of the ozone layer, and (iii) Climate Change (UNFCC). Ratified 1994, and (iv) Kyoto Protocol. Ratified 2003. Reduce greenhouse gases especially CO2 by an average of 5.2% by 2012.

**International agreements on culture and cultural heritage** include: (i) World Heritage Convention. Acceded 1992. Protection of sites of Outstanding Universal Values. (East Rennelle Island is listed as a World Heritage site), (ii) The Convention for the Safeguarding of the Intangible Cultural Heritage 2003, and (iv) The Convention of the Protection and Promotion of the Diversity of Cultural Expressions 2005.

## ILO Labor conventions ratified:

- Forced Labor Convention (No. 29) (ratified in 1960) this convention is to suppress any form of forced or compulsory labor in all its form.
- Freedom of Association and Protection of the Right of Organize Convention (No. 87) (ratified in 2014) this is one of the core conventions which forms international labor law. It comprises of the preamble, four parts and 21 articles. Part 1 outlines the rights of workers and employers to join organizations of their own choosing without prior authorization. Part 2 states that every ILO member undertakes to ensure "all necessary and appropriate measures to ensure that workers and employers may exercise freely the right to organise." Part 3 deals with technical matters related to the Convention. It

defines who may accept (with or without modification) or reject the commitments of this Convention with regards to "non-metropolitan territory[ies]", whose self-governing powers also include this area. It also discusses reporting procedures for modification of previous declarations regarding acceptance of these obligations. Part 4 outlines the procedures for formal ratification of the Convention.

- Right to Organize and Collective Bargaining Convention (No 98) (ratified in 2014) this convention sets out the rules for the freedom of unionization and collective bargaining, principles that belong to the core values of the ILO. The Convention ensures workers protection from discrimination for their membership or engagement in union activities.
- Abolition of Forced Labour Conventions (No. 105) (Ratified in 2014) is a legally binding instrument that requires States to take measures to prevent forced labour, protect victims and provide them with access to justice and remedies, including specific measures against trafficking in persons.
- Discrimination (Employment and Occupation) Convention (No. 111) (ratified in 1961) an anti-discrimination convention which addresses discrimination based on race, sex, political opinion, or religion. It is one of eight fundamental ILO conventions on the protection of labour standards.
- Worst Forms of Child Labour Convention (No. 182) (ratified in 2014) It is one of eight ILO fundamental conventions. By ratifying this Convention No. 182, a country commits itself to taking immediate action to prohibit and eliminate the worst forms of child labour, including slavery, child prostitution, use of children in criminal activities, and dangerous labour.

## **Appendix 3: Grievance Register**

Solomon Islands Urban Water Supply and Sanitation Sector Project Stakeholder Engagement Plan

Solomon Water

SOLOMON WATER GRIEVANCE REDRESS REGISTERING AND MONITORING FORM

## Complainant Information (Person Reporting Grievance)

Name:		Address:			
Nationality:		Gender:			
Mobile:		Email:			
Type of Complaint				_	
Affected company (a (AD)		ntermediary (on beh	alf of the	[	
Arrected person/s (AP)	/	NP) Sondos organization		opt institution)	
Other (specify)		Service organization	(e.g., local governin	ent institution)	
Onler (specify)					<u> </u>
Complaint Details					
					<u> </u>
					<u> </u>
Mode of receiving the gr	levance				
Letter	Phone call			Fax	
Email	Verbal complaint (walk-i	in)			
Other (specify)					<u> </u>
Location of the problem/	issue specified in the co	omplaint			
Town:		Province:			
Type of problem/grievan	ce				
Land related		Compensation			
Construction		Resettlement site	•		
Other (specify)					
Short description of the pro	oblem:				
Short description of the fac	tors causing the problem:	:			
Person/agency responsible	e for causing the problem:	:			
Past action/s taken by the	complainant (if any):				<u> </u>
					<u> </u>
Details of the focal point th	at received the complaint				<u> </u>
					<u> </u>
Name of the second second	and the same later				<u> </u>
Name of the person who	received the complaint				
Name of Receiving Officer		P	osition:	Date:	<u> </u>

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Solomon Islands Urban Water Supply and Sanitation Sector Project Stakeholder Engagement Plan

## Actions taken by the Receiving Office

Stage 1	Action taken; SW Responsible person; Outcome:
Stage 1	Action taken; SW Responsible person; Outcome:

Stage 2	Action	n taken; SV	V Respons	ible person	; Outcome:	—	—	—	—	—
_				_	—	_	—		—	
Stage 3	Action	n taken; Tri	bunal Mem	bers; Outo	ome:	—	_	_		_
—	—	—	—	—	—	_	—	—	—	—
Summary	of Final Re	esolution:					—		—	
_	_	_	—	_	_	_	_	_	—	_

## **Appendix 4: Information Hand Out**

	The project is administered by the Ministry of Finance and Treasury along with	* Ensuring that the project reflects local needs, has local support, and that it
Project Name: Urban Water Supply and Sanitation Sector Project (UWSSSP)	sonor agencies. Solomon Water manage the project through its Project Management	avoids or minimizes any adverse impacts on the community, local businesses,
Donor: Asian Development Bank, European Union, World Bank	Unit (PMU) and, where required, are supported technically by national and interactional consultants	and the environment
	International consultance.	Information analysis, new sweap, anterext perspectives
Executing Agency: Ministry of Finance and Treasury	About the Consulting Services (Detailed Engineering Design, Phase 2)	Conservationaling concerns, share-saing questions
Implementing Agency: Solomon Wover		Gaining support and understanding of the project
	The consulting services being delivered by SMEC relate to UWSSEP Outputs 1 and	
Consulting Services: UWSSSP - Detailed Engineering Design, Phase 2	<ol> <li>SMEC are studying and producing engineering designs for the following subprojects that will then at a later date be constructed by contractors. Subject to</li> </ol>	Safeguarda Requirements
Consultant: SMEC International Pty Ltd	funding, the construction period is anticipated to be over 2023 to 2025.	In order to successfully implement the Project, Solomon Water will comply with the Solomon Islands Government (SIG) and Asian Development Bank (ADB) safeguards
About Solomon Water	Subprojects	policies, procedures, and systems, including the following:
Solomon Water is a state-owned entergeise (SOE) created under the Solomon Islands	1. Water Supply Network Expansion, Auki: Includes two new reservoire, laying of	Safemarals Policy Statement (SPS) 2009 ADB
Water Act 1992. It is mandated to 'provide for the proper management and	new water pipes and connections to households and local businesses.	Environmental Impact Assessment Regulations 2010, SIG
development of urban water resources and severage services in Solomon Islands."		Environment Art 1998 SIG
	2. Water/Sewer System, Chonseal Town; Includes new reservoirs, sewage treatment	Environment Regulations 2008, SIG
Solomon Water currently deliver water supply services to approximately 65,000	plants, laying of new water and sewer pipes and connections to households and	<ul> <li>The Land and Titles Act (including Amendments), SIG</li> </ul>
people living in the wiban centers of Homara, Auin, Noro, and Tulagi. 58,000 of	local businesses. Sub marine water pipelines between the three islands are also	The second s
these people live in the greater Homars area. SW will also provide water supply	being considered.	
systems to additional provincial centres, namely Gizo, Munda, and Choiseul Bay	8. Water Supply Divaling Rababilitation, Review, Includes varianeers of aviating	
(Iano). SW also provides sewerage services to approximately 1,150 connections	water more a	SW PM0 Office, Honiara
(approximately 6,000 removement) in Homana.	and before	Office Bhone 44484
In pursuing its vision of Safe Water for a Healthy Nation Solomon Water	4. Water Supply Network Expansion, Honiars: Includes new reservoirs, laying of	Water
prepared a 30-year Strategic Plan for the period 2017 to 2047. The Plan includes	new water pipes and connections to households and local businesses.	Community Lialson Officer: Ms. Relinta Manaka
improvements to deliver safe and reliable water supply and sewerage services in	and an alternative stream with the second state of the second stream stream stream stream stream stream stream	
Solomon Water's areas of operation. A 5-year Action Plan for the period from	5. Sewer System Rehabilitation, Honiara, Includes replacement of existing sewer	Email: manaka@tolomonwater.com.tb
2017 to 2022 is ourrently being implemented with drafting of the next 5-year	popes and manholes.	
Action Plan covering the period 2028 to 2027 underway.		Social Saleguards Specialist, Mrs. Mansta Kapini
About the Project (UWSBSP)		Email: kapinimaristalitamail.com
		Environmental Sales and Specialist Mr. Joshua Fain
The UWSSSP commenced in 2020 and is designed to improve access to safe water	Decks index of a start	enversional surgeants spectrum in sources were
and improved manitation in urban and peri-urban areas of the Solomon Islands.	The second se	Email: jkerailisolomonwater.com.sb
Strategic outputs of the UWSSSP include:	State And	SMEC Project Office, Honiara
Output 1: Secure and safe urban water supplies	And a state of the	Office Phone: 21831
Ourput 2: effective, efficient, and safe urban samitation services	Carlos and the second of the second of the	Safeguards Specialist: Ms. Jaysle Boape
• Ourpur & Enhanced awareness of hygiene and water issues, and sustained		Email Javie Issane Brass com
improved hygiene behavior		China Descaration Contraction
	Purpose of Community and Stakeholder Consultations	
<ul> <li>Output 4: Solomon Water is financially and technically sustainable</li> </ul>	Consultations with communities and stakeholders are a very important success	
Project outcomes include improved health of the Solomon Islands population and	factor. It is also important to Solomon Water, donors, and the communities	
improved efficiency, accessibility, and sustainability in water and sanitation	benefiting from or impacted by the project. Consultation aims include:	
nervices.		

October - November 2028

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### WATER SUPPLY PIPELINE REHABILITATION

Proposed Prioritized 10km pipes selected:

- Area 5: Titinge 1 to Titinge 2 & 3
- Area 8: Papaho to Vara Creek
- Area 9: Vara Creek to West Kola
- Area 10: West Kola
- Area 11: West Kola to Talise
- Area 12: Vura 3 Heights Ridge to Kola Ridge Florence Young Road
- Area 15: Pipe starting from the Panatina SW reservoir site to Gilbert camp (pipe runs through Leo Creek, April Valley, April Hill, Aekafo and Gilbert Camp)
- Area 17: Titinge 2 & 3 to Tasahe



## **Appendix 5: Stakeholder Meeting Minutes**

Project Name: UWSSSP Phase 2

Date: August 4, 2022

Time: 9:30am

Venue: Rock Haven Conference Room

### Background

The UWSSSP commenced in 2020 and is designed to improved access to safe water and improved sanitation in urban and per-urban areas of the Solomon Islands. Strategic outputs of UWSSSP include:

- Output 1 Secure and safe urban water supplies.
- Output 2 Effective, efficient and safe urban water supplies.
- Output 3 Enhanced awareness of hygiene and water issues and sustained improved behavior.
- Output 4 Solomon Water is financially and technically sustainable.

Consultations with stakeholders and communities is a very important success factor. It is also important to Solomon Water, donors, and the communities benefiting form or impacted by the project.

#### Objective

Consultation aims include:

- To introduce the second phase of UWSSSP
- Ensuring that the project reflects local needs, has local support, and that it avoids or minimises any adverse impacts on the community, local businesses, and the environment
- Information sharing, new ideas, different perspectives
- Understanding concerns, addressing questions
- Fostering a sense of project ownership
- Gaining support and understanding of the project

#### **Solomon Water Team Members**

N0.	Full Name	Role
1	Scravin Tongi	Chief Operations Officer
2	Ray Andresen	Strategic Manager
3	Marista Kapini	National Social Safeguards
4	Agnes Atkin	Lands Officer
5	Relinta Manaka	Community Liaison Officer
6	Charlie Piringi	Media & Graphics Officer
7	Jaysie Boape	National Safeguards – SMEC
8	Wendy Mark	National Env. Safeguards Specialist – Outfall EA Team
9	Salome Pita	National Social Safeguards Specialist – Outfall EA Team

## Key Messages from SW

The Project (UWSSSP Phase 2) aims to:

- Provide secure and safe urban water supplies.
- Provide effective, efficient and safe urban sanitation services.
- Improve operational outputs through effective asset management and pipeline replacement programs.

• Update Solomon Water's next 5-Year Action Plan

Focus on physical infrastructure improvements through feasibility studies for networks identified as critical program outputs. These include water network expansions and sewerage system rehabilitation. Project Description – Subprojects (Phase 2)

- Water Supply Pipeline Rehabilitation, Honiara
- Water Supply Network Expansion, Auki
- Water Supply Network Expansion, Honiara
- Sewerage System Rehabilitation, Honiara
- New Water Supply Network/Sewerage System, Choiseul Bay

### Summary of Issues and Concerns Raised During Meeting

### Scravin Tongi – SW Chief Operations Officer

- 2017 we launched a 30year stategy for SW
- To be able to implement the 30 yr stategy developed 5 year action plan
- UWSSSP
  - Phase one designs
    - ✓ Includes Kongulai Water Treatment Plant a first of its kind in the Solomon Islands
  - Phase two undertaken by SMEC
    - ✓ Feasibility Studies
    - ✓ Detail engineering
- Projects funded by ADB, World Bank, European Union, SIG and Solomon Water
- Its all about improving our water supply to meet demands. Helping SI achieve SDG
- We currently operate in urban areas Auki, Tulagi, Noro & Munda
- Current focus for phase 2 Honiara, Auki and Choiseul Bay
- Reasons for rehabilitation:
  - Most infrastructure was put in place pre-independence
  - •We need to expand our supply system due to the high growth of population
  - •We do have challenges where some of the areas are not within the town boundary
  - Of our current production, we loose at least 50%
    - Loss include:
      - ✓ Theft
        - ✓ Leakages in our systems this is the main behind the rehabilitation
- We have received invitation from Choiseul to assist thus we have Choiseul Bay in phase 2 as well

### Jaysie Boape – SMEC

Auki sub-project

- 2 new sites for reserviors
- Communities for expansion Ambu, Kunu, Kilufi, Kilusakwalo, Aligegeo,
- Potential Water source identified Fiu River and others will be identified by landowners

### Choiseul

- SMEC doing study for water supply and water treatment plant
- Source identified Sorave River (Identified for hydro as well)
- Submarine pipe running from Choiseul Bay to Supizae and then to Taro Island

### Ray Andresen – SW Strategic Manager

Honiara Network Expansion Area

- Most areas are settlemnt areas thus not planned

- Noah Hill area, 9 Ridges, Jerico and Mt Austin areas
- Locations for reserviors as well as possible sources
- Challenges include houses have already been built on some of the areas (informal Settlement), pulling power into the areas and land issues.
- Min of Lands adopted planned strategy and south Honiara areas have not been heavily settled on.
- A proposed site for reservior has been identified in Mt Austin.

## Jaysie Boape – SMEC

### Sewer Expansion

- Four sites identified for rehabilitation - Rove, Varacreek, Tuvaruhu, Vura

## Scravin Tongi – SW Chief Operations Officer

- With the expansions, we need water sources, reservoirs, we need to deal with land issues as well as dealing with illegal settlers.
- Proper catchment area is also important to ensure better sources
- Kongulai we need to look after the catchment. Water comes out from rocks and sinkholes so it is very important that we look after them
- After these rehabilitation works, there should be a reduced level of our water loss.
- We find it very ahrd to carry out maintenance and repairs to our system because a good number of pipes are running under houses. So we need to reline the pipes along roads to ensure continous maintenance is carried out when need be.
- In addition to replacing pipes, we also need to up size our pipes to cater for the population increase
- We are liasing with other service providers such as Solomon Power and Telekom to ensure we are working together

### Jaysie Boape – SMEC

- Program/ next step for UWSSSP phase 2.

## Salome Pita – ADB TA – EIS Team

- We are currently doing a part of the process by which SW overlooked and should have done in phase 1.
- This is a step that will lead to SW being able to be granted Development Consent by the ECD for constructions/works to be able to start.
- This TA is only for Honiara Sanitation and outfalls and not water supply
  - Currently we have 14 outfall and should be reduced to 2 Ranadi and NRH
    - Conduct assessment for 6 pumping stations (EIS)
      - ✓ NRH
      - ✓ Vara Creek
      - ✓ Market Area
      - ✓ Landfill
      - ✓ Kukum
      - ✓ Ranadi
- Reports have been done and we will pick from the existing reports to do the assessment
  - Proposal application submitted to ECD
  - Director to do determination for PER or EIS
  - EIS needed for this upgrade thus this EIS TA team came about
  - EIS Scope include:
    - ✓ Marine and terrestrial studies in addition to the existing reports
    - $\checkmark$  To be done in 5 months
    - $\checkmark$  Social impact assessment along the coast from White River to Ranadi
    - ✓ Our team consist of 4 people 2 internationals and 2 nationals

## Marista Kapini (SW)

- Studies mentioned was done few years ago
- SW tried to satisfy donors, deal with land owners and these things take time. At the end of the day, we (people) are the ones who will pay the bills.
- Land issue has been an issue that has held us back. Negotiating with land owners
- Designs are there to use less energy, so that bills are affordable within our households
- We need support from you to be able move forward.

#### Feedback

### Lawrence Makili (Lord Howe Settlement Rep)

- Is there any existing consultant committee consisting of technical team that is used to deal with the technical issues on a national level?

## Scravin Tongi (COO – SW)

- I cannot say anything for the national level, but for Solomon Water; ensure scope on the technical specialty we need to engage for our projects are considered.

### Lawrence Makili (Lord Howe Settlement Rep)

- This should be included or formed to ensure developments are discussed including Ministry of Mines and Energy, Environment, Lands etc.
- These projects are of national interest but only taken care of by SW alone. This is something that all technical people should work together to address the arising issue.
- These are the processes that will determine our livelihoods.
- Lack of proper planning has seen increasing settlements.
- Consultative team consisting of the technical people from the ministries to ensure SW get the support needed.

### Jaysie Boape (SMEC)

- Projects should have steering committee.
- Invites have been given to Ministry of Mines and Energy, Solomon Power and Telekom but did not turn up.
- Consultations with my community has been done by SW and we appreciate the team. HCC, Ministry of Environment, Ministry of Mines etc. should be there during the consultations. Because of the absence of this team that we do not properly plan and left with unanswered issues.
- SW alone cannot deal with all the issues alone. Because of the absence of the technical team, we will have issues hindering work.

### Salome Pita (ADB TA-EIS)

- Previously, in Ministry of Lands, we have a board that deals with approval before people can move or settle in a particular area.
- Now, we do not have the technical team that deals with the old system. We cannot control the movement of people when it comes to settling.

### Melchior Mataki (PS – MECDM)

- There is a National water & sanitation policy that has an Integrated committee that looks after water and sanitation sector and chaired by Ministry of Mines and Energy. There is a gap where there is no representation outside of the government.

- Ministry of Land, deals with land. Anything that goes on the land stays with city council and the provincial government. Planning and development board deal with approval of what is built on the land.
- Enforcement of the existing regulations around urban development has fallen down so much that it has contributed a lot to increase of informal settlements which could have been avoided by authorities.
- Process wise, what the consultants are doing are independent. That is consultation and reporting because they produce the reports to us.

## Melchior Mataki (PS – MECDM)

- Congratulate SW for the steps taken developments taking place.
- Once developments are done, what percentage would NRW drop to? What impact would it have on the tariff/is it already factored in the tariff?
- At what depth is the outfall going out? 500m at Ranadi and 350m at NRH noting that the NRH one is closer to the RenLau community. What is the logic behind these distances?
- What else has been planned for raw material of sewer?

## Scravin Tongi (COO – SW)

- NRW is water loss through our system.
  - Main parts of loss: physical loss and commercial loss
    - Physical loss any loss occurring within our water supply system through leakages.
      - Commercial loss loss that happens at the customer's end.
- Target in next 7 years reduce by 30%.
- We reduced loss to 56% from 70%-80% driven from efforts that we started in 2013. We (SW & SMEC) had about 2 weeks of discussions (back and forth) on this. SMEC did a hydraulic study, and we then know which areas are experiencing frequent burst due to the age of the pipes. This formed our prioritization areas. This is for this project, but there are also capex projects funded by Solomon Water for upgrades as well.
- Human behavior a challenge as well people are stealing water i.e., they are tapping our lines to get water.
- Tariff if we save then we can look at the tariff status.
- Fiji water government subsidizes more than 70% of their operating cost, not the case for SW.
- Intention of the stakeholder consultation is to get the views appreciate Makili's concern.
- SW have a Project Management Unit that oversees the UWSSSP projects or donor funded projects.
- Steering committee, we have is at a higher level consisting of key stakeholder ministries and their job is to ensure that the governance is done right.
- Availability of treatment plant depends on availability of funds.

## Salome Pita (ADB TA-EIS)

- Question regarding depth of outfalls currently in the proposal submitted by SW, the outfalls will be 8m in depth. Which means it will be hanging. After the EIS is completed then we will have the detail design which will indicate the exact distance.
- A Marine biologist will be engaged and will do diving next week by then we will be able to know the distance in the EIS.
- 4 pumping stations are gravity fed. Solids are sieved and only liquids are disposed.

## Abednigo Maeohu (HCC)

- SMEC I see in the program that there is resettlement plan and I believe it is a critical aspect of the project progressing.
- ADB What are reasons behind site selections for outfalls NRH and Ranadi? Why build on previous reports, think that independent reporting or studies done is better?
- How do you determine the distances of the outfall going out?

- Risk analysis you have in place. Are there any mitigation measure you have relating to the impacts of this on the coastal areas?
- Which standards you adopt on the treatment plant management?
- Appreciate Solomon Water for this initiative and I believe you are on the right track. There are outstanding issues that we (HCC) need to address as well and see how things transpire from there. We really need to work together to ensure the projects progresses.

## Scravin Tongi (COO – SW)

- ADB is doing the EIS.
- SUEZ is doing the designs.
- Have been part of the discussions/consultations on designs along with Ministry of Environment and Mines and Ministry of Health as well etc. There are ongoing discussions on the issues you raised, and we are taking note of questions.

## Jaysie Boape (SMEC)

- LARP currently on feasibility phase. We will go and identify where the pipes are. Should there be encroachment on any private property then LARP will take place. If no impacts on private property (land and asses) then a due diligence report will be done by SMEC.
- The term indicates compensation, but the term is given by ADB for the report.
- Then a proposal application including concept design and then ECD to determine which report to be done (PER or EIS) before a DC is granted by MECDM.

## Salome Pita (ADB TA-EIS)

- If population affected more than 10% then LARP is required and if less than 10% then due diligence report is required
- Locations identified are from SW analysis.
- To do a standalone activity will be expensive and this is a continuation. Reports are less than 5 years which are still valid.
- Detailed report to be produced will also cover risk analysis.
- We comply to WHO and Australia and New Zealand standard.

## Scravin Tongi (COO – SW)

- For Kongulai Water Treatment Plant, SW footed all LARP process costs.
- If we are to do LARP then we will have to look for money. Solomon Water will have to foot the cost.

### Mathew Walekoro (MNPDC)

- We have been doing LARP. 6m for development along the road, we have to pay even market stalls built within the vicinity. This has also been our experience.
- Is there any other ways or innovative ways that we can use the energy for?

### Lawrence Makili (Lord Howe Settlement Rep)

- We the people of Lord Howe Settlement have allowed our land for projects because they are of national interest. So, we did not have anything such as LARP. The current eye centre is partly on our land, but we do not complain because these are important projects.
- Reports have been made but were not made aware of it. Consumers need to know about the information. Especially those of us who are living along the coast.

## Scravin Tongi (COO – SW)

- Appreciate Makili's concerns. It's what these meeting is called for, to get those thoughts and concerns and working together to address them. We are taking all your concerns into consideration.

## **Ricky Niutai**

- How did you convince other provinces for them to allow you to operate? I am thinking about my province, Renbel, who is also in need for water.

## Scravin Tongi (COO – SW)

- We have been requested by the provincial governments according to the SW Act. That could require some intervention from the ministerial intervention but once that request come then some paper works will be done to ensure there is compliance with the SIWA Act before we can operate.
- Declaration by minister in compliance with the act.

### Nix Hudson (SINU)

- What is the recommended length of going out and the depth of the pipes going out?

### Marista Kapini (SW)

- SW plans to have all outfalls redundant and have only 2 operating.
- We can still go out, but it is very costly and there are also other factors that is beyond our capacity to extend further.

### Abednigo Maeohu (HCC)

- We also would take note of the harbour that ships berth.
- Maybe after the studies are done then there could be some more light on this. Issues such as earthquakes could also be considered. This is new and interesting as well.

### Scravin Tongi (COO – SW)

- There is no standard length. We can ask what is the minimum safe length?
- Depending on the conditions, we do have a safe length (minimum). Anything beyond the minimum length will bring into account money factors.
- The further it is, the safer.

### Nix Hudson (SINU)

- Do you recommend service lines to be buried or can run on the ground? There are a number of service lines that runs on the ground at SINU.

### Scravin Tongi (COO – SW)

- Ideally the pipes should be buried. This should avoid frequent bursts to it caused by vehicles. We also have them buried to avoid illegal tapping.
- Thank you for raising that, we will take note and ensure our boys do have them buried.

#### Patricia Maike (MWYCFA)

- Have been wondering the difference between treatment plant and pumping station but through the discussions, I have learnt the difference.

- More commitment and taking ownership of these projects from the responsible ministries is the main call here.
- Thank you for this very informative session although technical for some of us to understand.

### Nancy Szetu (MFMR)

- How long will the work on our side take? We are located beside the road and our accessibility.

## Scravin Tongi (COO – SW)

- We won't disturb your access. We can share the design with you. It shouldn't take long.

### Janet Tuhaika (National Council of Women)

- We (women) are mainly concerned on affordability and accessibility of water to our homes.
- The idea of the polluted water/seas has made me hesitant to buy fish from the market.
- Community consultation on how to use water wisely in a sustainable manner is very important.

### Lionel Kakai (KGVI School)

- Appreciate the session.
- Need for proper coordination relating to these developments going forward.
- We need coherent planning.
- With the rain, we are expecting high turbidity.
- KGVI is similar to other schools, we pay commercial rates.

## Scravin Tongi (COO – SW)

- We are working on the tariff structure to address the issue especially for schools. I cannot say how long this will take but we will take it into consideration.
- Every surface water is subject to high turbidity. Our surface water sources are Kongulai, Rove and Kombito. 60% of production comes from Kongulai, 40% comes from borehole. Kongulai water treatment plant is aimed at supplying water even during rainy times.

### Jaysie Boape (SMEC)

- Under this project we will be conducting community consultations following this meeting
- Public hearing on Environment report

### Lawrence Makili (Lord Howe Settlement Rep)

- Support the idea of coordination team. With idea of catchment protection, Ministry of Forestry allowing logging and ministry of Environment giving out consents, we will continue to face these issues.
- SIWA cannot address all the water issues alone. There needs coordination and networking between responsible authorities to be able to solve the issues and progress with the projects.
- LO need to do business and they need development, so with the coordination, there could be some solutions to help the local people.

## Scravin Tongi (COO – SW)

- Thank you for the open sharing.
- Thank PS for attendance.
- Need coordination as discussed. We do take note of the constructive discussions we have made here.
   Other issues discussed are not related to the project, but these are all fairly important. The cost of SW water starts from \$8 for 1000L. We need sustainability as well.

- We need the spirit of working together not only for Solomon Water projects but all projects. Thank you one and all.

## Closing Prayer: Abednigo Maeohu

## **Community Consultation Participants Register**

No.	Name	M/F	Organisation	Phone Number	Email Address
1	Abednigo Maeohu	Μ	HCC – Waste Management	7498044	abednigomaeohu@gmail.com
2	Matthew Walekoro	Μ	Min. Nat.Planning + Dev Coord		mwalekoro@mndpc.gov.sb
3	Osbent Lalahu	Μ	World Vision Solomon Islands	7456459	osbentlalahu@wv.org
4	Nix Hudson	Μ	SINU	7437317	nix.hudson@sinu.edu.sb
5	Roy Sau Teika	Μ	Mamanawata	7127781	
6	Ricky Niutai	Μ	Mamanawata	7584192	
7	Ellison Mane	Μ	HCC – Education Division	7773731	
8	Patricia Maike	F	Min. Women, YC+FA	7299161	
9	Nancy Szetu	F	Min. Fisheries + Marine Res.	39143	Nszetu@fisheries.gov.sb
10	Melchior Mataki	Μ	PS – MECDM		mmataki@mecdm.gov.sb
11	Wendy Mark	F	ADB TA – EIS Team	7410392	wmark2007@gmail.com
12	Salome Pita	F	ADB TA – EIS Team	7472587	lausofilia@gmail.com
13	Jaysie Boape	F	SMEC		jaysie.boape@smec.com
14	Clement Waihaho	Μ	Bolmar Co	7332014	
15	Melesio Olibuma	Μ	SUEZ Consultancy	7495728	
16	Janet Tuhaika	F	National Council of Women	7440948	
17	Lawrence Makili	Μ	Lord Howe Settlement	7134636	
18	Lionel Kakai	Μ	KGVI School	8618892	
19	Jerry Bobongi	Μ	Mamanawata	7274254	
20	Agnes Atkin	F	Solomon Water – PMU	8736183	aatkin@solomonwater.com.sb
21	Ray Andresen	Μ	Solomon Water – PMU	8961945	randresen@solomonwater.co m.sb
22	Marista Kapini	F	Solomon Water – PMU	7216872	kapinimarista@gmail.com
23	Charley Piringi	Μ	Solomon Water – Comms	7295964	cpiringi@solomonwater.com.s b
24	Relinta Manaka	F	Solomon Water – Comms	8503730	rmanaka@solomonwater.com. sb
25	Scravin Tongi	Μ	Solomon Water – Ops	8961980	stongi@solomonwater.com.sb

## Photographs



# Appendix 6: Community Consultations Attendance Sheets

No.	NAME	GENDER	COMMUNITY	SIGNATURE	PHONE
esterin.				Signation	
1	David - Futar	M	llt Austen	B	
2	Grenson Erere	m	Mt Austen	Acres	1
3	Shamia furai	F	MIT Austin	Sime or	716401
4	Janet Masia	F	Mt Austin	Handle ;	
5	Frank Mai	M	Mt Austin	Thes	
6	Ruth door	F	Mt Austin	375	
7	Cathy Jack	F	Mt Austin	li	
8	Ruth. Tebahne	F	Mt Austin	18	
9	Jayse Bonpe	F	SMEC	Ahpe	7446257
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12	Martin Martin		As a		
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No.	NAME	GENDER	COMMUNITY	SIGNATURE	PHONE
1	Movin-James	XA	Ackafo	the in	8458054
2	John Rily	M	Ackafo	Deft.	7671680
3	Things Alaga	M	Ackafo	-mas.	7661257
1	ENOCH GEORGEOLON	M	AEKAFO	Balas	7286607
5	Sharon Foakali	F	AEKAFO	Starof de:	8576866
5	Jemimah Tara	F	AEKARO	Л	
7	JOYLELYN SiL	F	AEKAFO	app	7798354
3	JACINTH KISITH	1=	AEKAFO	Atel	7195187.
•	Pat Janet Tori	Ŧ	AETATO	Tia	7423316
10	Lucy Roto	Ŧ	AEFAFO	<b>B</b>	7363914
11	Nester Suiga	F	Aekafo	Nish	7500061 /7680387
12	Madhne Neio	F	Ackafo	Maro	7646794
13	Lency Meaule	M	Ackafo	Alearle.	7448107

No.	NAME	GENDER	COMMUNITY	SIGNATURE	PHONE
	Carlos Ram	M	AEKAFO	Cant	7641508
	Waley Initée	M	Aelal)	H.	7369027
	Brin Villy	M	V	K	7328582
	Conny Kwai	F	AEICAFO	que	8448430
5	Samson Endo	M	AEKAFO	Carlos	7651030
5	Ricarh 15 Toel	F	AEKAFO	E	7328982
7	Marion Harry	Ŧ	Ackafo	Nothing	78/3216
3	Bryan Hale	F	Aekafo	AD	7519836
9	Benjiman Hagi	M	Aekofo	Ħ	7832501
10	Anneth Sura	F	Aekof	Æ	7493404
11	Reliate M	F	SW	Althucay	8503730
12	Marista Kapini	f	SW	Alepinis	7216872
13	Alling. Gwain	M	SW		
1	NAME	GENDER	COMMUNITY	SIGNATURE	PHONE
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17	aussie bonpe		SMEC	Alape	7446257
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No.	NAME	GENDER	COMMUNITY	SIGNATURE	PHONE
1	TIMOTHY MAE	M	G-CATYP	A	7179143
2	NATHANIEL	M	G-GAREP	A	8408001
3	Jostua.	M	G-Camp	Ohi	7858389
4	JEFFERY	M	G-Camp	Allen',	7912092
5	CLEMENT KOOBA	4 M	6= Camp	- man	7583007
5	MOBES Suy	M	G Count	A C	1
7	Michael Laith	M	G-Comp	HAR	7696820
8	THACK NUGAN	M	G camp	Caequi	7954700
9	MOSES MANUI	m	G-Camp	140500 manui	7226314
10	Alice Fakani	F	C. Camp	-755	7918004
11	Tellet Mamanai	M.	G. Comp	Mann 1	7976806
2	William	M	4 Canp	Juch-	71183-62
13	Michael Mal	11	G-Camp	- States	7528472

No.	NAME	GENDER	COMMUNITY	SIGNATURE	PHONE
1	Betty Gwao	F	G Camp	Bhuao	
2	Silvia Haleman	Ŧ	G. Camp	di	7787815
3	Ivera Louisi	t	the G-camp	12	7270875
4	Rhoda Tava	Ŧ	G-camp	R	59.3255
5/	Ella mar	Ŧ	G-canp	Encie	
6	Cycly Talo	P	Cib Camp	vistro	-
7	Salome	F	G- Camp	Q_	
8	ower	m	G-tamp.	Ð	
9	Cathy	F	C-camp .	3	
10	Maria	F	C-Canop &	V.	
11	teresa	.+	C-Carp @		
12	ETHU	F	C-Carr	Ch	
13	Jessy	¥	Cecamp	m	

No.	NAME	GENDER	COMMUNITY	SIGNATURE	PHONE
1	Allan. Gwao	M	SW		
2	Relinta	F	SW		8503730
3	Marsh Kapine	F	SW		7216872
4	Janue bonne	F	SMEC		7446257
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10.	NAME	GENDER	COMMUNITY	SIGNATURE	PHONE
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	Abel Pora	M	PaPaho	7	1613657
	Vincent . fani	m	PaPaho	1	
	Peter Toi	m	PaPaho		
	Lindia Lio	F	Palaho		
	Linda . Taly	F	Papaho		
	Janet.	Ŧ	Papaho		
	Maria Kamate	F	PaPaho		
	Dorothy	F	Papahe		
1	Feller Siv	F	Papaho		
)	Satasi maoli	M	Papaho		
L	Stron Pegoa	F	PaPaha		7944018
2	Marsta Kapini	t	SW		1
3	Jalone Box mo	F	SMEZ	Ahra	76446257

No.	NAME	GENDER	COMMUNITY	SIGNATURE	PHONE
1	Alfred NollEN	M	Tituge	A	7842859
2	JaelRikalo	M	tities	Fabre	7777768
3	OBed mark	M	Titige	Anak	-
4	Matthew Lobonga	M	Tilinge	Hinder	7835097
5	WESLEYMANE	M	TITINGE	AL	7680233.
6	David Valusa	M	TITIGE	Alter	
7	Ethwarm fataca	M	t <i>i</i>		19639639
8	tsaac taon	m	-1	Alere	7875717
9	Ameth Tager	f	17	L	
10	Penninah fani	4	11		1716 1917
11	alvoin Pagy	4	17		
12	Obed Toxi	M	u/		
13	Lut Mathica	F	t.		

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40.	NAME	GENDER	COMMUNITY	SIGNATORE	Phone
L	Lave Kalen	F	Time		
2	Milan Paua	An	1/		
3	Niveran Manata	¥	te		
\$	Elvis Nixon	M	17		
5	Kalea	M	t.		
6	Annethe Kivi	¥.	16	,	
7	Vanazio Agosantu	M	~	Art	7624635
8	Jeniel Alasa	M	¥	-0	7489202
9	Joan . Tranger	7	V		
10	Jayne Boape	F	SMER	Alspe	7448067
11	Manster Kapini	F	SW-PMU		
12	Relink.	F			
13	Silas Talasi	m	SW		

## Appendix 7: Outline of Workers Code of Conduct

I, **[Name of Employee (Casual or General Worker and Personnel)]**, acknowledge that I will adhere to the WB Safeguards Policies and the ADB Safeguards Policy Statement, and will also comply with the project's safeguards requirements.

**[Name of Contractor]** considers that failure to follow the provisions of the construction environmental and social management plan (CESMP) and project's safeguards standards and policies, applicable to the project or by **[Name of Contractor]** at the worksite, worker's construction camp and communities surrounding the work site both during work hours and after work hours – can be considered as gross misconduct and are grounds for sanctions, penalties or termination of employment.

I understand that the **[Name of Contractor]** will create a respectful work environment and will not tolerate any forms of bullying or harassment.

I also understand and acknowledge that any misconduct relating to gender-based violence (GBV), sexual exploitation, abuse and harassment (SEAH) or violence against children (VAC) will not be tolerated and can and will be prosecuted legally.

I agree that while working on this project I will:

- Consent for a background check by my employer or any party involved in the project, if required.
- Attend and actively partake in safeguards (including health and safety and communicable diseases awareness and prevention, SEAH, GBV and VAC) training courses as requested by my employer.
- Will always wear my personal protective equipment (PPE) when at the work site or engaged in project related activities.
- Take all practical steps to implement the CESMP and relevant sub management plans.
- Adhere to a zero-alcohol policy during work activities, and refrain from the use of narcotics or other substances.
- Treat women, children (persons under the age of 18), and men with respect regardless of race, color, language, religion, political or other opinion, national, ethnic or social origin, property, disability, birth or other status.
- Not use language or behavior towards women, children or men that is inappropriate, harassing, abusive, sexually provocative, demeaning or culturally inappropriate.
- Not sexually exploit or abuse project beneficiaries and members of the surrounding communities including children.
- Not engage in any form of harassment, including sexual, of work personnel and staff —
  for instance, making unwelcome sexual advances, requests for sexual favors, and other
  verbal or physical conduct of a sexual nature is prohibited. E.g. looking somebody up and
  down; kissing, howling or smacking sounds; hanging around somebody; whistling and
  catcalls; in some instances, giving personal gifts.

- Not engage in sexual favors —for instance, making promises of favorable treatment (e.g. promotion), threats of unfavorable treatment (e.g. loss of job) or payments in kind or in cash, dependent on sexual acts—or other forms of humiliating, degrading or exploitative behavior.
- Not use prostitution in any form at any time.
- Not participate in sexual contact or activity with children under the age of 18—including grooming or contact through digital or social media. Mistaken belief regarding the age of a child is not a defense. Consent from the child is also not a defense or excuse.
- Unless there is the full consent by all parties involved, I will not have sexual interactions
  with members of the surrounding communities. This includes relationships involving the
  withholding or promise of actual provision of benefit (monetary or non-monetary) to
  community members in exchange for sex (including prostitution). Such sexual activity is
  considered "non-consensual" within the scope of this Code.
- Consider reporting through the GRM or to my manager any suspected or actual GBV by a fellow worker, whether employed by my company or not, or any breaches of this Code of Conduct.
- Report to my employer the following issues concerning children under the age of 18:
  - presence of any children on the construction site or engaged in hazardous activities.
  - Wherever possible, ensure that another adult is present when working in proximity of children.
  - Not invite unaccompanied children unrelated to my family into my home, unless they are at immediate risk of injury or in physical danger.
  - Not use any computers, mobile phones, video and digital cameras or any other medium to exploit or harass children or to access child pornography (see also "Use of children's images for work related purposes" below).
  - Refrain from physical punishment or discipline of children.
  - Refrain from hiring children for domestic or other labor below the minimum age of 14 unless national law specifies a higher age, or which places them at significant risk of injury.
  - Comply with all relevant local legislation, including labor laws in relation to child labor and World Bank's and ABD's safeguard policies on child labor and minimum age.
  - Take appropriate caution when photographing or filming children.

**Sanctions:** I understand that if I breach this Code of Conduct, my employer will take disciplinary action which could include:

- 1. Informal warning.
- 2. Formal warning.
- 3. Additional Training.
- 4. Loss of up to one week's salary.
- 5. Suspension of employment (without payment of salary)
- 6. Termination of employment.
- 7. Report to the Police if warranted.

I understand that it is my responsibility to ensure that all safeguards' policies are met and complied with. I will avoid actions or behaviors that could be construed as GBV. Any such actions will be a breach of this Code of Conduct. I do hereby acknowledge that I have read the Code of Conduct, and I do agree to comply with the standards contained therein and understand my roles and responsibilities to prevent and respond to Safeguards issues (Environmental and Social including OHS) and GBV issues. I understand that any action in breach of this Code of Conduct or failure to act mandated by this Code of Conduct may result in disciplinary action and may affect my ongoing employment.

Signature: \_\_\_\_\_

Printed Name:

Title: \_\_\_\_\_

Date: