
South Tarawa Sanitation Project Household Sewer Connection Improvements in Betio, Bairiki and Bikenibeu

Draft Environmental and Social Management Plan

South Tarawa Sanitation Project
Ministry of Infrastructure and Sustainable Energy
December 2025

Table of Contents

Executive Summary	viii
<i>Project need and justification</i>	viii
<i>Options considered</i>	viii
<i>Statutory and policy framework</i>	viii
<i>Unexploded ordnance (UXO)</i>	ix
<i>Environmental and social assessment</i>	ix
<i>Environmental and social management</i>	ix
<i>Conclusion</i>	x
1. Introduction	1
1.1 Project Background.....	1
1.2 Purpose of this ESMP	2
2. Existing Context	4
2.1 Access to Sanitation	4
2.2 Existing Sewer Network	4
2.3 Ocean Outfalls	5
2.4 Project Need and Justification	8
3. Project Description	10
3.1 Project Objectives	10
3.2 Project Design	10
3.3 Methodology	10
3.4 The Bubble Concept.....	12
3.5 Estimate of Wastewater Added to the Existing Network Compared to Outfall Capacity.....	15
3.6 Construction Activities.....	17
3.6.1 <i>Work methodology and construction staging</i>	17
3.6.2 <i>Sewer pipe installation</i>	17
3.6.3 <i>Traffic and access</i>	18
3.6.4 <i>Public utility adjustment</i>	19
3.6.5 <i>Private hedges, fences, and other assets</i>	19
3.6.6 <i>Provision of new toilet blocks</i>	19
3.6.7 <i>Decommissioning of septic tanks</i>	20
3.6.8 <i>Assumed construction schedule, workforce and working hours</i>	21
3.6.9 <i>Source and quantity of materials</i>	22
3.6.10 <i>Construction site compound and laydown areas</i>	22
4. Policy and Legal Framework	23

4.1	National Legal Requirements.....	23
4.1.1	<i>Environment Act 2021</i>	23
4.1.2	<i>Environment Regulation 2017</i>	23
4.1.3	<i>State Land Act 2001</i>	24
4.1.4	<i>Building Act 2006</i>	24
4.1.5	<i>Occupational Health and Safety Act 2015</i>	24
4.2	World Bank Policies	25
4.2.1	<i>Environmental and Social Framework</i>	25
4.3	Environmental and Social Commitment Plan	26
4.4	Labour Management Procedures	26
4.4.1	<i>Stakeholder Engagement Plan</i>	26
5.	Community and Stakeholder Engagement.....	28
5.1	Consultation Strategy	28
5.2	Consultation Activities to Date	30
5.3	Ongoing and Future Consultations	30
6.	Environmental and Social Impact Assessment.....	32
6.1	Soil Resources	32
6.1.1	<i>Existing conditions</i>	32
6.1.2	<i>Potential construction impacts</i>	32
6.2	Groundwater Resources	33
6.2.1	<i>Existing conditions</i>	33
6.2.2	<i>Potential construction impacts</i>	34
6.2.3	<i>Potential operational impacts</i>	34
6.3	Solid Waste Generation	35
6.3.1	<i>Potential construction impacts</i>	35
6.4	Marine Water Quality and Biodiversity	35
6.4.1	<i>Existing conditions</i>	35
6.4.2	<i>Potential construction impacts</i>	37
6.4.3	<i>Potential operational impacts</i>	38
6.5	Traffic and Access.....	42
6.5.1	<i>Existing conditions</i>	42
6.5.2	<i>Potential construction impacts</i>	43
6.5.3	<i>Potential operational impacts</i>	44
6.6	Air Quality and Odour.....	44
6.6.1	<i>Existing conditions</i>	44
6.6.2	<i>Potential construction impacts</i>	44
6.6.3	<i>Potential operational benefits and impacts</i>	44

6.7	Noise and Vibration	45
6.7.1	<i>Existing conditions</i>	45
6.7.2	<i>Potential construction impacts</i>	45
6.7.3	<i>Potential operation impacts</i>	45
6.8	Community Health and Safety	46
6.8.1	<i>Existing Conditions</i>	46
6.8.2	<i>Potential construction impacts</i>	46
6.8.3	<i>Potential operational benefits and impacts</i>	47
6.9	Visual Amenity	49
6.10	Socio-Economics	49
6.11	Occupational Health and Safety	50
6.12	Resource Use	51
7.	Environmental and Social Management.....	52
7.1	Roles and Responsibilities.....	52
7.1.1	<i>PMU</i>	52
7.1.2	<i>KFSU</i>	52
7.1.3	<i>PIAC</i>	52
7.1.4	<i>Construction contractors</i>	53
7.2	Detailed Design and Construction Planning	53
7.3	Bidding Documents.....	53
7.4	Mitigation and Management Measures	54
8.	Conclusion	69

Table Index

Table 2-1	Estimated current wastewater inflow rates in the 3 Bs (Baseline)	7
Table 3-1	Distribution of the bubbles in the 3Bs	12
Table 3-2	Number of proposed new HH connections to sewer network.....	15
Table 3-3	Estimate of total average and peak inflow post-project– average and peak inflow, compared to outfall capacity	16
Table 3-4	Outfall Capacity and Operating Regime (New Installation)	16
Table 3-5	Septic tank and cesspit decommissioning process	20
Table 5-1	Issues raised during consultation.....	28
Table 6-1	Estimated pollutant load at the Betio Outfall	37

Table 6-2 Estimated pollutant load at the Bairiki outfall	37
Table 6-3 Estimated pollutant load at the Bikenibeu outfall	37
Table 6-4 Future estimated pollutant load at the Betio outfall	40
Table 6-5 Future estimated pollutant load at Bairiki outfall.....	41
Table 6-6 Future estimated pollutant load at Bikenibeu outfall	42
Table 7-1 E&S mitigation and management measures.....	55

Figure Index

Figure 1-1 Location of Betio, Bairiki and Bikenibeu	2
Figure 3-1 Household connection methodology	11
Figure 3-2 Spatial distribution of bubbles in Betio	12
Figure 3-3 Spatial distribution of bubbles in Bairiki	13
Figure 3-4 Spatial distribution of bubbles in Bikenibeu	14
Figure 5-1 Tentative consultation timeline	29
Figure 6-1 Typical above/below ground infrastructure of new household toilets	49

Appendices

Appendix A – Inflow Rates Detailed Calculations

Appendix B - Differentiation of Pump Rates and Number of Pumps

Appendix C - 2021 for Trees, Crops and Building Structures

Appendix D - Consultation Summary

Appendix E – 3 Bs Meeting Minutes

Appendix F – Bikenibeu Pilot One-on-one HH Consultations

Appendix G - Review of Wastewater Flow and Nutrient-load Calculations in the ESMP

Appendix H – GRM Flowchart

Appendix I – Consultation Information Materials

Appendix J - Visual Examples of Chance Finds

Document Control Table

Rev No.	Author	Reviewed	Issued to WB date
0	STSP PMU/KFSU	KFSU	31 July
1	STSP PMU/KFSU	KFSU	9 September
2	STSP/PIAC	STSP	24 October
3	STSP/PIAC	STSP	26 November
4	STSP/PIAC	PIAC	5 December
5	STSP/PIAC	PIAC	16 December

Abbreviations

3Bs	Betio, Bairiki and Bikenibeu
BOD	Biological Oxygen Demand
CESMP	Contractor Environmental Social Management Plan
CoC	Code of Conduct
ECD	Environment Conservation Division
ECOP	Environmental Codes of Practice
EHS	Environment, Health and Safety
EIA	Environmental Impact Assessment
EL	Environment Licence
E&S	Environmental and social
ESCP	Environmental and Social Commitment Plan
ESHS	Environment, Social, Health, and Safety
ESIA	Environmental and Social Impact Assessment
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plan
ESS	Environmental and Social Standard
GRM	Grievance Redress Mechanism
HH	Household(s)
KFSU	Kiribati Fiduciary Services Unit
LMD	Land Management Division
MTCIC	Ministry of Tourism, Commerce, Industry and Cooperatives
MELAD	Ministry of Environment, Lands and Agricultural Development
MISE	Ministry of Infrastructure and Sustainable Energy
OHS	Occupational Health and Safety
O&M	Operation and Maintenance
PMU	Project Management Unit
PUB	Public Utilities Board
SEP	Stakeholder Engagement Plan
STSISP	South Tarawa Sanitation Improvement Sector Project
STSP	South Tarawa Sanitation Project
TN	Total Nitrogen
TP	Total Phosphorous
TSS	Total Suspended Solids
UXO	Unexploded Ordnance
WHO	World Health Organization

Executive Summary

Project need and justification

South Tarawa faces a severe sanitation crisis. 51.2 percent of the population within Betio, Bairiki and Bikenibeu (“the 3 Bs”) are connected to the sewerage system. 5.1 percent still practice open defecation, and the remaining 43.7 percent rely on septic tanks and latrines. Approximately 60 percent of wastewater is unsafely managed, contaminating groundwater, wells, and lagoons. The consequences for public health are serious: diarrheal diseases account for nearly 10 percent of under-five deaths, and child malnutrition is closely linked to poor sanitation.

The South Tarawa Sanitation Project - Household Sewer Connections (the Project) will connect 965 HH in Betio, Bairiki, and Bikenibeu to a safely managed sewer network, install new sewer main branches and construct new single unit toilets. By decommissioning unsafe septic tanks and reducing open defecation, the Project will substantially improve environmental conditions, protect water resources, and reduce preventable illness.

Options considered

Different technical approaches have been reviewed over time. Freshwater flushing was rejected due to extreme scarcity of freshwater resources. Upgrading on-site sanitation systems such as septic tanks was found to have limited impact in the densely settled, low-lying atoll environment. A mixed system would be operationally complex and less sustainable. Continuing with seawater flushing through the reticulated sewer network, combined with the use of deep ocean outfalls, remains the most feasible and environmentally appropriate option, consistent with existing infrastructure and sector investment plans.

Statutory and policy framework

The Project is governed by both national law and World Bank safeguards. At the national level, it falls under the Environment Act 2021 and Environmental Regulations 2017, which require an Environment Licence (EL) for significant activities, though MELAD has confirmed that no license is necessary for these works. Building permits under the Building Act 2006 will, however, be required for household toilets and connections. The Occupational Health and Safety (OHS) Act 2015 set out clear employer obligations to safeguard workers and site visitors.

The Project is subject to the World Bank Environmental and Social Framework (ESMF) on an international level. The most relevant standards include ESS1 on risk management, ESS2 on labour and working conditions, ESS3 on resource efficiency and pollution prevention, ESS4 on community health and safety, ESS5 on land use, ESS6 on biodiversity, ESS8 on cultural heritage, and ESS10 on stakeholder engagement. At the Project level, the Environmental and Social Commitment Plan (ESCP), Labour Management Procedures, and Stakeholder Engagement Plan (SEP) provide binding safeguards obligations for community and stakeholder engagement.

This ESMP and subsequent Construction ESMP (CESMP) for sewer connections under the STSP complies with the World Bank Environmental, Health and Safety (EHS) Guidelines. These include General EHS Guidelines, which provide overarching requirements for

environmental management, occupational health and safety, community health and safety, and construction practices. In addition, the sector specific EHS Guidelines for water and sanitation are applicable, covering sewer network installation, wastewater treatment, sludge handling, odor control, and work safety. Furthermore, the CESMP must align with the World Bank's Environmental and Social Framework (ESF), excluding ESS7 and ESS9.

Community engagement has been extensive and is continuing. Maneaba meetings, HH visits, and site inspections have been held in all three Project areas, and information has also been disseminated during public events and through radio, posters, and social media.

Concerns raised by HH and communities include unclear land boundaries, risks to wells and saltwater pipes, blocked access during trenching, and disturbance from noise and dust. Some residents also feared they might be asked to pay for toilets. The Project team has responded by verifying boundaries with MELAD, planning protective measures for wells, committing to maintain safe household access during works, and clarifying that toilets and connections are provided at no cost to eligible HH. A grievance redress mechanism (GRM) is in place and accessible through multiple channels. Engagement will continue through the detailed design and construction phases, with particular attention to the needs of vulnerable groups such as female-headed HH, tenants, the elderly, and people with disabilities.

Unexploded ordnance (UXO)

Betio's history as a World War II battleground means that unexploded ordnance may still be present underground, creating a significant safety risk. Under the design-build contract, UXO surveys and clearance will be carried out once the detailed design is finalized, to ensure that clearance covers all actual alignments and excavation areas. Clearance will be a strict precondition for site activities: no trenching, excavation, or pipe-laying will commence until UXO clearance is complete and the area certified safe. The UXO contractor will prepare and implement a dedicated CESMP addressing all safety, environmental, and social aspects of their work for Betio only.

Environmental and social assessment

The ESMP identifies both short-term construction risks and long-term benefits. Excavation and septic tank decommissioning may temporarily affect soils and groundwater, but the removal of over 600 failing septic tanks will greatly reduce contamination in the long run. Additional inflows to the ocean outfalls will remain within design capacity, and a new monitoring program will track groundwater and marine water quality.

Biodiversity impacts are limited, as works occur mainly in already urbanized settings, but marine ecosystems in the lagoon will benefit from reduced nutrient and pathogen loads.

Construction risks to communities include traffic disruption, dust, noise, and temporary access restrictions. These will be managed through careful planning and mitigation, including traffic controls, dust suppression, and advance community notifications. The long-term health benefits of improved sanitation, reduced diarrheal disease, and reduced malnutrition are expected to be significant.

Environmental and social management

Project implementation will be guided by this ESMP, with site-specific measures detailed in CESMPs. The design-build contractor must prepare a CESMP consistent with this ESMP, the World Bank Environmental and Social Standards (ESS), the Project's Environmental

and Social Commitment Plan, and the applicable World Bank General and Sector-Specific Guidelines. The CESMP will specify construction methodologies, mitigation measures, OHS procedures, waste and traffic management plans, and monitoring arrangements. Approval by the PMU will be mandatory before any site activities commence.

Together with the UXO contractor's dedicated CESMP, this framework establishes a comprehensive system for managing environmental, social, and safety risks throughout implementation.

Conclusion

The STSP - Household Sewer Connection in Betio, Bairiki, and Bikenibeu addresses one of South Tarawa's most pressing development challenges. By extending the seawater flush sewer network, connecting almost one thousand HH to a safely managed sewer network, constructing new single unit toilets, decommissioning unsafe septic tanks and cesspits, and reducing open defecation, it will deliver substantial improvements in public health, environmental quality, and community well-being. Combined with rigorous safeguards on UXO clearance in Betio, community engagement, and environmental and social management, the Project provides a safe, feasible, and sustainable pathway toward improved sanitation for the people of Betio, Bairiki, and Bikenibeu.

1. Introduction

1.1 Project Background

The Ministry of Infrastructure and Sustainable Energy (MISE) proposes to undertake Household Sewer Connection Improvement Works to connect approximately 965 households (HH) to the existing sewer network in Betio, Bairiki and Bikenibeu. This intervention (the Project) will be implemented as part of the South Tarawa Sanitation Project (STSP) with financial support from the World Bank. The Project will increase access to sanitation services in selected areas of South Tarawa, resulting in substantial public and environmental health benefits. The locations of Betio, Bairiki and Bikenibeu are shown in Figure 1-1 below.

The Household Sewer Connection Improvement Works include:

- Cleaning and rehabilitating the sewer network prior to the commencement of the works, including repairing damaged pipes, maintaining outfalls and pump stations, and strengthening PUB's capacity through staff training and the development of standard O&M procedures.
- Upstream extensions of the existing mains sewer network located within public road corridors. This will substantially extend the mains sewer network bringing it closer to residential HH not currently connected to the mains network.
- Connecting approximately 344 HH with existing toilets to the mains sewer network and decommissioning their existing septic tanks.
- Providing new toilets for approximately 622 HH that currently do not have a toilet and connecting the new toilets to the sewer mains network.
- HH with existing toilets that are not currently connected to the saltwater flushing system will be retrofitted to direct connections. This will replace the existing practice of collecting buckets of saltwater from standpipes to flush toilets.

South Tarawa faces significant challenges in sanitation coverage. While approximately half of the population has access to basic sanitation, the remainder rely on shared facilities, unimproved on-site systems such as pit latrines, or resort to open defecation practices that pose serious public health risks and contribute to environmental degradation. 51.2 percent of the population across the 3Bs is currently connected to the existing sewerage network, and there is no wastewater treatment infrastructure. Untreated sewage is discharged directly into the marine environment via ocean outfalls. HH typically discharge greywater into the ground, relying on the natural infiltration of coral sands.

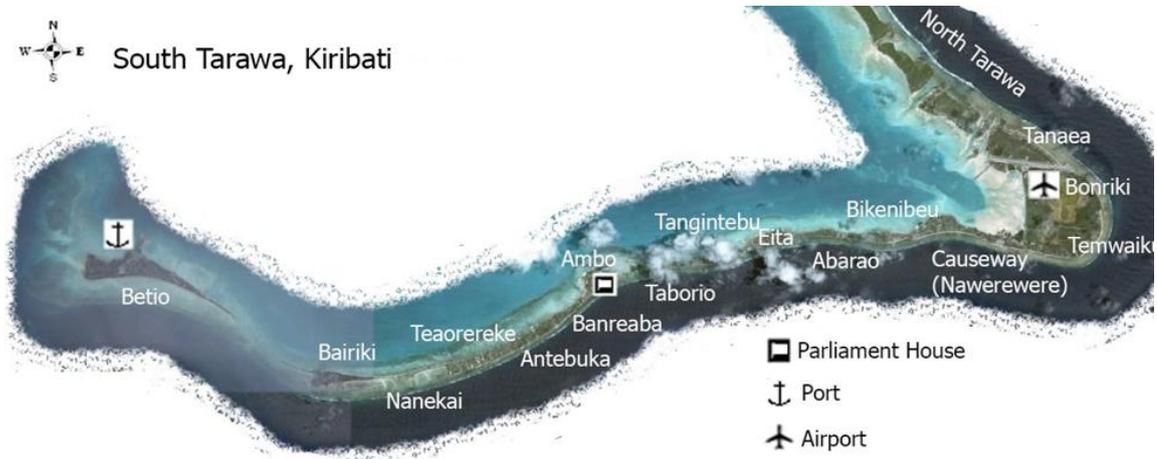


Figure 1-1 Location of Betio, Bairiki and Bikenibeu

1.2 Purpose of this ESMP

The purpose of this Environmental and Social Management Plan (ESMP) is to identify and assess the potential environmental and social (E&S) impacts associated with construction and operation of the proposed HH sewer connection improvements. This ESMP also proposes mitigation and management measures to minimize and avoid adverse impacts.

This document has been prepared in accordance with the World Bank ESMF, specifically Environmental and Social Standards (ESS) 1, 3, 4, 6, 8 and 10 which guide environmental and social assessment. It aligns with the Kiribati Environment Act of 1999 (along with its 2007 Amendments), the updated Environment Act 2021, as well as the Environment Regulation 2017, and the Building Code and Building Act 2021. In addition, it also considers the State Lands Acts in relation to ESS5, as well as the national labour legislation namely Occupational Health and Safety Act 2015 and Employment and Industrial Relations Code 2015 in relation to ESS2.

In addition, the Project is guided by the STSP Environmental and Social Commitment Plan (ESCP), which sets out key measures, actions, and timelines that the Government of Kiribati has committed to implement in order to comply with the World Bank's Environmental and Social Standards (ESSs). The ESCP outlines important requirements for the preparation and implementation of this ESMP for the sewer connection works, ensuring that commitments on organizational arrangements, monitoring and reporting, incident management, labour and working conditions, land access, stakeholder engagement, and grievance redress are applied. This ESMP therefore operationalizes relevant aspects of the ESCP by detailing site-specific risks, impacts, and mitigation measures to be implemented during the sewer connection activities.

This ESMP will be submitted to the Ministry of Environment, Land, and Agriculture Development (MELAD) to be assessed as part of the EL application process. Additionally, it will be submitted to the World Bank for their clearance prior to bidding for the Construction Contract. An EL form has been submitted to the Environment Conservation Division (ECD) at MELAD in accordance with the Environment Act 1999 and Environmental (General) Regulations 2017. The EL is required prior to any construction work starting onsite, in accordance with Part IV of the Environment (Amendment) Act 2007.

A Building Permit also needs to be obtained from the MELAD Lands Management Division, which involves the Public Utilities Board (PUB) and MISE. The building permit is required before ECD will issue the EL.

The OHS Act require employers to provide and maintain, as practicable, a working environment for employees and site visitors that is safe and without risks to health. This ESMP considers potential occupational, health and safety risks to workers and recommends appropriate mitigation measures that will be enforced during construction work.

This ESMP also outlines a framework for monitoring implementation of mitigation measures, including the roles and responsibilities of the PMU and the construction contractors.

2. Existing Context

2.1 Access to Sanitation

South Tarawa continues to face major challenges in the provision of adequate and sustainable sanitation services. Although approximately half of the population has access to basic sanitation, a significant proportion still rely on shared toilets, unimproved on-site systems such, as pit latrines without slabs, or, in many cases, practice open defecation in nearshore areas. Estimates suggest that up to 5.1¹ percent of the population across the 3Bs resorts to open defecation, at least, occasionally. These practices are more prevalent among low-income HH, where over two-thirds of the poorest quintile lack access to any form of sanitation.

The environmental implications of this situation are serious. With 51.2 percent of the population across the 3Bs are connected to reticulated sewerage networks, the majority of wastewater is either discharged directly into the environment or into the sea via submarine outfalls, without treatment, beyond primary bar filtration, that is designed to remove larger objects and rags that have entered the system. Greywater is typically discharged directly onto the land, making use of the high infiltration capacity of coral sand. However, this poses risks to both groundwater and surface water quality. Past studies have detected microbial contamination at well sites and frequent occurrences of faecal coliforms in lagoon and reef waters, which are commonly used for bathing and subsistence activities. The lack of wastewater treatment, combined with inadequate solid waste disposal and poor on-site systems, continues to threaten environmental and public health outcomes across South Tarawa.

2.2 Existing Sewer Network

The existing piped sewerage systems on Betio, Bairiki and Bikenibeu were installed under Australian aid projects in the 1970s and 1980s.

As part of the STSP project, a site inspection of the sewer network and pumping system was undertaken in November 2024. This inspection identified that several pumps were broken, causing the sewer network to not operate as designed. Based on recommendations from this inspection, 40 new Sulzer submersible sewer pumps, two for each pump station (with seven different pumping inflow rates and power ratings, including sensors that automatically activates and deactivates when specific water levels are reached) were procured under STSP Operation and Maintenance (O&M) support funding. The pumps have been delivered to PUB and will be installed after the sewer network and pumping stations are fully jet-cleaned, due to solid waste build-up from the six-year cessation of jet cleaning (since 2019). HH connections will also only follow once both jet cleaning and pump installation are done.

At this time, it was considered preferable to preserve the limited available freshwater resources on South Tarawa for all purposes except toilet flushing and instead use saltwater for flushing. These sewerage and saltwater supply systems were partially rehabilitated by the Asian Development Bank (ADB) funded Sanitation, Public Health and

¹ Source: ChildFund data. ODF for Betio is 114 out of 2471 HH, Bairiki is 32 out of 463 HH and Bikenibeu is 67 out of 1,233. Using 6.5 average person per HH, the estimated ODF population is 1385 out of a total population of 27,086 across the 3Bs, during the survey.

Environment Improvement (SAPHE) Project in the early 2000s and again under the STSISP in the late 2010s. As the system uses saltwater there is an increased risk of corrosion of system elements, particularly metallic components.

The saltwater flushing system has been supplemented with standpipes (or “tap stands”) to enable people to fill buckets with saltwater for flushing toilets rather than having direct connections to individual toilet cisterns.

Saltwater leaks have been an ongoing problem in the South Tarawa sewerage system in all three serviced areas including post STSISP rehabilitation. Causes of leaks include corrosion of existing tapping bands (connectors from HH sewer lines to the sewer mains), surface loads from heavy vehicles causing pipe fracturing, faulty installation methods, and holes caused during excavations by others.

Saltwater leaks can contaminate the groundwater lens and may also lead to contamination of soils and death of local trees and gardens close to where the leak occurs.

Based on multiple option assessments and sector plans, continued seawater flushing of the sewer network remains the most feasible and environmentally preferred approach given the existing constraints of severe freshwater scarcity, limited land for treatment, and the network’s original seawater design). Current WB/ADB investments therefore prioritize rehabilitating and directly connecting the salt-water flush network to toilets, while managing corrosion and leakage risks. This includes the South Tarawa Water and Sanitation Roadmap 2011-2030 (Fraser Thomas) and Tarawa Water Master Plan 2010-2030 (NIWA/PRIF).

The saltwater flush system remains the most appropriate solution for wastewater flushing in South Tarawa. The newly rehabilitated saltwater flush system delivered under STSISP is operating well according to the Sewerage O&M Technical Support advisor appointed under STSISP.

2.3 Ocean Outfalls

South Tarawa has three sewage effluent outfalls located at Bikenibeu, Bairiki and Betio (the “3 Bs”). The original outfalls (connected to the piped sewer network and saltwater flush systems) were built between 1978 and 1983 and were subsequently rehabilitated under the SAPHE project in 2001-05. This system served the most densely populated parts of Betio, Bairiki and Bikenibeu by pumping saltwater to elevated tanks and from there piping it to HH and toilet blocks that had flush toilets in place. A sewer collection network then delivered the wastewater to three outfalls at the reef edge.

The outfalls were upgraded in 2018 under the ADB-financed STSISP. The upgrades involved replacement of the old PVC pipes with high-density polyethylene (HDPE). The capacity of the pumps at the outfalls are 41.54 L/s for Betio and 25.62L/s for both Bairiki and Bikenibeu.

To date, only preliminary screening of solids is undertaken at the pumping stations prior to discharge, with no secondary or tertiary treatment provided. The system relies on offshore dispersion and dilution as the primary means of managing the impacts on marine water quality (SMEC, 2019: Coastal Fisheries Division, 2019).

In 2020, FCG and FTP Fraser Thomas Partners reviewed previous projections of wastewater generation from several technical studies and concluded that the revised outfall pipe diameters have ample capacity for inflows for the growing population in the

3B's in South Tarawa through to the 2040 population estimates. The sewer network does not cover the rest of South Tarawa.

No inflow data is collected from any of the networks nor outfall data at the outfalls, so the current average wastewater discharges are based on estimates and assumptions of the number and type of connections. Based on the population Census 2024, the 3Bs has a total population of 36,324 (refer Table 2-1). Child Fund and KHC data shows sewer household sewer connection of 1642 in Betio, 519 in Bairiki and 718 in Bikenibeu (refer Table 2-1). Based on the sewer household connection, the total population connected to the sewer network in the 3Bs is 18,712 which is 52% of the total population.

The calculation for existing inflows includes the existing household connections as per the ChildFund data, KHC residential connections and Institutional and commercial buildings. Commercial and industrial waste flows are not monitored in South Tarawa. PUB has a number of commercial and industrial connections in Tarawa but specific details on the water supply usage, the wastewater flows and the wastewater characteristics are not well documented. To estimate the contribution of commercial and industrial wastewater to the total baseline discharge estimates, a person equivalency factor of 10 is used for the commercial clients in the 3Bs (estimated at 55, as of 2015) and a factor of 50 person equivalents is used for industrial properties (estimated at 23, as of 2015). This is likely an underestimate for some facilities but an overestimate for many others. As there are no known large-scale slaughterhouses, breweries or other similar facilities with high organic loads, this approach is viewed as adequately capturing the additional risk. In total this approach yields an equivalent of an additional 1,700 people across the 3Bs, which adjusted for 2025 figures yields a total of 2,775 people equivalents. Without data showing the specific numbers for each community, the analysis has assumed one third in each of the three Bs (equivalent to 925 people per village).

These existing connections are currently generating average wastewater inflows, consisting of black wastewater, of 12.03 L/s, 4.42 L/s, and 5.82 L/s at Betio, Bairiki and Bikenibeu outfall respectively². These inflows are based on average discharge.

To assess nutrient loading at the 3 ocean outfalls, research reports from PUB³ provide standard domestic waste flows, containing blackwater, there is a concentration of 250 mg/L for Biochemical Oxygen Demand (BOD), 250 mg/L for Total Suspended Solids (TSS), 40 mg/L for Total Nitrogen (TN), and 7 mg/L for Total Phosphorus (TP) (refer to Table 6-1, Table 6-2, Table 6-3).

Table 2-1 presents an estimate of the current wastewater inflow and the existing capacity of the pumps at each outfall. The number of connected HH is based on data from ChildFund and KHC. Refer to Appendix A for detailed calculations on inflow rates and to Appendix G (Sections 5, 6 and 7) for calculations of wastewater flows and nutrient-loads.

² This has been calculated using an estimate of 90L/person/day which includes allowances for commercial and industrial connections in each community, and that each household has 6.5 people.

³ These figures represent analysis of waste flows arriving at the outflows.

Table 2-1 Estimated current wastewater inflow rates in the 3 Bs (Baseline)⁵

Sewer network Project area	Population (census data 2024 ⁴)	Connected population (2024 ChildFund +KHC)	Connected HH (2024 ChildFund + KHC)	Industrial and commercial population equivalent	Avg current inflow HH (Child Fund + KHC+ Commercial & Industrial) (L/s)	Existing Outfall capacities (L/s)
Betio	19,337 (18,429 in 2020 census with 1.21 % annual growth)	10,673	1,642	925	12.03	41.54
Bairiki	5,132 (4,151 in 2015 census with 2.38 % annual growth)	3, 372	519	925	4.45	25.62
Bikenibeu	11,855 (9,589 in 2015 census with 2.38 % annual growth)	4, 667	718	925	5.82	25.62

Note: This table is a summary of Sections 5, 6 and 7 of Appendix G.

⁴ This is an assumption based on growth rates in respective to the 3Bs for 2024 from the Census Data.

⁵ Refer to the Appendix A detailed calculation

An Initial Environmental Examination (IEE) was undertaken and published at the time and an Environment Licence (EL) issued by ECD covering the construction of the outfall and the ongoing sewerage discharges. The ECD is yet to reissue an updated version of the current EL, dated 2019, with amendments aligning with the Kiribati Environmental Act 2021, including specification of the licence’s expiration date. While the ECD does not prescribe specific permissible limits for the quality or quantity of wastewater discharged from the outfalls, it encourages all activities to comply with relevant WHO and regional environmental standards.

2.4 Project Need and Justification

South Tarawa’s population suffers from poor availability and quality of sanitation services. According to ChildFund, KHC and PUB survey data across the 3Bs, approximately:

- 51.2 percent of the population are using a toilet connected to the sewerage system.
- 5.1 percent practising open defecation with the remaining.
- 43.7 percent use a toilet to a septic tank and pit latrines.

Approximately 40 percent of wastewater and faecal sludge is contained and treated by water dilution at depth and disposal within ocean waters while 60 percent is unsafely managed leading to poor water quality in the lagoon, intertidal reef and in domestic wells resulting in associated public health implications. Inadequate water and sanitation services and poor hygiene practices are closely associated with many waterborne diseases. Public health impacts are severe: diarrhea accounts for about 9.5 percent of deaths among children under five, with under-five mortality at 50 per 1,000 live births and infant mortality at 40 per 1,000 live births—the highest in the Pacific. Malnutrition is also linked to poor sanitation, with 6.5 percent of children under five underweight and 14 percent stunted. Monitoring of lagoon and groundwater in 2019 showed widespread fecal bacteria, with one-quarter of samples at levels posing significant health risk⁶.

Recent upgrades to the deep ocean outfall system have allowed sewage from sewered HH to be safely disposed to the ocean and the STSP Project proposes to install more HH connections to this network.

South Tarawa’s water supply system relies on several sources: a reticulated network drawing groundwater from the Bonriki and Buota lenses, a desalination network that supplements and integrates harvesting systems, and open or protected groundwater wells. Potable water – comprising reticulated groundwater, harvested rainwater, and limited private desalination output – is mainly reserved for drinking and essential domestic use. Brackish water from privately owned or nearby dug wells is commonly used for non-potable purposes such as toilet flushing, washing, and cleaning. HH provided with new toilets located outside the dwelling, as part of the sewer connection works, will also use brackish water for flushing. In some areas, a reticulated seawater flushing system provides an additional non-potable source of sanitation.

Groundwater reserves are protected through fencing, buffer zones, and routine monitoring to prevent contamination, while desalination intakes are managed to reduce

⁶ International Development Association. 2022. South Tarawa Sanitation Project Appraisal Document. Report No. PAD4763.

pollution risks. The South Tarawa Drought Response Plan⁷ sets out strategies for conserving limited freshwater resources during droughts or alert periods, supported by community awareness programs promoting protection and sustainable use.

The Bonriki and Buota groundwater reserves are officially designated and managed by MELAD, with land use restricted to water infrastructure and monitoring activities. However, the growing number of informal settlements has increased the risk of encroachment and contamination. Currently, PUB supplies about 60% of HHs through these reserves and new desalination plants, but continued population growth and land pressure pose ongoing challenges to safeguarding water resources in the long term.

Safeguarding water sources from contamination, particularly from surrounding sanitation infrastructure, remains a persistent public health challenge. The influx of people migrating from the outer islands to South Tarawa, combined with ad hoc urban planning and weak management, has resulted in overcrowded living conditions and insufficient sanitation services⁸. The Project is expected to yield significant social benefits, including improved health outcomes associated with better sanitation.

⁷ [TripReportCAIA_October2015_Kiribati_Final.pdf](#)

⁸ Kiribati Annual Health Bulletin. 2023.

3. Project Description

There are no associated facilities linked to STSP. All works are confined to the designated Project sites and do not rely on or impact any external infrastructure beyond the scope of the Project.

3.1 Project Objectives

The Project objective is to improve liquid waste management in South Tarawa by upgrading sewerage and sanitation infrastructure in Betio, Bairiki and Bikenibeu. This will be achieved by:

- Providing HH with access to improved sanitation services.
- Reducing the number of HH practicing open defecation.
- Increasing access to sanitation services through increased connections to the existing sewerage system, retrofitting the saltwater flushing system and providing toilets to more HH.
- Improving public health outcomes by reducing exposure to waterborne disease and malnutrition associated with poor sanitation.

3.2 Project Design

The proposed Project activities include the following:

- Upstream extensions of the existing mains sewer network located within public road corridors. This will substantially expand the mains sewer network bringing it closer to residential HH not currently connected to the main sewer network.
- Connecting approximately 344 HH with existing toilets to the main sewer network and decommissioning their existing septic tanks.
- Providing new toilets for approximately 622 HH that currently do not have a toilet and connecting the new toilet to the sewer mains network.

HH with existing toilets that are not currently connected to the saltwater flushing system will be retrofitted to directly connect to toilets. This will replace the existing practice of collecting buckets of saltwater from standpipes to flush toilets.

3.3 Methodology

To establish a relevant baseline data collection measure, ChildFund Kiribati carried out HH surveys for Betio, Bairiki and Bikenibeu in Q4 of 2024. This covered a total of 2,872 HH in Betio, 520 HH in Bairiki, and 1,349 HH in Bikenibeu (4,741 HH in total). To identify up to 1,830 eligible HH to connect within the STSP Project, this data was analysed and filtered accordingly.

The following explains the filtering methodology and presents the respective results.

From the main filtering method (Filter A), the surveyed HH was distinguished by the following criteria:

- Private or rental houses.
- Already own a toilet.
- Currently not connected to the sewer network.
- Located within a radius that secures the potential to connect by gravity (Connectivity Zone).

For the second option to increase the total number of HH, a second selection (Filter B) has been processed:

- Private or rental houses.
- Do not own a toilet.
- Do not use communal toilets (secondary criteria).

Several Connectivity Zones were distinguished, utilizing different assumptions on slope and minimum depth as below:

- 1:80 slope with 500mm minimum invert depth.
- 1:100 slope with 100mm minimum invert depth.
- 1:200 slope with 300mm minimum invert depth.

To calculate the proper radius from each manhole, the following method was applied:

Instead of having a straight line from the manhole to the HH to be connected, it was assumed that the HH connection could branch in 90° angles multiple times due to the existing dense settlement structure. The radius would then be the hypotenuse of the triangle between radius, X and Y, with X=Y and X+Y being the maximum house connection length considering the defined minimum slope and invert depth (see below).

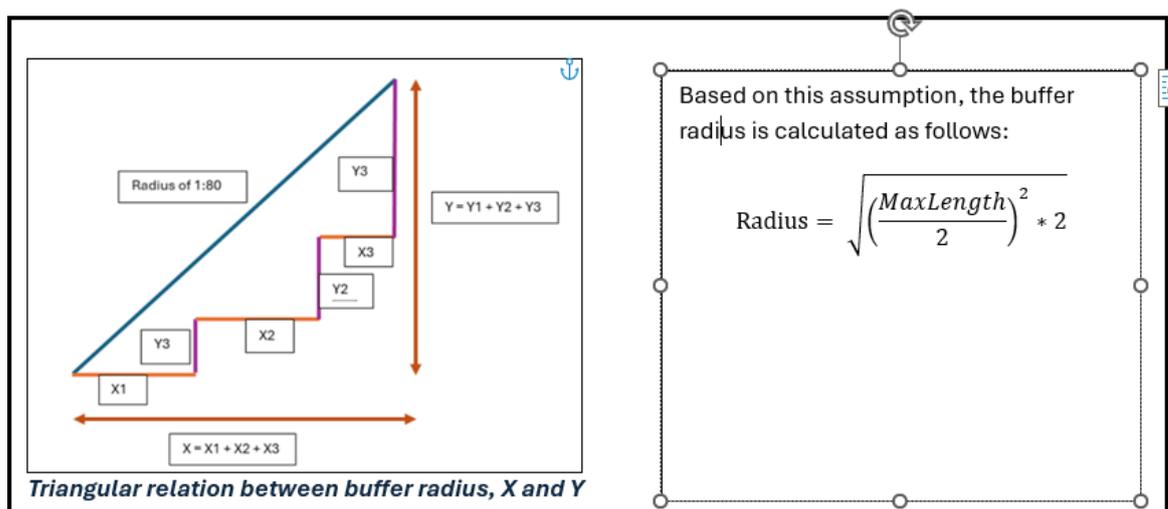


Figure 3-1 Household connection methodology

3.4 The Bubble Concept

The connectivity zones or areas were identified through QGIS charting and analysis. From this analysis a series of “Bubbles” were created. These bubbles are located around a manhole and will be able to connect all HHs according to the methodology mentioned above.

A total of 95 bubbles were created in this manner, divided over the 3Bs (refer to Table 3-1).

Table 3-1 Distribution of the bubbles in the 3Bs

Village	Number of bubbles
Betio	50
Bairiki	14
Bikenibeu	31
TOTAL	95

The spatial distribution of the respective bubbles is illustrated in the following maps.



Figure 3-2 Spatial distribution of bubbles in Betio

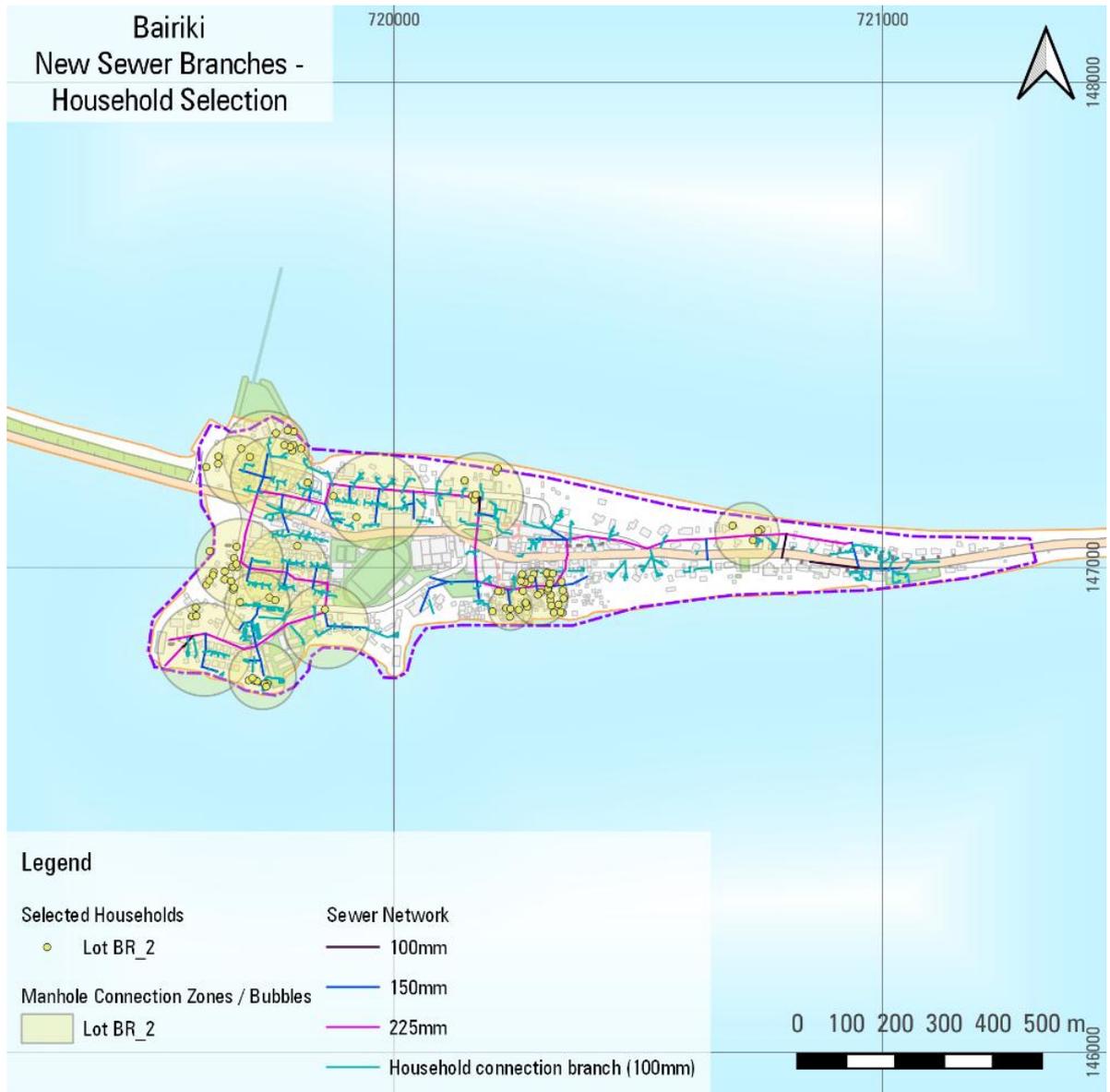


Figure 3-3 Spatial distribution of bubbles in Bairiki

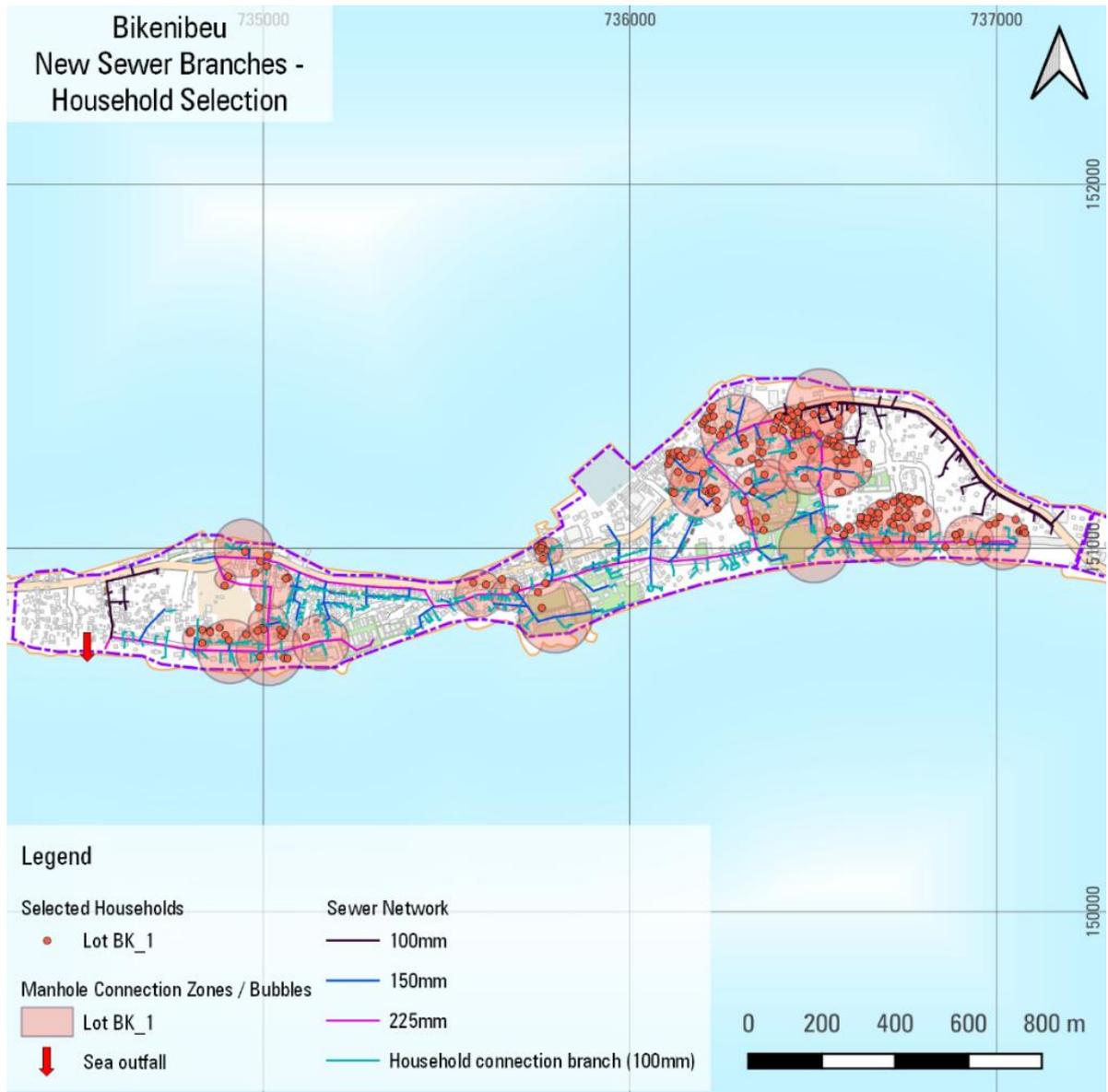


Figure 3-4 Spatial distribution of bubbles in Bikenibeu

Approximately 965 HH in Betio, Bairiki, and Bikenibeu that are not currently connected to the existing sewer network will be connected under the Project. As mentioned earlier in this report this figure was established through a HH survey undertaken by ChildFund in Q4 of 2024, using a selection process that considered connectivity zones with varying slopes and pipe cover depths, as described in 3.2.1 above. Of the 965 HH, 343 are already equipped with toilets, while 622 will be provided with new toilets under the Project.

Table 3-2 provides a breakdown of proposed new HH connections to the sewer network for each outfall catchment.

Table 3-2 Number of proposed new HH connections to sewer network

Village	New toilets	Existing toilets	TOTAL HH
Betio	436	207	643
Bairiki	56	40	96
Bikenibeu	130	96	226
TOTAL	622	343	965

The exact alignment of sewer main extensions and HH connections will be determined during detailed design. At that stage the final alignments will be informed by the following:

- Consultation with individual HH.
- Land access permissions.
- Consideration of invert levels.
- Constructability of connections for each HH due to site constraints.

HH coordinates data and land boundaries will be obtained from MELAD to support the detailed planning of sewer connections. HH coordinates are being requested from MELAD; QGIS/ Mapping Unit, while land boundaries will be confirmed with the Lands Division once the final sites are agreed. This information is expected to be available prior to the finalisation of the detailed design.

The installation of HH sewer connections and toilets will be rolled out in a phased approach that divides the work by type and geographic area. The staged rollout is proposed to begin with Bikenibeu, which has a total of 226 beneficiary HH identified. The method of phasing will allow HH/landowner consultation to be undertaken in advance of any physical needs; to understand individual family needs, site constraints and obtain signed landowner permission. Areas where HH land status and signed permission letters have been obtained will be compiled into one package for international bidding and a design and build contract. The successful bidder may or may not then sub-contract local plumbers and contractors to carry out the work.

The timing / phasing of the bubbles will depend on the sanitation agreement and land agreement processes.

3.5 Estimate of Wastewater Added to the Existing Network Compared to Outfall Capacity

Previous technical assessments for Betio, Bairiki, and Bikenibeu outfalls relied mainly on field-based measurements, historic flow estimates, and HH connection surveys, not on integrated hydraulic modelling, because of limited system data. These conservative methodologies and data sources are documented in the sections “Existing Context – Ocean Outfalls (Section 2.3)” and “Project Design (Section 3.2) and Methodology (Section 3.3)” with supporting discharge estimates in Table 3-3. While the new pump sizing allows for system redundancy and anticipated future population growth, this ESMP notes the limitations of historical and estimated data and highlights the need for future investments

in hydraulic modelling and waste flow monitoring to further improve design accuracy and operational efficiency.

In order to arrive at the values in Table 3-3 below, the following assumptions were followed:

- the blackwater fraction was estimated to range between 70 and 90 L per person per. PUB does not have actual flow data so a per capita wastewater generation of 90 L/d is used. The added average inflow was made based on an assumed 90L per capita and day, i.e. the highest figure of the assumed range of blackwater that will be directed to the respective outfalls.
- the average HH size of 6.5 persons in Kiribati is used.

The 965 proposed new HH connections will only capture the blackwater fraction of each HH's wastewater and convey it to the sewer system.

Table 3-3 Estimate of total average and peak inflow post-project– average and peak inflow, compared to outfall capacity

Location	New HH connections	Added avg. inflow (L/s)	Existing avg. inflow (Child Fund + KHC+ Commercial & Industrial) (L/s)	Total avg. inflow (L/s) (A)	Peak inflow (L/s) (Ax3)	New pump rate L/s
Betio	643	4.35	12.03	16.38	49.14	46.7
Bairiki	96	0.65	4.42	5.07	15.21	26.81
Bikenibeu	226	1.53	5.82	7.35	22.05	26.81

Table 3-4 summarises the maximum pump rates peak flows and assumed duty cycles at each of the three ocean outfalls.

Table 3-4 Outfall Capacity and Operating Regime (New Installation)

Location	Maximum pump rate (L/s)	Peak inflow (L/s)	Pump running time (minutes)	Pump rest or off minutes
Betio	46.70	49.14	23	37
Bairiki	28.61	15.21	10	50
Bikenibeu	28.61	22.05	20	40

At Betio, the duty pump will have a maximum pump rate of 46.70 L/s and is assumed to operate on a 60-minute cycle comprising 23 minutes of pumping followed by 37 minutes of rest, repeated continuously over a 24-hour period. The average post-Project inflow from connected HH at Betio is estimated at 16.38 L/s, equivalent to 58,970 L/h. During the 23-minute operating period each hour (1,380 seconds), the pump is able to discharge

approximately 64,446 L/h (46.70 L/s x 1,380 s), which closely matches the average hourly inflow.

This demonstrates that under normal operating conditions, the Betio pump duty cycle has sufficient hydraulic capacity to balance incoming wastewater on an hourly basis without risk of sustained surcharge or overflow.

The results show that, at average flow conditions, the pumps at each outfall are adequately sized to discharge the effluent and that there should be no risk of overflow during normal operation. Across the three ocean outfalls, the assessment compares the maximum duty-pump discharge rate at each pump station with the projected peak inflow and the assumed hourly duty cycles. At Betio, the maximum duty-pump rate will be 46.70 L/s while the design peak inflow is 49.14 L/s, indicating that short-term peak events can exceed the instantaneous pumping capacity. The proposed management measure to avoid overflows is to take advantage of some storage in the network and operate the pumps continuously as required prior and during events where inflows will exceed the pump rate until the inflows subside again.

At Bikenibeu, the maximum duty-pump rate of 26.81 L/s is only slightly higher than the peak inflow of 22.05 L/s, so the pump will be run at or close to full capacity during peak conditions and for longer periods than the typical 20-min cycle per hour if necessary to clear the peak from the system.

3.6 Construction Activities

3.6.1 Work methodology and construction staging

Detailed work methodologies would be determined during construction planning and once a construction contractor is engaged. An indicative construction methodology for the Project is provided in this section, and a description of the workforce is provided below.

The alignment of new sewer pipes will be determined during detailed design and construction contractors are engaged. The alignment will be determined based on detailed site survey, site constraints, topography, network alignment and location of HH toilets.

Community consultations will be conducted with HH located along each common sewer branch. During these consultations, the detailed design and construction plans provided by the selected contractor will be shared with participants.

3.6.2 Sewer pipe installation

Earthworks and trenching

Where feasible, small excavators and backhoes will be used for surface preparation and trenching for installation of underground sewer pipes (PVC with 150mm diameter). Some locations will have limited access for machinery and trenching will be undertaken by hand. UXO scanning (Betio only) has been contracted to a specialised firm (Milsearch Pty Ltd.). In September 2025, i.e. site surveys and UXO clearance will be completed prior to the start of construction.

The earthworks may include clearing bushes, topsoil removal and stockpiling, detailed excavation, placing bedding material and pipe laying, backfilling and compaction.

Any surplus material removed during clearing and trenching that cannot be reused in the works will be temporarily stockpiled before being loaded, hauled and deposited. The final disposal site will be advised by MELAD's Waste Management Division in line with the national regulations. The contractor will confirm appropriate disposal locations with the PMU, which may include Bikenibeu landfill but most likely be reused at other construction sites.

Trench width will be approximately 200mm wider than the proposed pipe diameter. For example, a 150 mm sewer pipe will require a trench width of approximately 350 mm, while a 200 mm pipe will require a trench width of approximately 400 mm. Trench depth will vary depending on topography, invert levels and the distance to inverts.

Manual excavation of trenches will be limited to a depth of 1.5m. If a trench is more than 1.5m deep it will be excavated using small excavator and a 1:2 bench or batter-cut will be used to prevent overburden falling back into the trench or/and trench collapse. The appropriate support will be determined based on-site soil properties and will be checked by the Project Manager to advise on approved trench collapse preventive methods.

If trenches encounter groundwater, the Construction Contractor will install portable pumping equipment to allow pumping of water and laying of pipes. Any water pumped from the trench will be disposed into an existing drainage channel with sufficient capacity to not cause surface flooding or surface erosion.

Pipelaying shall follow closely behind the progress of trench excavation. The back filling of trenches and surface reinstatement of excavated areas will occur as soon as reasonably practicable after the pipes have been laid and jointed.

Pipe laying

The Construction Contractors will determine the methodology and details for pipe installation. The methodology will include contingency plans or alternative methods of pipe installation should the ground conditions prove more difficult than expected during trenching.

The sewer pipe will be laid to a minimum 1:100 gradient. The sewer pipe will typically be laid in lengths of approximately 6m. Completed sections of sewer pipe will be flushed clean by the contractor and pressure tested before being backfilled and covered.

The Contractor will establish the invert levels of existing PUB manholes to be connected before finalizing the pipeline route for the collection of wastewaters from the surrounding HH.

3.6.3 Traffic and access

All trench excavation and related works undertaken within footpaths, public roads, or private accessways will be completed as quickly as practicable and with full regard for public safety. Precautionary measures will include, but not be limited to, the installation of traffic control systems and temporary pedestrian pathways.

The community will be informed of construction schedules and any temporary traffic management arrangements at least one week in advance, with follow-up reminders provided 24 to 48 hours before works commence. Temporary traffic control measures will be implemented based on the needs at each location and may include:

- Signage.
- Detours.
- Physical barriers.
- Spotters.

The Contractors are responsible for implementing all traffic and access management measures as well as well as communicating with communities via the community consultation specialist. Foot and vehicle access to private properties will always be maintained during construction works.

Trenching in roads and footpaths will have the written permission from MISE and/or the Local Councils as the authorities responsible for public roads and footpaths. Where works affect utilities or other public assets, approval will also be obtained from the relevant asset owner (such as the PUB for water and sewer infrastructure). Reinstatement will be undertaken in accordance with the technical specifications of the approving authority.

3.6.4 Public utility adjustment

The construction contractors will be responsible for locating and protecting all utilities during construction. All works will be undertaken in accordance with the utility owners' requirements. Any potential disruptions to utility services will be communicated with affected property owners.

Where trench excavation is carried out close to or across the line of sewers, pipes, cables and other services whether underground or overhead the contractors shall where necessarily, provide temporary supports or slings and, where such sewer, pipe, cable or other service is temporarily disturbed, it shall be replaced.

In any area where buried power cables may be present, the contractor shall use appropriate cable-locating equipment to survey the trench route prior to starting excavation.

3.6.5 Private hedges, fences, and other assets

Where the proposed trench excavations cross private assets like hedges, fences and walls the contractors, as a temporary measure during installation of pipelines, shall provide temporary fencing in place of any parts of such barriers which have to be removed. After trench excavation has been reinstated, the contractors shall carry out work as necessary for permanent restoration of any damaged assets. The PMU Safeguards team will be informed of any assets that need removal prior to works starting. Any replacement or reinstatement of assets will be undertaken in consultation with affected HH and in line with MELAD's "Approved Compensation Rate for Trees, Crops and Building Structures" (attached as Appendix C).

The Contractor shall ensure that installations under private roads or accessways do not disrupt the normal operation of these facilities.

3.6.6 Provision of new toilet blocks

Approximately 622 HH in Betio, Bairiki and Bikenibeu that currently do not have a toilet will be provided with a new toilet block. The new toilet block will be built in accordance with the Building Code and Building Act 2021. All new toilets will be connected directly to the saltwater flushing network. All new toilets will be external to existing houses,

provided either as standalone small buildings within the HH compound or attached to an exterior wall of the dwelling, depending on HH preference. This involves small scale trenching and pipe laying to the nearest network connection.

Each toilet will include appropriate lighting, doors, and locks to ensure user safety, and handwashing facilities (a sink with tap or, where piped water is not available, a container with tap) will also be provided.

Construction of an individual HH toilet block is expected to take 1–2 days, and the rollout of all 622 new facilities will be staged across the construction period, with full completion expected within the overall civil works contract timeframe (estimated 14–18 months after contractor mobilization) The exact location of each new toilet block will be confirmed in consultation with the local HH during detailed design.

The new HH toilets will be small cubicle structures designed to blend with the visual character of residential compounds. Figure 6-1 illustrates the typical above-ground and below-ground infrastructure associated with these toilets. Conversion of existing toilets to saltwater flushing.

HH with existing toilets that are not currently connected to the saltwater flushing system will be retrofitted to direct connections, including preparing trenches and laying pipes to the nearest network connection on or near the property. This will replace the existing practice of collecting buckets of saltwater from standpipes to flush toilets. Existing saltwater standpipes that are no longer required for flushing toilets will be removed.

3.6.7 Decommissioning of septic tanks

HH septic tanks that are no longer required will be decommissioned. Holding tanks for wastewater are commonly found at the HH on South Tarawa. These include open-bottomed concrete structures or cesspits, oil drums, and containers. Decommissioning involves pumping out the tank or other structure, breaking it down or removing it and backfilling the area with clean material. When a septic tank is abandoned, it may deteriorate and cause environmental and health issues. Structural deterioration can lead to leaks, toxic gas release or surface subsidence.

The Construction Contractor will survey HH earmarked for sewerage connection to assist in ascertaining the types of septic tanks that requires decommissioning. The decommissioning process will follow the steps outlined in the following table.

Table 3-5 Septic tank and cesspit decommissioning process

Process		Responsibility
1	Locate septic tank – Typically < 3m from the home.	Owner / Contractor
2	Disconnect septic tank: <ul style="list-style-type: none"> • Disconnect any electrical controls and/or tank accessories • Remove all buried service and electrical lines • Disconnect plumbing 	Contractor
3	Pump and dispose sludge: <ul style="list-style-type: none"> • Pump any sludge and effluent from the tank 	PUB waste management technicians / Contractor

Process		Responsibility
	<ul style="list-style-type: none"> • Transport sludge to faecal sludge separator in Betio • Solids and liquids are separated. • Sludge liquid goes through the outfall • Solids are transported to the landfill 	/ ECD.
4	Lime treatment: <ul style="list-style-type: none"> • After pumping, treat tank with Ag lime or hydrated lime to disinfect the tank and prevent odour. 	Contractor staff qualified to safely use chemicals
5	Removal of lid and drainage of tank: <ul style="list-style-type: none"> • After lime treatment, drain tank by making holes in bottom. • Remove lids to access the tank. • The soak wells are drained and disconnected. 	Contractor
6a	Removal: <ul style="list-style-type: none"> • If feasible, carefully and completely excavate the empty tanks and dispose them at the landfill 	Contractor
6b	In place decommissioning: <ul style="list-style-type: none"> • If empty tanks cannot be removed, the tank is to be buried below ground level and the surface compacted to prevent settling or collapse. This is a simpler, more affordable solution, particularly for concrete septic tanks. 	Contractor
7	Inspect and grade area: <ul style="list-style-type: none"> • Once the septic tank is decommissioned, cover the area with topsoil. 	Contractor

3.6.8 Assumed construction schedule, workforce and working hours

Construction is expected to take approximately 14-18 months to complete with works progressively rolled out across Betio, Bairiki and Bikenibeu. It is anticipated that two international contractors, each supported by local subcontractors, could be working simultaneously in different locations. Construction teams are expected to consist of both international and local workers, with each team comprising approximately 10–20 staff. These figures are indicative and will be confirmed by the appointed contractors during the construction planning stage. The number of teams working at any one time would vary throughout the 14-18 months construction period depending on when individual work packages are cleared for implementation.

It is anticipated that most construction work would be undertaken during standard working hours. The recommended standard hours for construction are:

- Monday to Friday: 7am to 6pm.
- Saturday: 8am to 1pm.
- No work on Sundays and public holidays.

Some construction work may be required outside of these standard working hours to minimize traffic impacts. These works would include trenching a laying of pipes through highly trafficked areas. In such cases, the local community and MELAD will be notified in advance by the PMU and the contractor through consultations held prior to the commencement of any works planned outside of standard construction hours.

3.6.9 Source and quantity of materials

All sand and aggregate will be sourced from licenced suppliers in South Tarawa. It is likely that the pipes and manhole covers will be imported. All other materials will be sourced locally from the licensed hardware shops in Tarawa.

3.6.10 Construction site compound and laydown areas

A temporary construction compound and laydown area will be needed during construction for site offices, machinery parking, material stockpiles and storage. The size and location of these areas will be determined by the construction contractor during the construction planning phase.

4. Policy and Legal Framework

This section outlines the relevant policies and legislation that apply to the Project and the approvals needed from different government agencies. The section also describes the applicable World Bank ESMF requirements. Kiribati's legal framework provides a strong basis for environmental protection and social regulation; however, it is less comprehensive in areas such as social impact management, labour rights, stakeholder engagement and livelihood restoration. The STSP will therefore apply the World Bank ESF standards in full and use project-level instruments such as the ESMP, LMP, SEP and ESCP to bridge these gaps and ensure international best practice.

4.1 National Legal Requirements

4.1.1 Environment Act 2021

The Environment Act 2021 provides for the protection, improvement, and conservation of the environment within the Republic of Kiribati. The Act focuses on controlling pollution and the impacts of development. Environmentally Significant Activities (ESA) are listed in the Schedule for the Act and are required to obtain an EL. Often an Environmental Impact Assessment or Environmental Management Plan is required to support the EL application. often required.

The Act assigns primary responsibility for undertaking environmental assessments of projects to the project developer. For the South Tarawa Sanitation Project, MISE is the Project developer.

The Ministry of Environment, Lands and Agricultural Development (MELAD) is responsible for implementing the Act including the review and approval of environmental assessment reports, issuance of environment licences, and prescription of any conditions to the licenses.

Within MELAD, the ECD has responsibility for reviewing, assessing, and monitoring relevant development projects.

4.1.2 Environment Regulation 2017

The Environment (General) Regulation 2017 complements the Environment Act and outlines the requirements for the project applicant to obtain an environment licence. Activities that are considered to create a significant environmental impact require application for an EL. A list of activities that are deemed environmentally significant are listed in the Schedule for the Regulation.

On consideration of the application, the ECD determines whether to issue an EL or require an EIA, or to refuse the application. The required contents of the environmental assessment report are set out in the Environment (General) Regulations 2017. During preparation of the EIA, the applicant is required to undertake consultation with stakeholders such as adjacent landowners and other interested parties.

The Household Sewer Connection Improvements do not require an EL under the Environment Act 1999 and its 2007 Amendments, as confirmed by ECD on 13 January 2025. ECD advised that the works do not trigger environmental significance thresholds under the Regulations. However, preparation of this ESMP remains a requirement under the Project's ESCP agreed with the World Bank. This ESMP therefore serves as the key

safeguards instrument to guide contractor management, E&S supervision, and compliance monitoring throughout implementation.

4.1.3 State Land Act 2001

The State Land Act 2001 provides for the Lands Management Department (LMD) under the MELAD to carry out boundary demarcation and maintain records of state land.

Administration of land titles and land registration are responsibilities of the LMD within MELAD. The Land Information & Administration Section within LMD is responsible for undertakings related to the State acquisition of land under the Native Lands Ordinance. In some cases, the Land Planning & Development Section and the Land Survey & Technical Section are also involved. The Chief Lands Officer is responsible for determining boundaries and compensation.

The HH sewer works will occur within publicly road reserves as well as privately owned land. Works within public road corridors will follow the standard PUB practices for such works.

For works outside of public road corridors, community champions will go door to door engaging with HH in advance of Project works. Signed landowner permission forms will be obtained before any works commence onsite, including any trenching works over adjacent land.

4.1.4 Building Act 2006

The Building Act 2006 sets out guidance, regulations and requirements for building related work in Kiribati. It provides design and construction guidelines for all design and construction work.

The activities funded by the Project will require a Building Permit under the Building Act 2006. The building permit application consists of the utility's clearance, the land site plan, construction activities, quantity and quality of the materials. Building Permits (BP) under the Building Act 2021 will be applied for by the design/engineering team for individual HH toilets or sewer connections, as required for each activity, rather than as a single permit for the overall Project. Normally, the BP process would follow the issue of an EL under the Environment Act; however, ECD has confirmed that no EL is required for the Household Sewer Connection Improvements or the Bubble Pilot, as the works do not trigger environmental significance thresholds. Accordingly, BPs will be sought directly from MELAD for each relevant activity, with applications supported by the technical designs and this ESMP as the safeguards reference document. And the final decision on issuance of the Building Permit will rest with the relevant Island Council.

4.1.5 Occupational Health and Safety Act 2015

The Occupational Health and Safety Act 2015 (OSH Act) mandates employers to provide and maintain, so far as practicable, a working environment for employees and site visitors that is safe and without risks to health. The law applies to all workplaces, except for some family related activities. The Ministry of Labor and Human Resources Development is responsible for enforcing the standards. The main objectives of the OHS Act are to:

- Secure the health, safety and welfare of people at work.
- Protect people at work against risks to health and safety.
- Assist in securing a safe and healthy work environment.

- Eliminate as far as practicable risks to the health, safety and welfare of people at work.
- Provide for the involvement of employees and employers in the formulation and implementation of health and safety standards at workplaces.

This ESMP considers the health and safety risks associated with the Household Connections Sewer Improvements and provides mitigation and management measures that will be implemented by Construction Contractors (refer Section 6 and Section 7).

4.2 World Bank Policies

4.2.1 Environmental and Social Framework

The World Bank ESF is a set of policies and standards that guide how the World Bank assesses and manages E&S risks and impacts of projects it finances. Screening of the STSP E&S risks when the Project was appraised for funding identified that the following WB ESF Environmental and Social Standards (ESS) apply to project activities:

- ESS1 - Assessment and Management of Environmental and Social Risks and Impacts. Establishes the core process for identifying, evaluating, and managing E&S risks and impacts throughout the project lifecycle.
- ESS2 - Labor and Working Conditions. Protects workers' rights, ensures fair treatment, promotes safe and healthy working conditions, and prohibits forced or child labour.
- ESS3 - Resource Efficiency and Pollution Prevention and Management. Promotes sustainable use of resources (energy, water, raw materials), and addresses pollution prevention and control (air, water, soil, noise, hazardous waste).
- ESS4 - Community Health and Safety. Covers risks to local communities from project activities, such as traffic safety, infrastructure safety, disease transmission, and emergency preparedness.
- ESS5 - Land Acquisition, Restrictions on Land Use and Involuntary Resettlement. Seeks to avoid or minimize involuntary resettlement and ensure affected people are compensated fairly and supported in restoring their livelihoods.
- ESS6 - Biodiversity Conservation and Sustainable Management of Living Natural Resources. Protects biodiversity and habitats and promotes the sustainable management of renewable natural resources like forests and fisheries.
- ESS8 - Cultural Heritage. Aims to protect tangible and intangible cultural heritage from adverse impacts and promotes its preservation and appreciation.
- ESS10 - Stakeholder Engagement and Information Disclosure. Mandates early and ongoing engagement with stakeholders, including the public, affected communities, and vulnerable groups, ensuring transparency and appropriate consideration of grievances.

The Kiribati Government has prepared guiding documents that demonstrate how E&S risks will be managed during Project implementation. The requirements of the relevant ESS are incorporated into the guiding documents.

Note that all safeguard documents prepared for this Project will require clearance from the World Bank safeguard team.

4.3 Environmental and Social Commitment Plan

The ESCP is a key document in World Bank-funded projects that outlines the Government's commitments to managing and mitigating environmental and social risks and impacts throughout the life cycle of a project. It serves as a framework for ensuring that a project complies with the World Bank's ESF.

The ESCP provides clear guidelines on the actions, timelines, and resources needed to manage and mitigate environmental and social risks throughout the project.

The STSP ESCP includes requirements to:

- Promptly notify the WB of any incident or accident related to the Project which has, or is likely to have, a significant adverse effect on the environment, the affected communities, the public or workers.
- Adopt and implement an ESMP which includes this document.
- Incorporate the relevant aspects of the ESCP, including, inter alia, the relevant E&S instruments, the Labor Management Procedures, and Code of Conduct (CoC), into the Environment, Social, Health and Safety (ESHS) specifications of the procurement documents and contracts with contractors and supervising firms.
- Ensure that an initial screening for unexploded ordnances (UXO) is conducted on all Project sites where civil works are proposed.
- Adopt and implement measures and actions to assess and manage traffic and road safety.
- Prepare, adopt, and implement measures and action to assess and manage specific risks and impacts to the community arising from Project activities.
- Adopt and implement the chance finds procedures included in the Environmental and Social Impact Assessment (ESIA) developed for the Project (and in this case, included in the ESMP).

4.4 Labour Management Procedures

The STSP Labour Management Procedures (January 2022) (LMP) outlines how labour-related issues will be addressed throughout project implementation. It ensures compliance with the World Bank ESS2 which mandates the protection of workers' rights and their welfare. The LMP provides a framework for managing direct workers (e.g. project staff and consultants) and contracted workers (e.g. construction workers, service providers), as well as community workers and primary supply workers.

The LMP requirements for protecting workers' rights, ensuring workplace safety and adhering to labour laws and standards have been incorporated into the mitigation measures outlined in Section 7 of this ESMP.

4.4.1 Stakeholder Engagement Plan

The STSP Stakeholder Engagement Plan (2025/v4) (SEP) is a key document prepared during the Project preparation phase. It outlines how the Project will engage with affected and interested stakeholders throughout the Project lifecycle. This includes identifying stakeholders, understanding their concerns, and ensuring their views are considered in decision-making processes. The World Bank ESS10 mandates that projects establish and implement a robust stakeholder engagement process, ensuring that stakeholders are

provided with timely, relevant, and accessible information, and that their concerns are addressed throughout the project. Implementation of the SEP ensures Project compliance with ESS10.

Stakeholder and community engagement for the Household Sewer Connection Improvements has been undertaken in accordance with the STSP SEP and is discussed further in Section 5 of this ESMP.

The GRM helps deal with complaints that come up during the Project. It works alongside local laws and customs, giving people another way to solve problems at the community or Project level. The GRM aims to resolve concerns through dialogue and shared solutions. If a problem cannot be solved this way, it is passed on to the right authority. It also keeps track of all complaints, sorting and ranking them so they can be handled properly (Refer to Appendix H). In addition, the GRM has steps to handle SEA/SH complaints privately and with care for the person affected. It also provides clear ways to connect survivors to qualified GBV services providers for proper support.

5. Community and Stakeholder Engagement

5.1 Consultation Strategy

The consultation strategy for the Project activities followed the approach set out in the STSP SEP, but under this ESMP the strategy has been developed specifically on the sewer connection works in Betio, Bairiki, and Bikenibeu. The aim of the consultation will be to make communities understand what the Project is doing, especially people whose HH will be directly affected. The consultation will focus on giving families an opportunity to raise concerns or questions before construction starts. This is important since these works involve digging near homes, using access roads, and connecting private properties to the public sewer system. By the end of August 2025, PMU has received grievances such as requesting to be included in the Project if they are not enlisted including positive feedback such as demonstrating support for the Project and a readiness to cooperate (refer to Appendix D). Table 5-1 outlines the issues raised by the communities during consultations.

Table 5-1 Issues raised during consultation

Issue	Who raised It	Project response
Land access and unclear plot boundaries	Landowners in Bikenibeu, Bairiki and Betio	Safeguard team with the Lands Division confirm boundaries before any works start onsite
Possible damage to HH wells or saltwater pipes	HH near alignment areas	Locations identified during site visits will be marked and protected during construction.
Concerns about blocked access during trenching	Elderly residents and families	Contractor will ensure continued HH access for elderly residents, disabled individuals and other members of the HH such as an alternative path, cover over trenches to allow temporary crossing until work is done. Advance notice will be provided to HH.
Noise, dust, and construction disturbance	Residents near roadside alignments	Will be managed through mitigation measures presented in this ESMP, including provision of safe access around works, dust and noise control, timely reinstatement of disturbed areas, and advance community notification
Confusion over whether HH must pay for toilets	Tenants and low-income HH	Clarified by PMU that toilets and connections are fully covered for eligible HH.
Not knowing how to raise complaints	General community	The GRM has been explained during community meetings and will be re-shared before works begin. It is open to the public and accessible through the Project's Facebook page (South Tarawa Sanitation Project), GRM Gmail account (Grievance_stsp@mise.gov.ki), in-person visits to the PMU office, and via local councils through representatives (BTC and TUC).

Issue	Who raised It	Project response
Requests for clearer information on start dates and areas	Betio and Bikenibeu residents	Project team committed to sharing detailed timelines once final design is complete through the Facebook Page (South Tarawa Sanitation Project), posters across Government and NGO facilities including shops, and radio broadcasting

Engagement has included *mwaneaba* meetings, site visits, and one-on-one discussions, depending on the location and the HH situation. Special attention has been given to groups that are sometimes left out, like renters, elderly, disabilities and female headed HH, to make sure they are also informed and involved in the decision-making in terms of accessibility and safety.

Consultation has been led by the PMU Safeguards Team, with support from the Community Engagement Specialist. To date, activities have included maneaba meetings, HH visits, and coordination sessions with BTC and TUC. Through these consultations, HH have raised issues relating to road access during trenching, timing of works, and connection fees. Some of these concerns have been addressed through early design adjustments and scheduling agreements with local councils. All concerns raised have been recorded in the Project’s GRM register, in accordance with the procedures outlined in the SEP (Sections 9 and 12; Appendices 3–6). Going forward, under this ESMP, the consultation strategy will focus on structured roll-out for each cluster in Betio, Bairiki, and Bikenibeu. Consultation is ongoing and will continue throughout the roll out of each cluster, including more detailed engagement once the design is finalised and before construction begins and keeping in touch during construction, as demonstrated in Figure 5-1 Tentative consultation timeline.

The Project is currently in the ‘advance notice to beneficiaries’ phase.

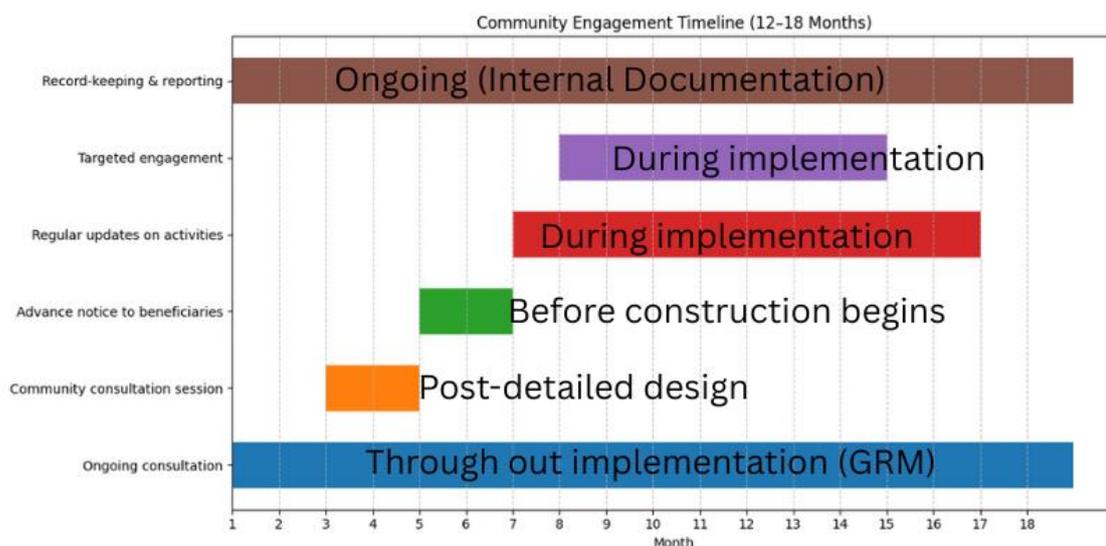


Figure 5-1 Tentative consultation timeline

5.2 Consultation Activities to Date

Consultation for the sewer connection activities builds on earlier engagement under the SEP for the wider STSP. For this specific component, initial consultation activities were carried out between June and July 2025 in the target areas of the Project in Betio, Bairiki, and Bikenibeu. These included:

- Site visits with the PMU Safeguards Team and engineers to inspect possible connection points, understand ground conditions and undertake informal discussions with landowners and HH to raise awareness about the Project and explain what the connection works would involve.
- *Mwaneaba*-based meetings to introduce the Project to a wider audience and answer general questions from the community.
- Distribution of information during the Kiribati Independence celebrations, where updates on the sanitation pilot, communal toilet works, and HH sewer connections were shared.
- Sharing the tentative consultation timeline (see Figure 5-1) to give communities a general understanding of the expected duration of the sewer connection works (approximately 14-18 months) and the likely timing of future consultations.

Some of the main concerns raised, as summarised in Table 5.1, were about land access, protection of HH water wells, and whether access to homes would be temporarily blocked during trenching. These concerns were noted and considered during preparation of this ESMP.

All discussions and issues raised during the consultation meetings were recorded informally through notes, and where necessary, followed up by the PMU Safeguards Team. More formal consultations will take place once the detailed design is finalised and before any construction starts in each area.

Between September 19 to 25, 2025 further 7 community meetings were to be undertaken by the PMU safeguard and SBCC team in Betio (3), Bikenibeu (3) and Bairiki (1). As shown in Appendix D, the team successfully completed one consultation in Bikenibeu and will continue with the remaining ones before the ESMP can be granted a no objection status. The key objective was to update the direct beneficiaries and potentially affected people from the immediate surroundings on the current status of the Project, on the results of the impact assessment, and on the proposed E&S mitigation measures as well as any other recommendations as per the ESMP. The records of some of these meetings are attached to this ESMP in Appendix E.

5.3 Ongoing and Future Consultations

Consultations with stakeholders will continue throughout the Project implementation period in Betio, Bairiki, and Bikenibeu, in line with the STSP SEP. Most of the people likely to be directly inconvenienced by these works are also Project beneficiaries, as their HH will be connected to the sewer system. Neighbouring HH and immediate neighbourhoods will also be consulted where works affect shared access roads or utilities.

Once the contractor's detailed design is finalized for each cluster, further community consultation sessions will be held to present the details of the final design solutions and outline the key E&S measures contained in this ESMP. These sessions will allow HH and other stakeholders to understand upcoming activities, ask questions, and raise any issues. Before construction begins, the contractor and the Project team will provide advance

notice to beneficiaries and affected neighbours. This will include information on the construction timeline, expected impacts (e.g. noise, access disruptions), and contact points for questions or complaints. Information will be shared through printed notices, community meetings, maneaba discussions, and verbal announcements, ensuring HH without digital access are also reached.

During implementation, the contractor will provide regular updates to beneficiaries and affected neighbours, particularly where activities may affect access, utilities, or daily routines. The contractor will also prepare monthly reports on the consultations they carry out (attendance, issues raised, actions taken), which will be submitted to the PMU Safeguards Team to ensure consistent messaging and coordination.

Special efforts will be made to engage vulnerable groups, including female-headed HH, elderly persons, people with disabilities, and tenants without formal leases, who may otherwise lack access to information or representation. These groups will be engaged through targeted HH visits or small group discussions led by the PMU Safeguards Team, in coordination with local councils and community leaders, depending on the needs of the community.

All consultation activities will be recorded by the PMU Safeguards Team and logged in the GRM register and consultation database, in accordance with SEP procedures. A summary of engagement activities, issues raised, and responses provided will be included in the Project's regular monitoring reports.

6. Environmental and Social Impact Assessment

6.1 Soil Resources

6.1.1 Existing conditions

The soils across Betio, Bairiki and Bikenibeu are typical of low-lying coral atolls, which are characterized by poor fertility and high permeability. The soils are derived from coral sands and reef limestone, resulting in coarse, highly porous textures with very limited water and nutrient retention capacity. Organic matter content is low, and the soils are typically nutrient poor. The thin topsoil layer often overlays unconsolidated coral gravel or reef rock, and in many places, the soil profile has been disturbed or modified by human activity. Soils remain vulnerable to saline intrusion, especially during king tides or storm surges.

Betio is densely populated, and soils has been significantly altered by extensive land development. Natural soil characteristics have largely been replaced by compacted, soils with poor infiltration.

Bairiki, which includes key government and administrative buildings, has similarly degraded soils due to urban development. Soils are generally coarse, sandy, and low in nutrients. Compaction and modification through infrastructure development have also impacted soil permeability.

Bikenibeu is less urbanised than Betio and Bairiki and retains some residential gardens and planted open areas. However, natural soil characteristics remain poor.

Overall, the soils in the Project area are naturally low in fertility and have been highly degraded by human activities.

6.1.2 Potential construction impacts

If not properly managed, construction activities associated with the installation of sewer infrastructure, decommissioning of septic tanks, and the establishment of temporary construction areas have the potential to result in contamination of soils. These impacts are particularly significant in the context of South Tarawa, where the soils are thin, highly porous, and vulnerable to erosion, compaction, and contamination.

Excavation and trenching for sewer pipe installation will cause direct disturbance of soil, with a risk of topsoil loss if excavated material is not carefully stockpiled and reused. The movement of construction machinery may lead to soil compaction, reducing permeability and increasing surface runoff and erosion potential. Additionally, the use of heavy equipment poses a contamination risk if fuel, lubricants, or other chemicals are accidentally spilled to the ground.

The decommissioning of existing septic tanks may be a further source of soil contamination: Improper emptying or rupture of tanks during removal may lead to sludge spillage, potentially contaminating surrounding soil with pathogens and nutrients. In some locations, existing contamination from previously leaking or deteriorated tanks may be encountered and disturbed by trenching.

The use of laydown areas and temporary construction compounds can further impact soil conditions. Fuel storage, material stockpiles, and parked machinery all pose contamination risks if spills occur. Note that the location and size of these sites will be determined by the contractor prior to the start of construction and described in the CESMP, which will require approval from the PMU.

The handling and disposal of construction waste, including spoil material and sludge from septic tank decommissioning, may also result in localized soil pollution if not managed appropriately. Uncontrolled dumping or storage on bare ground can lead to leaching of contaminants and the spread of sediment into adjacent areas, particularly during rain events.

6.2 Groundwater Resources

6.2.1 Existing conditions

Groundwater in South Tarawa, including Betio, Bairiki, and Bikenibeu is characterised by a shallow freshwater lens in the porous coral substrate. The availability and quality of groundwater are key national concerns for public health, particularly given South Tarawa's low elevation, limited land area and high population density.

The freshwater lens is typically 1 to 3 meters thick, depending on rainfall. Due to the permeable soils and lack of surface water storage, groundwater is highly vulnerable to contamination and saltwater intrusion. Recharge depends entirely on rainfall infiltration, with no permanent rivers or lakes providing aquifer replenishment.

Groundwater quality across Betio, Bairiki, and Bikenibeu is poor, with contamination arising from multiple sources, including:

- Septic systems and pit latrines are often poorly sealed or degraded.
- Solid and liquid waste is frequently disposed of informally.
- Stormwater runoff and ponding carry pathogens and pollutants into the groundwater.
- Saltwater intrusion due to over-extraction of groundwater, rising sea levels and storm surge events.

As a result, shallow groundwater does not generally meet WHO guidelines for human consumption. Pathogens, nitrates, and salinity are common problems. Many residents therefore rely on rainwater harvesting or desalinated water as their primary source of potable water.

Betio groundwater is highly saline and contaminated due to dense settlement and poor sanitation infrastructure. Leaks from the saltwater sewer reticulation system in all three areas, including saltwater standpipes, may be contributing to elevated salinity levels at shallow depths. In Bairiki and Bikenibeu the groundwater conditions are slightly better than Betio, however, their aquifers remain vulnerable. Some shallow wells for non-potable water supply exist but are often impacted by pollution or salinity.

Groundwater quantity and quality vary between seasons. During dry periods, the freshwater lens contracts, which results in increased salinity levels. In contrast, during wet seasons, there is greater recharge, but also an increased risk of contamination from flooding, especially in areas with poor drainage and inadequate sanitation systems.

Monitoring bores at Betio, Bairiki and Bikenibeu were installed in 2011 and provide valuable insights into the freshwater lenses accessed by communities that rely on for their

non-potable water needs. Most wells show contamination by faecal coliforms, and many have elevated levels of nitrate exceeding the WHO drinking water guideline.

Deeper groundwater

Monitoring bores in Betio (20 m), Bairiki (7 m), and Bikenibeu (5 m) indicate generally low contamination with *E. coli*, indicating limited pathogen migration to deeper aquifers.

However, nitrate concentrations exceeded WHO drinking water guidelines (50 mg/L) in all three bores, attributed to leaky sewer pipes and agricultural (pig pen) runoff.

6.2.2 Potential construction impacts

Project activities associated with sewer pipe installation and decommissioning of existing septic systems presents short-term and long-term risks to groundwater quality across Betio, Bairiki, and Bikenibeu. The highly porous nature of soils and the shallow groundwater lens, makes the groundwater highly vulnerable to contamination.

During trenching and pipe-laying works, dewatering of excavations may lead to temporary lowering of the local water table and changes in shallow groundwater flow. Furthermore, if water pumped from trenches is not adequately filtered, it may carry sediment or construction-related contaminants (e.g. hydrocarbons, lubricants, pathogens) into adjacent land or stormwater drains resulting in pollution.

A key risk during pipe installation is the potential for wastewater infiltration into the local groundwater resources. If pipe joints are faulty or construction supervision is inadequate, leaks may occur during or after installation, allowing untreated sewage to percolate directly into the groundwater or represent a health risk to community members if exposed to the leak.

The decommissioning of septic tanks presents a further source of contamination risk if not handled correctly. Improper sludge removal or failure to apply lime disinfection could result in the release of pathogens and nutrients into surrounding soil and groundwater, representing a risk to the environment and community health.

Improper disposal of construction waste and sludge, particularly waste generated during septic tank decommissioning, also poses a risk. If sludge, contaminated soils, or construction debris are stockpiled on bare ground or disposed informally, there is a high potential for leachate to seep into the groundwater. This would result in degradation of groundwater quality.

Construction contractors will be required to implement mitigation and management measures for the handling transporting, and disposing of liquid waste, including coordination with existing sludge treatment or disposal services and use of containment systems at work sites. These mitigation measures are outlined in Section 7.1.4 of this ESMP (refer to 7.4 Table 7-1).

6.2.3 Potential operational impacts

The operational phase of the Project is expected to generate significant positive long-term benefits in groundwater quality, by enhancing the management of human waste and reducing reliance on deteriorating on-site sanitation systems and open defecation.

Connecting an additional 965 HH to the centralised sewer network will reduce the risk of groundwater contamination across Betio, Bairiki, and Bikenibeu representing an

approximate 20.34%⁹ increase in total population for sewer connections compared to the current situation.

Approximately 622 septic tanks/soakage systems will be decommissioned under the Project, representing approximately 41% of the septic tanks/soakage pits currently in use by HH. By removing these septic systems that are poorly maintained, overflowing, or located too close to groundwater sources, leaching of untreated effluent into the soil and groundwater will be reduced resulting in environmental and public health benefits. This reduction in discharges to ground and groundwater may also have the potential to improve water quality within the lagoon, making it safer for swimming.

The installation of new toilets, including the retrofitting of existing units to enable saltwater flushing, will provide additional environmental benefits. This will reduce reliance on informal defecation and greywater disposal practices, both of which contribute to localised groundwater pollution. In addition, the planned decommissioning of old, leaking saltwater standpipes will further lower the risk of saline intrusion into the shallow groundwater lens.

The Project also acknowledges the potential risk of soil and groundwater contamination if the system is not properly maintained or continues to operate beyond the expected lifespan of its key components.

6.3 Solid Waste Generation

Construction and operation of the new infrastructure will generate both solid and liquid waste, each posing specific environmental and public health risks if not properly managed.

6.3.1 Potential construction impacts

Construction activities will produce solid waste materials such as broken concrete, discarded pipes, excess packaging, and general debris. If not promptly collected and disposed of at approved facilities, these materials may accumulate at worksites or be illegally dumped in public areas, causing public nuisance and potential health and safety risks for the local communities.

6.4 Marine Water Quality and Biodiversity

6.4.1 Existing conditions

South Tarawa is a narrow, densely populated atoll. It consists of small islands connected by causeways, stretching between Betio in the west and Bonriki in the east. The atoll's biodiversity is shaped by its coastal and marine environments, modified terrestrial habitats and high population density.

Biodiversity in South Tarawa is significantly affected by urbanisation, land development, pollution and habitat disturbance. However, coastal and marine ecosystems such as lagoons and reef flats provide important ecological functions and resources for local communities. The key sources of pressure on the biodiversity resources South Tarawa are the following:

- Urban development resulting in habitat loss.

⁹ Total existing connection population is 30,838 with an additional 3,711 to be connected in this Project.

- Wastewater discharge, leaching from septic systems and solid waste affecting lagoon water quality.
- Invasive species, including rats, cats, feral dogs and weeds.

No terrestrial protected areas exist in South Tarawa, but community-based management is encouraged for marine and coastal areas.

Terrestrial flora

The terrestrial vegetation of Betio, Bairiki, and Bikenibeu is predominantly modified due to extensive settlement, agriculture, and infrastructure development. Most natural vegetation has largely been cleared or altered, and the remaining flora is dominated by:

- Coconut trees/palms which are widespread and often cultivated.
- Breadfruit, pandanus and papaya which are grown around the local HH.
- Coastal shrub species found in remnant pockets like *Scaevola taccada* and *Tournefortia argentea*.
- Introduced ornamental and shade trees such as hibiscus and frangipani.
- Weedy species including *Leucaena leucocephala* and *Cassia* which colonize disturbed areas.

Areas with natural terrestrial plant communities are minimal. Most vegetated areas are home gardens, roadside plantings, and community plots.

Terrestrial fauna

Native terrestrial fauna in Betio, Bairiki, and Bikenibeu is limited due to habitat disturbance. Species expected to be found in these villages include:

- Common urban and coastal birds such as the Pacific Reef Heron, Black Noddy, Zebra Dove and Common Myna.
- Small lizards such as Mourning Gecko and Common House Gecko.
- Domesticated animals such as chickens, pigs, and dogs.

Coastal and marine biodiversity

The surrounding marine environment supports greater biodiversity and plays a critical role in local subsistence, food security, and cultural practices. Coral species and coral cover are highly variable and degraded in areas of high pollution, particularly in the areas surrounding Betio. Seagrass beds are found in shallow lagoon areas and provide habitat for fish, molluscs, and invertebrates.

Reef and lagoon fish such as parrotfish, rabbitfish, grouper, and wrasse are common. Sea cucumbers, clams, octopus, and crustaceans such as crabs and shrimp are harvested for food. Limited mangrove stands exist in pockets around Bikenibeu which provide coastal protection, sediment trapping and nursery habitat. Community-lead planting of mangroves also occurs in designated areas.

Table 6-1 Estimated pollutant load at the Betio Outfall

Parameter	Assumed concentration (mg/L)	Pollutant load (kg/day)	Calculated annual load (t/yr)
BOD	250	207.88	75.88
TSS	250	207.88	75.88
TN	40	41.58	15.18
TP	7	7.28	2.66

Table 6-2 Estimated pollutant load at the Bairiki outfall

Parameter	Assumed Concentration (mg/L)	Pollutant load kg/day)	Calculated annual load (t/yr)
BOD	250	95.47	34.85
TSS	250	95.47	34.85
TN	40	15.28	5.58
TP	7	2.67	0.97

Table 6-3 Estimated pollutant load at the Bikenibeu outfall

Parameter	Assumed Concentration (mg/L)	Pollutant load (kg/day)	Calculated annual load (t/yr)
BOD	250	125.71	45.88
TSS	250	125.71	45.88
TN	40	20.11	7.34
TP	7	3.52	1.28

6.4.2 Potential construction impacts

Site preparation and trenching for sewer pipe installation may require vegetation clearing along road corridors and near HH, resulting in the removal of ornamental or native plant species, including shrubs and groundcover. While most work will take place in developed/urban areas, removal of vegetation may temporarily displace some common urban birds and reptiles, e.g. geckos. Any potential impacts to biodiversity are anticipated to be low due to the characteristics of the local environment and limited native habitat.

The construction of new HH toilets and decommissioning of septic tanks will have minimal, direct and localized impacts on biodiversity, as these activities will take place within residential compounds already modified by human activities.

Construction laydown areas can also have indirect negative effects on biodiversity, particularly if they are established on undeveloped land where they may cause habitat loss or degradation. They can also facilitate the introduction or spread of invasive weed species through contaminated equipment or construction materials.

Sediment-laden water from trench dewatering may enter local drains or coastal areas, potentially impacting nearshore marine biodiversity. If not well managed, leaks, spills or dumping of septic sludge could pollute marine areas.

6.4.3 Potential operational impacts

The Project is expected to deliver positive long-term environmental outcomes for marine water quality and coastal ecosystem health. By connecting HH to a centralized sewer system and decommissioning failing septic tanks, the Project will significantly reduce the leaching of untreated wastewater into groundwater and the discharge of raw sewage into stormwater systems and lagoonal waters. The scale of these measures is anticipated to result in measurable benefits to groundwater quality, stormwater runoff and improvements of nearshore marine water quality. The reduction in sewage and nutrient loads to the local groundwater resources will decrease nutrient discharge into the lagoon. In addition, the reduction of open defecation within the lagoon will have direct positive effects on water quality. Other sources of groundwater and surface water contamination will remain, including pig pens, solid waste disposal, contaminated stormwater runoff. However, the removal of a major source of faecal and nutrient contamination is expected, over the long term, to contribute to the recovery of coastal ecosystems, including coral reefs, seagrass beds and fish stocks.

The ocean impacts have not been modelled for this ESMP. Instead, a qualitative impact assessment has been completed for each outfall based on data and modelling outputs from the following:

- Outfall design projections from the 2011 Tarawa Water and Sanitation Roadmap 2010 to 2030¹⁰.
- Initial Environmental Assessment (2011)¹¹ and Basic ESIA (2015) for the 3B's outfall upgrades (completed in 2019).
- ESIA for Betio Desalination Plant 2023 (Volume 1 and Volume 2) (which proposes to use the Betio outfall to discharge brine)¹².
- Water quality monitoring around each outfall in 2019¹³.

Betio

The additional 4.35L/s is approximately 36% increase in average sewerage inflows compared to baseline, which is significant. Sewerage effluent will be immediately mixed with brine effluent from the desalination plant, and both waste streams will be discharged via the outfall diffusers.

The outfall is located 30m deep and greater than 100m offshore. To assess the potential impacts on ocean water quality and habitat, the post-Project sewerage flow and pollutant load at the outfall has been compared to the discharge dispersal modelling results from the brine dispersal study in the Betio Desalination ESIA (2023). The dispersal modelling used an average sewerage flow rate of 64L/s, salinity of 16,000 mg/L and a pollutant load of 100,000 faecal coliform MPN/100ml, along with a brine flow rate of 57L/s, salinity of 50,000 mg/L. The average and peak post-Project discharge rates are within the modelled flow, and the pollutant loads are considered the same, therefore it is reasonable to predict

¹⁰ Fraser Thomas Partners, 2011, Tarawa Water and Sanitation Roadmap 2010 to 2030.

¹¹ Government of Kiribati. 2011. Initial Environmental Examination. KIR: South Tarawa Sanitation Improvement Sector Project.

¹² FCG 2023. ESIA-Desalination Facilities (Betio Mackenzie). Vol 1 and Vol 2.

¹³ Bollen, L. 2019. South Tarawa Sanitation Improvement Sector Project Quarterly Ocean Outfall Monitoring-Technical Note. Draft. SMEC International. Unpublished.

that the dispersal behaviour of the discharge plumes will be within the parameters of the modelled predictions.

The modelling predicted, under 'worst case' low-current conditions, the combined sewerage effluent and brine remains at depth due to the high salinity content of the brine. The effluent would quickly disperse and return to ambient seawater salinity within 3 metres of the diffusers, which is a very small mixing zone. Within 3.5m of the diffusers the effluent dilution factor was predicted to be a factor of 50, meaning most pollutants meet ambient conditions (Refer Table 6-1).

It can be concluded that the environmental and public health impacts of the increased, post-Project flows at the Betio ocean outfall can be considered low risk and within the impacts predicted in previous ESIA:

- While the additional household connections result in a 36% increase from baseline, the total predicted average flow of 16.38 L/s and peak flow of 49.14 L/s is lower than the modelled sewerage flow (64L/s) meaning that the impacts are likely to be less than those predicted below using the modelling outputs.
- With a dilution factor of 50 at 3.5m from the diffusers, most parameters meet ambient conditions except total phosphorous and faecal coliforms. Total phosphorous, an indication of nutrient inputs, would need another 100 x dilution factor which is possible at this location well before the plume reaches the reef and therefore is not likely to cause eutrophication. Total suspended solids (TSS) of 5 mg/L is considered low for marine conditions and likely to meet ambient conditions (although no TSS data for Tarawa has been sourced for this ESMP). Faecal coliforms, an indicator of pathogenic health risk to humans, would require an additional 10 x dilution factor, conservatively assuming faecal coliforms are equivalent to enterococci. Again, this is considered possible to achieve within a very short distance from the diffusers.
- There are no biodiversity values within the mixing zone of the effluent, the benthic environment is mostly sand and rubble.
- The combined plume does not reach the surface where people are most likely to come in contact with it, meaning very low risk of any public health issues.

Table 6-4 Future estimated pollutant load at the Betio outfall

Parameter	Assumed concentration (mg/L)	Concentration 3.5m distance from the diffuser (50 x dilution) ¹⁴	Seawater default guideline values ¹⁵	Recreational standards for public health ¹⁶	Pollutant load (kg/day)	Calculated annual load (t/yr)
BOD	250	5 mg/L	<3mg/L		353.81	129.14
TSS	250	5 mg/L	*Depends on local condition		353.81	129.14
TN	40	0.8 mg/L	<1 mg/L		56.61	20.66
TP	7	0.14 mg/L	<0.015 mg/L		9.91	3.62
Faecal coliforms	100,000 MPN/100ml	2000 MPN/100ml		<200 MPN/100ml (equivalent to <140 MPN enterococci)		

Bairiki

The additional 0.65 L/s at the Bairiki outfall is approximately 15% increase in average sewerage inflows compared to baseline, which is a moderate difference. The outfall is located 30m deep and greater than 100m offshore and 75m from the reef edge. Typically, currents are long shore, meaning plumes are more likely to travel parallel to the beach rather than drift inshore. No dispersal modelling has been done for the Bairiki outfall, so the impact assessment has made some assumptions based on the various Betio outfall model outputs. The sewerage plume from the diffusers at 30m depth, with little to no current (calm conditions) is likely to rise to the surface within a few metres of the diffuser location. With higher currents the plume would disperse at a greater rate in the water column and reach the surface more than 10m from the diffuser location. The concentrations of contaminants at the surface cannot be predicted in the same way as Betio in the above paragraphs because dilution rates are not known. Data from one

¹⁴ Assuming no background concentration.

¹⁵ Default guideline values (DVGs) for available eutrophication parameters, as recommended for tropical Australian slightly disturbed marine inshore ecosystems with clear waters, cited in Graves, C. et. al (2021). *Marine water quality of a densely populated Pacific atoll (Tarawa, Kiribati): Cumulative pressures and resulting impacts on ecosystem and human health*, in Marine Pollution Bulletin Volume 163, February 2021. <https://doi.org/10.1016/j.marpolbul.2020.111951>

¹⁶ Cited in Government of Kiribati (2011): *Guideline values for microbial quality of recreational waters given by the World Health Organization in their Guidelines for safe recreational water environments (2003) are between 41 and 200 MPN enterococci / 100 ml of water. Within these, a value of 140 MPN enterococci / 100 ml of water has been identified by the Ministry of Environment, New Zealand based on a quantitative assessment of the risks of infection with recreational water use (described in their publication Microbiological Water Quality Guidelines for Marine and Freshwater Recreational Areas, 2002). The equivalent enterococci for faecal coliform concentration is estimated using the relationship enterococci = 0.0195(faecal coliform)1.67 provided in WHO (2001) Bathing Water Quality and Human Health: Protection of the human environment water, sanitation and health Report WHO/SDE/WSH/01.2. Geneva.*

round of water quality monitoring at the Bairiki outfall in 2019, at four sites within 40m up-current and down-current of the outfall, demonstrated that there was no obvious plume at the surface (indicating adequate mixing within the water column). Most monitoring parameters down-current were similar to up-current except slightly elevated total phosphorous.

Applying this to the estimate of the impact of the post-Project discharges, a further 15% of effluent may have a small to moderate impact on the dispersal and size of the plume / mixing zone but not to the extent that public health or reef health could be affected because of the low level of baseline impacts and large distance to shore and the reef system.

Table 6-5 Future estimated pollutant load at Bairiki outfall

Parameter	Assumed Concentration (mg/L)	Total post-Project Calculated Daily Pollutant load kg/day)	Total post Project Calculated Annual Pollutant Load (t/yr)
BOD	250	109.51	39.97
TSS	250	109.51	39.97
TN	40	17.52	6.39
TP	7	3.07	1.12
Faecal coliforms	100,000 MPN / 100ml		

Bikenibeu

The additional 1.53 L/s at the Bairiki outfall is approximately 26% increase in average sewerage inflows compared to baseline, which is a moderate difference. The outfall is located 30m deep and greater than 100m offshore and 75m from the reef edge. Similar to Bairiki, typically currents are long shore, meaning plumes are more likely to travel parallel to the beach rather than drift inshore. No dispersal modelling has been done for the Bikenibeu outfall, so the impact assessment has made some assumptions based on the various Betio outfall model outputs. The sewerage plume from the diffusers at 30m depth, with little to no current (calm conditions) is likely to rise to the surface within a few metres of the diffuser location. With higher currents the plume would disperse at a greater rate in the water column and reach the surface more than 10m from the diffuser location. The concentrations of contaminants at the surface cannot be predicted in the same way as Betio in the above paragraphs because dilution rates are not known. Data from one round of water quality monitoring at the Bikenibeu outfall in 2019, at four sites within 40m up-current and down-current of the outfall, demonstrated that there was no obvious plume at the surface (indicating good mixing within the water column). Similar to Bairiki, most monitoring parameters down-current were similar to up-current except slightly elevated total phosphorous.

Applying this to the post-Project plume, a further 26% of effluent may have a moderate impact on the dispersal and the size of the plume / mixing zone but not to the extent that public health or reef health could be affected because of the low level of baseline impacts and due to the distance from shore and the reef system.

Table 6-6 Future estimated pollutant load at Bikenibeu outfall

Parameter	Assumed Concentration (mg/L)	Pollutant load (kg/day)	Calculated annual load (t/yr)
BOD	250	158.76	57.95
TSS	250	158.76	57.95
TN	40	25.40	9.27
TP	7	4.45	1.62
Faecal coliforms	100,000 MPN / 100ml		

Mitigation and Monitoring for all outfalls

Impact mitigation will be achieved through effective operation and maintenance of screening systems, outfall pipelines and diffusers to ensure continued performance and dilution in accordance with the design specifications. This will align with the updated EL conditions under the 2021 revised Environmental Act, which we are yet to receive, on wastewater effluent discharge, which emphasise the importance of reducing contaminants to protect public health and environment. Component 3 of STSP is providing support to MISE and PUB for operations and maintenance capability and financial sustainability, which will contribute to the likelihood of effective maintenance. No additional sewerage treatment is proposed in any of the three networks in the foreseeable future.

A marine water quality monitoring program covering all three outfall areas will be financed under the STSP. The PMU has prepared draft Terms of Reference (ToR), with procurement scheduled for the last quarter of 2025 and programme commencement anticipated to commence by mid-2026. Monitoring will include quarterly sampling and analysis of groundwater and of marine waters at all 3 outfalls. While comprehensive pre-implementation baseline data may not be available, initial monitoring rounds will establish a critical reference point for assessing direct and indirect impacts on the receiving marine environment and taking corrective action as and where required. Over the longer term, the monitoring framework can be integrated into routine operational procedures, providing early warning of adverse trends and informing maintenance and system improvement decisions. According to the proposed ToR, the monitoring program is initially planned to operate for a period of two years.

6.5 Traffic and Access

6.5.1 Existing conditions

South Tarawa is served by a single transport corridor which connects the islands from Betio to Bonriki. This road functions as the main artery for both vehicle and pedestrian traffic. The road was rehabilitated in 2016 through the Kiribati Road Rehabilitation Project (co-financed by ADB/WB) and is in generally good conditions. Secondary residential roads and accessways that branch from the main transport corridor remain unsealed or in poor condition. These roads are often narrow, encroached upon by structures or abandoned vehicles and shipping containers.

Traffic volumes on the main artery are high, particularly during peak hours in the morning and late afternoon. The road accommodates a mix of private vehicles, buses and minibuses, motorcycles, bicycles, and pedestrians. Congestion is becoming increasingly problematic, especially in high-density areas such as Betio and Bairiki. Key road safety issues include the lack of designated pedestrian crossings, poor lighting in some sections, and informal vendors occupying footpaths and roadsides. Traffic enforcement is the responsibility of the Kiribati Police Services Traffic Unit.

Public transport is dominated by privately operated minibuses that provide a critical and affordable service to the population. These minibuses operate informally, without designated stops, often picking up and dropping off passengers at unplanned points. This practice contributes to traffic congestion and presents safety hazards for passengers and other road users.

Access to residential properties typically involves narrow laneways or informal paths that branch off the main road. These accessways are often shared between multiple HH, unpaved, and vulnerable to flooding during heavy rains. Many are intersected by open drainage channels or utility lines.

6.5.2 Potential construction impacts

The Project involves installation of sewer mains and HH connections that require trenching along and across public roads and footpaths, and the transport of construction materials and waste. Temporary blockages of footpaths and laneways, establishment of construction compounds, and the movement of construction personnel and vehicles will also occur. These activities will be carried out incrementally in clusters and will vary in duration and intensity across locations.

The narrow and congested nature of the road corridors, combined with limited access routes, will pose logistical challenges for material transport, equipment deployment, and safe execution of works for the contractor. Ensuring public safety during trenching will be the responsibility of the Construction Contractor.

Several sensitive locations are likely to be impacted by construction activities, including:

- Schools and churches, where pedestrian movement is high during peak hours.
- Markets and commercial areas which experience substantial pedestrian traffic and vehicle deliveries.
- Residential laneways, which are narrow, shared, and prone to disruption.

Increased traffic congestion is likely due to the already high traffic volumes and the added presence of construction vehicles, trenching operations, and temporary lane closures.

Temporary restrictions of access to HH and businesses may result from trenching or construction equipment blocking pathways. Pedestrian safety risks may arise where construction works use footpaths and pedestrians must use the road. Delays for ambulances could result from trenching in narrow corridors unless access is carefully managed. Damage to access infrastructure is a risk if trenching is not properly executed and maintained, potentially affecting driveways or informal paths.

Construction Contractors will be responsible for implementing traffic control measures, communicating with the public, minimising disruptions and maintaining safe access for residents throughout construction. The details of the necessary actions will be described in the Contractor's Traffic Management Plan – as part of the CESMP.

6.5.3 Potential operational impacts

No impacts to traffic and access are anticipated during operation of the sewer extension and new toilets other than potential minor, short-term inconveniences to HH and road users, associated with maintenance work. Any maintenance work would be the responsibility of PUB and would be undertaken in accordance with PUB Environmental and Social Management System procedures.

6.6 Air Quality and Odour

6.6.1 Existing conditions

Air quality in South Tarawa is influenced by a combination of natural conditions and human activities. The coastal setting and prevailing sea breezes help disperse airborne pollutants, but localised air quality degradation occurs due to urban density, poor waste management practices and dust. The overall ambient air quality across much of South Tarawa is generally ok, however, in urban centres such as Betio, Bairiki, and Bikenibeu, air quality can be periodically degraded due to vehicle emissions or open burning of waste.

Odour is a common concern, particularly in areas with inadequate sanitation. Key sources include:

- Poorly functioning septic systems and pit latrines.
- Wastewater ponding in drainage ditches.
- Solid waste accumulation and uncollected HH waste.

Odour and air quality conditions can worsen during the wet season (November to April), when higher rainfall leads to flooding. The World Health Organisation (WHO) notes that hydrogen sulphide odour (sewage type smells), should be minimised to prevent odour annoyance in exposed populations.

6.6.2 Potential construction impacts

During construction, several activities have the potential to impact local air quality and create temporary nuisances for nearby communities.

Excavation, trenching, and the movement of vehicles on unsealed surfaces can produce dust, particularly during dry weather. This may affect air quality and cause discomfort for residents and workers close to construction zones. The use of small machinery and transport vehicles will result in localized emissions of air pollutants if machinery is not well maintained.

Temporary unpleasant odours may occur when HH septic systems are connected to the new sewer network or during the decommissioning of septic tanks. These odours are expected to be moderate, but localized and short-term, primarily affecting residents and workers near connection sites.

6.6.3 Potential operational benefits and impacts

Once operational, the new sewerage infrastructure is expected to deliver environmental and public health benefits. However, if not properly maintained, the system may also introduce certain risks, particularly in relation to odour.

If the sewer system is poorly maintained or suffers from mechanical failures, it may emit foul odours, primarily due to the release of hydrogen sulphide and other gases. This is

particularly likely near manholes, pump stations, or overflow points. According to the WHO, hydrogen sulphide odour above ambient $\text{H}_2\text{S} \leq 7 \mu\text{g}/\text{m}^3$ as a 30-minute average, will cause odour annoyance in exposed populations. This value is set for nuisance/well-being (not toxicity).

A major benefit of the operational sewer network will be the potential reduction in background odour levels in residential areas. By replacing informal waste disposal practices and overflowing latrines with a sealed, reticulated sewerage system, overall sanitation conditions will improve. This represents a positive and long-term impact on community ambient air quality, improving the quality of life and lifestyle of the local population.

6.7 Noise and Vibration

6.7.1 Existing conditions

South Tarawa is a densely populated with a mix of residential and commercial land uses. The existing noise environment is primarily influenced by human activities, including:

- Road traffic and vehicular noise.
- Loud music.
- Small-scale construction involving power tools.
- Diesel powered generators, particularly during power outages.
- Roosters, pigs, and dogs are common in many residential areas and can be sources of persistent background noise.

Sensitive noise receptors include health facilities, schools, churches and residential areas.

6.7.2 Potential construction impacts

During construction, noise will be generated from a range of activities including excavation, trenching, use of machinery (e.g., small excavators, pumps, generators), material transport, and other on-site operations. These activities may lead to temporary increases in ambient noise levels, particularly as works will be in residential areas and in close to sensitive receptors.

Construction noise impacts are expected to be moderate and short-term as works progress from one location to the next. Works will be restricted to daytime hours where possible. Notice will also be provided to affected communities in advance of works commencing to inform of the activities as well as changes in the working hours if necessary.

The use of machinery for trenching activities would generate minor ground vibration. Communities will need to be informed of any trenching works carried out within a few metres of existing structures (e.g., houses, sheds, or concrete fences), as well as of any changes to working hours, if necessary.

6.7.3 Potential operation impacts

No noise and vibration impacts are anticipated once all the new toilets and HH sewer connections have been completed, and the construction contractors have demobilised.

6.8 Community Health and Safety

The outfall discharge will convey pollutant loads offshore and to a higher diluting mixing zone. While this does not constitute treatment, it reduces public health exposure near HH. In line with the design parameters and findings of the approved ESIA and EL, the discharge remains within permissible limits in accordance with the SMEC 2019 report and IEE, briefly referenced in Section 6.4.3. Monitoring will continue to assess potential impacts on the marine environment.

Although the EL does not prescribe fixed national discharge values in the Act, it authorises ECD to set case-specific thresholds which are guided by international practice such as WHO standards and Pacific regional guidelines and by the sensitivity of the receiving environment.

6.8.1 Existing Conditions

Betio, Bairiki, and Bikenibeu are highly populated areas where HH are located very close to each other, as well as to roads and community infrastructure. Community health and safety conditions include poor sanitation, limited access to clean water, overcrowded living conditions and traffic hazards. Waterborne and vector-borne diseases such as diarrhoea, dengue fever, typhoid, and hepatitis A are common.

Open defecation and the use of poorly maintained HH septic tanks and pit latrines result in contamination of the shallow freshwater lens. Informal waste disposal contributes to localised pollution, odours, and breeding sites for mosquitoes and flies.

Betio Hospital is the largest health facility in South Tarawa, providing inpatient and outpatient services, including maternal and child health. Kiribati's Annual Health Bulletin 2023 reported 26,779 cases of diarrhoea and 8,453 cases of dysentery at health centres/clinics for water-borne illnesses.

Bairiki and Bikenibeu clinics offer primary health care services. Health services are overstretched with limited resources.

Roads through Betio, Bairiki, and Bikenibeu are narrow, congested, and shared by pedestrians, vehicles, motorcycles, bicycles, and children playing. Pedestrian infrastructure is limited, increasing the risk of vehicle-related injuries, particularly near schools, markets, and construction sites.

In addition to the risk to the community, gender-based violence and personal safety risks, especially for women and girls using poorly lit public spaces, have been reported.

6.8.2 Potential construction impacts

Construction activities will take place in densely populated urban areas, where community interaction with workers will be frequent and often unavoidable. This increases the potential for a range of health and safety risks to residents, particularly vulnerable groups.

Construction in high-density environments increases the risk of accidents involving community members, especially children and the elderly. Open trenches and stockpiled materials in residential areas pose tripping hazards to residents and pedestrians. These risks are elevated where footpaths are obstructed, lighting is inadequate, or pedestrian detours are poorly constructed.

Temporary restrictions on roads and footpaths caused by excavation and roadworks may disrupt residents access to homes, clinics, schools, and markets. These disruptions are unlikely to impact any one HH for more than one week as works would progress relatively quickly from street to street.

Residents living near construction areas will likely experience increased dust and noise levels, potentially causing discomfort. This is especially relevant as many homes are close to where trenching will be required (less than 10m). Vulnerable groups, such as those with respiratory conditions, infants, and the elderly are most at risk from these short-term environmental nuisances.

The removal of septic tanks and connection of sewer pipes could potentially contaminate soils or groundwater representing a risk to the environment (refer to section 6.2.2) and community health. Direct physical contact with leachate or contaminated water from leaks could result in skin infections while using or consuming contaminated groundwater wells for HH purposes, could expose families to water borne diseases and pathogens.

The presence of a temporary construction workforce and increased interaction between workers and the community has the potential to elevate risks of sexual exploitation, abuse, and harassment (SEA/SH). These risks are particularly relevant as works will be undertaken within HH / family compounds. Risks are elevated with male-dominated international workforce.

6.8.3 Potential operational benefits and impacts

The extension of the piped sewerage network will deliver major and measurable long-term public health, safety, and well-being benefits for residents in Betio, Bairiki, and Bikenibeu. Prior to the Project, approximately 5.1¹⁷ percent of South Tarawa's population—mainly in Betio and Bikenibeu—practiced open defecation or relied on failing septic tanks. Once 965 connections are completed under the STSP more than 6,272¹⁸ residents—or nearly 21 percent of the total 3B population—will benefit directly from safely managed sanitation and the decommissioning of unsafe systems.

By preventing uncontrolled discharge, the Project will drastically reduce exposure to sewage and faecal pathogens. Associated benefits that could be observed through the exposure reduction pathways are as follows:

- **Groundwater route (groundwater contamination)**

Closing septic tanks eliminates anaerobic leakage of faecal bacteria and nitrates into shallow wells. Previous national tests detected *E. coli* in over 25¹⁹ percent of samples on South Tarawa. Also, a survey conducted under the South Tarawa Sanitation Improvement Sector Project (STSISP)²⁰ estimated that decommissioning more than 600 failing septic and cesspit tanks will eliminate continuous nutrient and bacterial leaching into soils and domestic wells.

¹⁷ ChildFund Survey Report 2024; ODF for Betio is 114 out of 2471 HH, Bairiki is 32 out of 463 HH and Bikenibeu is 67 out of 1233. Using 6.5 average person per HH, the estimated ODF population is 1385 out of the total population of 27,086 across the 3Bs, during the survey.

¹⁸ Average population adopted is 6.5

¹⁹ Source: Kiribati Water Quality Monitoring Data (2019) – Commonwealth Marine Economies Programme Survey (Cefas, UK). <https://doi.org/10.14466/CefasDataHub.112>. Supporting source: MELAD National Water Quality Monitoring Report

²⁰ Source: Public Utilities Board & MISE. (2023). *Household Sanitation Survey* [Project internal dataset]. Context reference: Asian Development Bank. (2020). *South Tarawa Sanitation Improvement Sector Project – Project Completion Report*. Retrieved from <https://www.adb.org/projects/43072-013/main>

Consequently, reducing pathogen exposure through this pathway also align directly with the World Bank’s ESS4 on Community Health and Safety.

- **Surface contamination**

Sealed sewer connections prevent storm-runoff carrying sludge and latrine waste into open drains—an issue historically common after heavy rainfall.

- **Direct contact**

Household toilets remove the reliance on shared or open sites, significantly reducing hand-to-mouth and vector-mediated transmission risks, particularly among children.

Furthermore, peer-reviewed studies in Pacific Island States and similar environments show that improved sewer connectivity is associated with:

- A 15-30²¹ percent reduction in diarrhoeal incidence, up to 20²² percent decline in child stunting through better nutrient absorption.
- ²³ Reduced re-infection rates for intestinal parasites in communities achieving open - defecation-free status.

Applying these projections to South Tarawa’s 3B population suggests the Project could avert approximately 300-400²⁴ cases of faecal-oral disease each year among under -five children and reduce malnutrition rates within five years, provided safe hygiene practices continue.

Women, girls, the elderly, and persons with disabilities will gain access to safe, private, and accessible HH toilets, improving dignity and reducing risks of assault and exposure linked to open or poorly located facilities. These factors contribute to ESS4’s objectives on equitable access to safe infrastructure.

The longevity of the mentioned community and public health outcomes depends on the effective operation and maintenance by the PUB and community participation.

Regular servicing of pump stations, rapid fault response, and HH education programmes are critical to prevent misuse or blockages in compound connections.

In summary, the Project achieves a transformative shift from unsafe excreta management—where roughly 60²⁵ percent of wastewater was previously unsafely handled—to a safely managed system fully contained within the reticulated network. By physically removing

²¹ Source: Prüss-Ustün, A., Wolf, J., Bartram, J., Clasen, T., Cumming, O., et al. (2019). *Burden of disease from inadequate water, sanitation, and hygiene for selected adverse health outcomes. The Lancet Global Health*, 7(9), e1335–e1345.

[https://doi.org/10.1016/S2214-109X\(19\)30286-6](https://doi.org/10.1016/S2214-109X(19)30286-6). Complementary summary available via WHO Open Access:

<https://www.who.int/publications/i/item/9789240075610>

²² Source: Cumming, O., & Cairncross, S. (2016). *Can Water, Sanitation and Hygiene Help Eliminate Stunting? Maternal and Child Nutrition*, 12(S1), 91–105. Accessible via Semantic Scholar: <https://www.semanticscholar.org/paper/Can-water,-sanitation-and-hygiene-help-eliminate-Cumming-Cairncross/bd848a2f8f20e7acd8a7a8e96cc477dc7d87e10a>

²³ Source: WHO / UNICEF Joint Monitoring Programme (2021). *Progress on Household Drinking Water, Sanitation and Hygiene 2000–2020: Five Years into the SDGs*. World Health Organization and UNICEF. Full report available via WHO/UNICEF JMP: <https://washdata.org/sites/default/files/2022-01/jmp-2021-wash-households-highlights.pdf>

²⁴ Kiribati Ministry of Health and Medical Services (2019). *Kiribati Annual Health Bulletin 2019*. Download via Pacific Regional Health Data Repository (PSRO): <https://psro.dataforall.org/sites/default/files/2024-10/Kiribati%202019%20Annual%20Health%20Bulletin.pdf>

²⁵ Source: WHO / UNICEF Joint Monitoring Programme (2021). *Progress on Household Drinking Water, Sanitation and Hygiene 2000–2020: Five Years into the SDGs*. World Health Organization and UNICEF. Full report available via WHO/UNICEF JMP: <https://washdata.org/sites/default/files/2022-01/jmp-2021-wash-households-highlights.pdf>

exposure pathways and improving marine water quality, the STSP directly advances Sustainable Development Goals 6.2 and 3.9 on sanitation and health, ensuring sustained reductions in disease burden and environmental contamination for South Tarawa's population.

6.9 Visual Amenity

The visual landscape of Betio, Bairiki, and Bikenibeu reflects a densely developed and heavily modified landscape. This includes a mix of concrete buildings, informal housing, unpaved streets, shipping containers, open storage areas, makeshift stalls and visual clutter. Vegetation cover is limited, with coconut trees/palms, breadfruit trees, and ornamental plants scattered throughout HH compounds. Open areas used for recreation or gathering are few and generally lack formal landscaping or aesthetic design.

The presence of excavated material, construction waste, machinery, and temporary fencing in residential areas will create negligible, short-term visual amenity impacts. Excavation and trenching may require removal of trees or vegetation, affecting the visual amenity of an area.

Most of the new infrastructure is underground, reducing the potential for long-term visual impacts on communities. The new HH toilets will be small cubical structures that fit within the visual context of residential compounds. An illustration of the typical above and below ground infrastructure associated with the new HH toilets is presented in Figure 6-1.

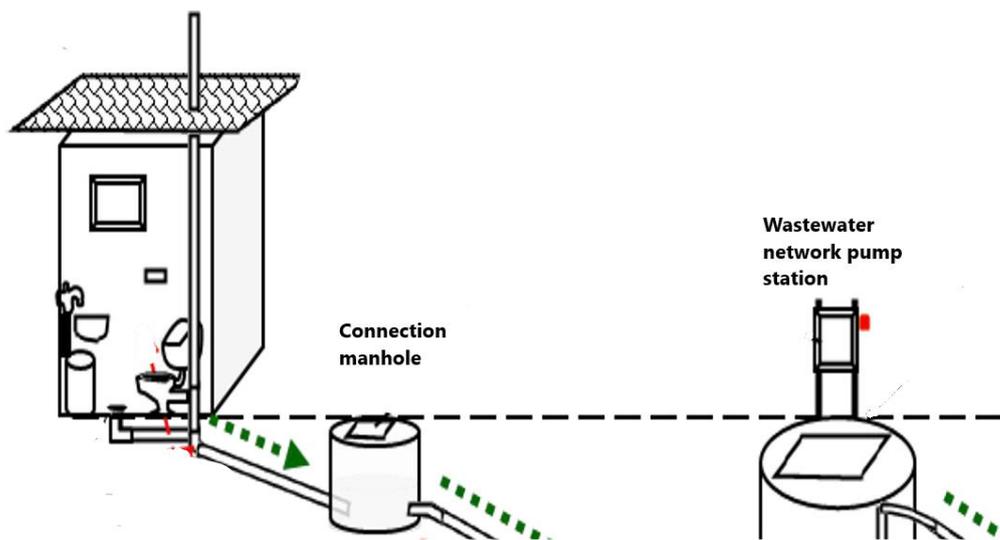


Figure 6-1 Typical above/below ground infrastructure of new household toilets

6.10 Socio-Economics

Public Health and Social Benefits

The Project will contribute to a healthier population, cleaner surroundings, improved hygiene and hence to improved standards of living. Reduced illness-related disruptions will lower absenteeism from both school and work. Women and girls, in particular, will benefit from improved access to safe and private sanitation facilities, provided these are designed with adequate lighting, locks, privacy, and menstrual hygiene considerations. Hygiene promotion and awareness campaigns will further strengthen inclusion and empowerment.

Economic Opportunities

During construction, the Project will generate short-term employment for both skilled and

unskilled workers, with priority given to local labour. While exact workforce requirements will be determined during the procurement of construction contracts, it is anticipated that three to four construction teams, each comprising around 20 workers, will be engaged.

Temporary Construction Impacts and Social Risks

Construction activities may temporarily restrict access to roadside stalls and small businesses, with noise, dust, and roadworks deterring customers or causing vendors to pause operations. These disruptions are expected to be temporary and site-specific. No property acquisition, displacement, or permanent loss of land access will occur under the Project. However, if sewerage connections or toilet upgrades are limited to selected households or areas, residents outside Project zones may feel excluded, creating perceptions of inequity. Transparent communication and community engagement will be essential to mitigate such risks.

Land Impacts

Due to the dense housing layout in particular areas in Betio and Bairiki, the proposed HH sewer connections follow that makes the best use of the available space, to ensure optimal access and flow to the main sewer line. The route is designed to be as straight as practicable; however, several bends are incorporated to navigate existing structures and physical constraints. A similar approach is applied to Bikenibeu, but with less complexity.

While Betio presents engineering challenges due to its dense housing layout, Bikenibeu introduces a different set of complexities related to land tenure. In Bikenibeu and Betio, issues such as land ownership and sub-lease titles complicate the provision of HH sewer connections. Also note that if connections are provided to squatters, it may be interpreted as granting them permanent residency or sublease entitlement rights.

Furthermore, concerns were raised by some HH owners that their tenants might remain on their land permanently once the sewer connection has been made. These issues were raised during the one-on-one HH consultations (Refer to Appendix F). Currently, PMU works closely with the LMD officers to obtain updated sublease data for the 3Bs, while PMU and SBCC teams focus on collecting completed PUB connection forms and proof of land entitlements. As part of the LMD approach, the officers encourage illegal squatters to submit their sub-lease applications at their earliest convenience. However, if they fail to do so, they may be issued an eviction notice during the follow up HH consultations. Hence, the Lands Department recommends communal toilets as a preferred alternative for government lands where sublease entitlements are being processed or where land disputes exist among households during construction works.

6.11 Occupational Health and Safety

The OHS of all workers on site is the responsibility of the construction contractors and must comply with the OHS Act 2015. However, limited enforcement of safety standards, inadequate training, informal work practices, insufficient protective equipment, restricted access to first aid, and weak risk monitoring present substantial risks to workers' health and safety.

Project-related activities that pose OHS risks include:

- Trench collapses, particularly in sandy or saturated soils.
- Accidents involving excavators and trucks, which can cause serious injuries.
- Manual handling and repetitive work, including lifting heavy pipes or concrete, leading to musculoskeletal injuries.

- Manual removal of domestic waste, such as broken glass, tin cans, and wood with nails, which can cause cuts, puncture wounds, or infections.
- Exposure to fine particulate matter, including bioaerosols from decomposed organic waste, mold spores, noise, diesel fumes, and potentially hazardous chemicals.
- Prolonged outdoor work in tropical heat and humidity, resulting in dehydration, exhaustion, or heat stress.
- Contact with untreated wastewater, sludge, or contaminated soils, which can cause illness and infection.

An additional risk relates to the potential presence of unexploded ordnance (UXO) in the future work areas, particularly in Betio. Trenching activities may uncover UXO buried in the soil, presenting a serious risk of detonation. Such incidents can lead to injury or death, Project delays, and public concern. In response to these risks MISE contracted a specialised firm to undertake a pre-construction survey in the future work areas and to safely remove any identified UXO within this corridor prior to the start of construction. This exercise will follow an approved protocol and is supported by a CESMP that was prepared by the contractor.

The actual UXO survey will be undertaken once the detailed design for the Project has been completed.

6.12 Resource Use

Construction will require the use of various resources. Water will be needed throughout the construction period for dust suppression, concrete mixing and cleaning equipment. Aggregate and sand will be required for trench backfilling, bedding of pipes, and concrete production.

All sand and aggregate will be sourced from licenced suppliers in South Tarawa. It is likely the pipes and manhole cover will be imported. All other materials will be sourced locally from the licensed hardware suppliers in Tarawa.

7. Environmental and Social Management

The potential E&S impacts associated with construction and operation of the HH sewer connection improvements has been assessed in Section 6.

Section 7 outlines proposed mitigation and management that should be implemented to minimise and avoid potential adverse impacts on the environment and communities. This section also details the roles, responsibilities and processes for Project implementation, monitoring, and reporting. All mitigation and management measures relating to construction have been incorporated into Table 7-1 for Contractors.

The preparation of this ESMP is a requirement of the STSP, ESCP and ECD. The ESMP will be implemented before, during and after construction.

7.1 Roles and Responsibilities

7.1.1 PMU

The PMU Safeguards team, comprising the Social and the Environmental Safeguard Officer, is responsible for supervising design, procurement and the contractors' activities on the ground, to ensure compliance with all social and environmental safeguards requirements. The key roles and responsibility include:

- Ensuring that the social and environmental standards along with the mitigation measures specified in this ESMP are properly implemented.
- Reviewing bid documents to ensure ESMP requirements are included.
- Reviewing and providing feedback on progress reports.
- Monitor design and contractor performance in relation to social and environmental safeguards through Project implementation.
- Coordinating and working closely with the PIAC Safeguard Expert and the KFSU team to address and manage social and environmental matters.
- Overseeing OHS for both Project workers and the health and safety of surrounding communities and ensuring that the contractor effectively implements the measures specified in this ESMP.
- Ensuring the contractor CoC is adhered to and zero tolerance to GBV, SEA/ SH.
- Ensure the GRM and the workers GRM are implemented, and grievances are closed out satisfactorily.

7.1.2 KFSU

The KFSU E&S specialists assist the PMU Safeguards team and provide guidance on all aspects of STSP safeguards requirements. This included assistance with preparation of this ESMP. The KFSU team will support the PMU safeguards specialists throughout the duration of STSP implementation.

7.1.3 PIAC

The PIAC will be responsible for addressing E&S risks during the design and procurement phases and support the PMU to monitor E&S mitigation measures during construction.

This includes providing E&S technical guidance on final designs, how to resolve E&S issues, including OSH, labour and working conditions and regularly reporting progress to the PMU.

7.1.4 Construction contractors

The construction contractors will be responsible for the final designs, including final decisions on how HH will be connected to the main sewer network and all construction activities onsite. Under their contracts, the construction contractor(s) shall complete works in accordance with the mitigation and management measures outlined in this ESMP and with conditions specified in the EL. This includes compliance monitoring and reporting on compliance, grievances and incident management. The construction contractors will also have primary responsibility for the health and safety of all workers and visitors onsite and following all OHS requirements. In addition, the construction contractor(s) will be required to adhere to a CoC on zero tolerance for GBV/SEA/SH.

7.2 Detailed Design and Construction Planning

This ESMP is based on preliminary Project planning and design concepts. Due to the nature of work proposed, detailed design of each cluster will be responsive to actual onsite conditions experienced once contractors mobilise and HH consultation has been completed.

The detailed designs will be reviewed and cleared by the PMU prior to works starting. This review process will include a review of the E&S design elements, including responding to beneficiary and stakeholder feedback and confirming land access approvals.

7.3 Bidding Documents

The bidding documents for the construction contractors will include specific work requirements that will contractually bind the successful bidders to E&S tasks and outcomes. The specifications in the bidding documents will incorporate the environmental, social, health and safety (ESHS) mitigation measures outlined in this ESMP. The bidding documents will stipulate the minimum requirements for the nominated ESHS Construction Manager, including a minimum number of years of relevant experience in similar roles and qualification requirements.

The scope of works including the Employers Requirements, and the Specifications, and other documentation issued to the bidders, will itemize the specific ESHS tasks that need to be completed. The Priced Activity Schedule (PAS) will describe the items to be priced for inclusion during execution of the works. Any workforce training and community engagement will also be included in the contractor pricing

All construction work force will be expected to sign a CoC for behaviours relating to sexual exploitation and sexual harassment (SEA/SH).

The bidding documents will outline specific hold points in the contract where works cannot commence without certain approvals being obtained. For example, construction cannot start until the EL has been granted, the land consent process has been completed, and the Contractor's CESMP has been reviewed and approved.

The construction-related mitigation and management measures specified in this ESMP will be attached to the bidding documents and incorporated in the construction contract, to ensure that they become binding contractual requirements and are adequately reflected in construction pricing and planning.

7.4 Mitigation and Management Measures

Key to the delivery of the Project, including the management of impacts, is the development, implementation and monitoring of a suite of measures covering detailed design, construction and operation.

Construction contractors is required to prepare a CESMP which translates the mitigation measures presented in Table 7-1. It is prepared to meet the requirements of the STSP Labor Management Procedures, SEP, ESCP, World Bank Environment and Social Standards and relevant Kiribati legislation. Its purpose is to ensure that construction related impacts are appropriately managed.

This ESMP addresses the following key requirements for E&S management as are summarised in Table 7-1:

- Training requirements for employees, sub-contractors and visitors.
- Environmental incident and emergency management.
- Complaints grievance management (workers GRM).
- Compliance monitoring and reporting.
- Mitigation measures.
- Corrective action procedures.
- Find chance procedures (refer to Appendix J for visual examples).
- Procedures for the management of UXO.
- Chance Find Procedure(s) including the management of human remains.
- Occupational Health and Safety.
- CoC (including wording to adhere to zero tolerance of SEA/SH).

Table 7-1 E&S mitigation and management measures

Ref	E&S impact	Mitigation measures	Implementation responsibility	Monitoring		
				Monitoring parameter	Reporting	Responsibility
DETAILED DESIGN PHASE						
D1	General	<p>Ensure E&S considerations are incorporated into detailed designs including:</p> <ul style="list-style-type: none"> • Sewage infrastructure design minimises the risk of system leaks impacting groundwater quality. • HH preferences are taken into consideration when selection trenching alignments and location of new toilets. • The placing/location of system components should take into consideration potential impacts on existing HH and community assets, including common spaces, fences, buildings, driveways and gardens and avoid where possible/practical, otherwise compensation agreed with the landowner. • Consulting with affected communities, landowners, government agencies and other relevant parties to gather input, address concerns and ensure transparency. • Legally and socially secure access to land such as obtaining permissions, resolving disputes, or confirming ownership. 	Design -Build Contractor	Check that design related E&S mitigation measures are incorporated into the final detailed design.	Final detailed design technical specifications and works plan.	PMU safeguards officers, PIAC safeguard specialist
D2	Unexploded Ordnance	<ul style="list-style-type: none"> • An UXO survey of the agreed works area and 2 metres beyond the boundary, must be undertaken by a qualified entity/person before any ground disturbance occurs. • All ground disturbance activities, including earthworks and trench must be limited to the areas cleared by the UXO survey. • If a suspected UXO is encountered during works, all work in that areas must stop and be reported to the Project Manager. Workers must be trained to identify potential chance finds, such as cultural heritage items or human 	Construction Contractor/PMU	Clearance letter provided for specific area by UXO Survey team.	Clearance letter included in updates to the PMU.	PMU safeguards Officers, PIAC safeguard specialist

Ref	E&S impact	Mitigation measures	Implementation responsibility	Monitoring		
				Monitoring parameter	Reporting	Responsibility
		<p>remains and must follow national heritage protocols and guidance from relevant government authorities – MTCIC (Ministry of Tourism, Commerce, Industry and Cooperatives) and KPS (Kiribati Police Service).</p> <ul style="list-style-type: none"> No works are permitted in the areas until permission is given by the UXO Specialist team. 				
CONSTRUCTION PHASE						
C1	General	<p>The Construction Contractor shall establish processes for implementing the construction related mitigation measures outlined in this ESMP. This shall be in the form of a 'CESMP' include:</p> <ul style="list-style-type: none"> Nominate a person who will be responsible for all Environment, Health and Safety requirements onsite. Allocate budgets for all ESHS equipment personnel, etc Implement all mitigation and management measures outlined in this ESMP that relate to construction. Design and implement a GRM for workers Monitor the effectiveness of mitigation measure. Make changes as required to improve the E&S outcomes of mitigation measures. Record all feedback and complaints using the STSP GRM procedures (Appendix H) investigate suitable solutions and report to the PMU. Agree with PMU on responsible party for each feedback/complaint. Induct all workers/subcontractors to inform them of their EHS responsibilities. Provide training for workers (including subcontractors), as required, so they have the knowledge to undertake work in accordance 	Construction Contractor	Appropriate EHS management processes are being implemented.	Fortnightly updates provided to the PMU.	PMU safeguards officers, PIAC safeguard specialist

Ref	E&S impact	Mitigation measures	Implementation responsibility	Monitoring		
				Monitoring parameter	Reporting	Responsibility
		<p>with their EHS responsibilities.</p> <ul style="list-style-type: none"> • Provide fortnightly progress updates to the PMU regarding implementation of EHS requirements. • Record and report all environmental, social, health and safety incidents to the PMU. This includes near misses. Complete Environment and Social Incident Reporting Tool (ESIRT) form, which is filling in incident reports for PMU and WB when there has been a serious environmental, social health or safety incident, if required. 				
C2	Soil	<ul style="list-style-type: none"> • Site clearance must not commence until formal land access approval has been received from the PMU. The contractor must ensure that no physical works begin until they have received PMU's communication on land access confirmation. Ensure to notify occupiers and landowners 7 days prior work will commence. • Limit site clearing to areas required for trenching or construction of new toilets- site can only be cleared once all crops have been assessed and valued as per compensation method (refer to Appendix C). • As far as practical, preserve and protect the existing vegetation. • Set aside the excavated material and reuse for backfilling trenches. • Cover all backfilled areas with topsoil and compact. • Reuse excess excavated materials beneficially as close to site as possible, in consultation with landowner/HH (e.g. for filling potholes or depressions in access tracks). • Minimise duration between excavation and backfilling of trenches. 	Construction Contractor	Areas of disturbance are limited to that area needed to undertake work. Excavated material is being neatly stockpiled and backed filled into trenches as soon as practical.	Fortnightly updates provided to the PMU.	PMU safeguards officers, PIAC safeguard specialist

Ref	E&S impact	Mitigation measures	Implementation responsibility	Monitoring		
				Monitoring parameter	Reporting	Responsibility
C3	Soil contamination	<ul style="list-style-type: none"> All fuels or hazardous materials must be handled only by trained personnel using appropriate protective equipment, and stored in cleared labelled, locked containers under cover to protect from weather and bunded areas on impervious surfaces that prevent any leaks or spills from contaminating the ground. In the event of a spill, the contractor must follow five-step response: contain the source, absorb the spill with sand, notify the site supervisor and PMU once stable (with serious pollution events reported within 12 hours), collect and dispose of the waste in consultation with ECD, and clean the affected area thoroughly. Always keep a spill kit onsite. All excavated soil with visible contamination (oil, sewerages, piggery waste) shall be managed as hazardous waste and removed from site. Prepare a procedure for the disconnection and reconnection of the existing pipe work to the PUB sewer, in a manner that avoids contamination of soil. Maintain all construction machinery and vehicles and keep free from leaks. 	Construction Contractor	No signs of visible spills. Waste is being appropriately handled and disposed. Spill kit kept onsite.	Fortnightly updates provided to the PMU.	PMU safeguards officers, PIAC safeguard specialist
C4	Air quality and odour	<ul style="list-style-type: none"> If dust is generated from construction areas during dry, windy conditions then suppress dust with water. Maintain all vehicles and machinery so that no excessive emissions are observed from exhausts. Prohibit any burning of waste material Undertake septic decommissioning in accordance with agreed protocols and remove effluent under controlled conditions to minimise odour and minimize any health risks 	Construction Contractor	No visible signs of dust from work areas. No excessive exhaust fumes from machinery. No prolonged periods of excessive odour.	Fortnightly updates provided to the PMU.	PMU safeguards officers, PIAC safeguard specialist

Ref	E&S impact	Mitigation measures	Implementation responsibility	Monitoring		
				Monitoring parameter	Reporting	Responsibility
		related to vector borne diseases.				
C5	Groundwater	<ul style="list-style-type: none"> Monitor the installation of sewage infrastructure to ensure the quality of work undertaken will minimise the potential for leakage and impacts on groundwater quality. If dewatering of trenches is necessary, discharge pumped water to vegetated areas or natural drainage channels that do not flow directly into the coastal marine environment or use sediment traps or silt fences. Schedule works during dry weather where possible to reduce water ingress and runoff Dispose of sludge to the PUB sewer network. All solid waste should be disposed of in the landfill. Remove septic tanks in accordance with agreed procedures outlined in this ESMP on the decommissioning of septic tanks and manage odour during connection work by sealing open pipe ends, capping tanks promptly and ensuring waste is contained. 	Construction Contractor	Technical sign-off from a suitable qualified engineer.	Fortnightly updates provided to the PMU.	PMU safeguards officers, PIAC safeguard specialist
C6	Noise	<ul style="list-style-type: none"> Limit working hours to 8:00 AM – 6:00 PM, Monday to Saturday. No works on Sunday or public holidays. Inform communities at least 48 hours in advance of activities in their area. Use low-noise machinery where feasible and keep equipment well-maintained. Ensure a clear GRM process is in place for the public to raise noise complaints. 	Construction Contractor	Noise complaints received.	Fortnightly updates provided to the PMU.	PMU safeguards officers, PIAC safeguard specialist
C7	Utilities and services	<p>Prior to any excavation or trenching:</p> <ul style="list-style-type: none"> Obtain plans from the PUB showing the locations of pipelines and electricity cables. Consult with landowners to establish the location of any informal services. Hand digging prior to machine excavation to 	MISE/PUB Construction contractor	Sign off from a suitably qualified engineer.	Fortnightly updates provided to the PMU.	PMU safeguards officers, PIAC safeguard specialist

Ref	E&S impact	Mitigation measures	Implementation responsibility	Monitoring		
				Monitoring parameter	Reporting	Responsibility
		<p>locate services that may be impacted.</p> <ul style="list-style-type: none"> Inform HH if any disruption to utilities is anticipated. 				
C8	Property and assets	<ul style="list-style-type: none"> Where possible, rehabilitate the site to its original condition. Avoid disrupting and removing trees, fences and pig pens during construction, unless absolutely necessary If removal is required, consult the property owner and coordinate with the LMD for compensation. Removal should only proceed after official confirmation of payment. If LMD does not cover the asset, the contractor must ensure fair compensation (Appendix C) or in-kind restoration, with PMU support and proper documentation. Replant trees and restore fences or pig pens in suitable locations as requested by the landowner or occupier. Landowners may choose to dismantle or relocate their own assets. This must be agreed upon during consultations and documented. Stop work immediately if cultural heritage items (e.g., graves, human remains, artifacts) are discovered. Secure the site, notify the supervisory engineer, and follow the Chance Find Procedure. Work may only resume after written clearance from the relevant government authorities such as police and the Ministry of Culture and Internal Affairs. Identify and engage a local community member to support Project implementation and act as a liaison, if necessary. 	Construction Contractor	Complaints received from HH or visible damage to assets. Areas suitable rehabilitated.	Fortnightly updates provided to the PMU.	PMU safeguards officers, PIAC safeguard specialist
C9	Traffic and access	<p>To minimize and manage traffic and access impacts during construction, the following measures should be implemented as appropriate:</p> <ul style="list-style-type: none"> install signage, detours and pedestrian 	Construction Contractor	Traffic management measures are implemented.	Fortnightly updates provided to the PMU.	PMU safeguards officers, PIAC safeguard

Ref	E&S impact	Mitigation measures	Implementation responsibility	Monitoring		
				Monitoring parameter	Reporting	Responsibility
		<p>controls as needed to allow the safe passage of pedestrians and vehicles around work areas including stabilising trenches and holes, installing barriers to prevent fall and capping exposed rebar to prevent impalement injuries</p> <ul style="list-style-type: none"> • Provide advance notice to the community before starting works. HH and businesses should be notified at least 7 days before works commence. • Install temporary barriers, or provide clear alternate paths where footpaths are blocked. • Maintain access to homes and business and provide timely information on temporary access restrictions. • Avoid peak traffic times (school and work commuting hours) where possible. • Work vehicles must be parked beside the road or within the designated construction area; do not block shared access roads used by other vehicles, pedestrians or community members; use cones around work vehicles to indicate they are part of the construction • Restore all roads, driveways, footpaths, and verges to original or better condition. 				specialist
C10	Community Health and Safety	<ul style="list-style-type: none"> • All workers are to sign a CoC that outlines expectations of behaviour when interacting with the community and HH, including an induction on risks and obligations for GBV /SEA/SH, keep record and where necessary, send referrals to the SafeNet focal points which are Police, Nurse, Assistant Social-Welfare Officer and the Kiribati Women and Children Support Centre. • Erect a signage board at each work area informing the community of the Project's GRM and how to register a complaint or provide feedback. 	Construction Contractor	Signed codes of conduct forms. Appropriate signage visible. Public access restricted to work areas.	Fortnightly updates provided to the PMU.	PMU safeguards officers, PIAC safeguard specialist

Ref	E&S impact	Mitigation measures	Implementation responsibility	Monitoring		
				Monitoring parameter	Reporting	Responsibility
		<ul style="list-style-type: none"> Engage and inform the community about Project timelines and potential risks. Restrict public access to construction areas using barriers, fencing and signs indicating hazards. Remove all waste and debris; leave site clean before closing the job. Contain the cement area to prevent spillage and contamination of the surrounding environment. Store extra materials in a secure, covered area away from walkways. Ensure that signage for public awareness and safety will always be visible with appropriate safety messaging covering all risks involved in the construction activities. 				
C11	Working Condition and Occupational Health and Safety (international contractor risks)	<p>The Construction Contractor shall implement the following OHS measures:</p> <ul style="list-style-type: none"> Written contracts for all workers, compliant with Kiribati law and ESS2. SEA/SH reporting pathway via GRM (Appendix H); survivor-centred referrals to the SafeNet focal points which are Police, Nurse, Assistant Social-Welfare Officer and the Kiribati Women and Children Support Centre. Worker accommodation (if provided by the Contractor) to meet IFC/ESS2 standards (privacy, hygiene, potable water, sanitation, security). Laydown areas fenced, signed, waste segregation, spill kits, fuel storage with secondary containment. High-risk OHS (deep trenching, UXO, asbestos, traffic, emergency response) to follow CESMP method statement which reflects expectations outlined in the ESMP prepared by PMU and align with World Bank Group EHS Guidelines, 	Construction Contractor (CESMP preparation & implementation) Supervision: PMU Safeguards Team	OHS measures are implemented.	Fortnightly updates provided to the PMU.	PMU safeguards officers, PIAC safeguard specialist Third-party Audits

Ref	E&S impact	Mitigation measures	Implementation responsibility	Monitoring		
				Monitoring parameter	Reporting	Responsibility
		<ul style="list-style-type: none"> Targeted training, PPE and equipment) for workers' safety and against potential exposure to sewage and effluent. Include health and safety as an agenda item in Daily Toolbox Talks Conduct regular OHS audits and inspections. Conduct mandatory OHS induction for all workers and site visitors. Provide task-specific safety training (e.g., PPE use, traffic management). Provide all workers with free and appropriate PPE to their tasks: e.g. hard hats, safety boots, high-visibility clothing, gloves, eye and hearing protection. Ensure PPE is used correctly and is commensurate with the specific OHS risks of each workplace Shore trenches deeper than 1.5m to prevent cave-ins Provide shaded rest areas and clean drinking water. Train workers on hygiene when handling faecal matter or contaminated soil. Train operators and spotters to reduce risks of accidents and minimise ecological damage such as removing coconut trees or disturbing graveyards. Use reversing alarms, signage, and barriers. Maintain first aid kits and ensure transport on site for injuries; train workers in basic first aid and to keep ambulance contact details on hand Establish a system in the CESMP for reporting, investigating, and correcting accidents or near misses. 				
C12	Working conditions	<ul style="list-style-type: none"> All workers must be over the age of 18 Implement a workers' GRM process where 	Construction contractor	Works GRM in place.	Fortnightly updates provided to the PMU.	PMU safeguards officers, PIAC safeguard

Ref	E&S impact	Mitigation measures	Implementation responsibility	Monitoring		
				Monitoring parameter	Reporting	Responsibility
		<p>workers can raise issues with the contractor without fear of prejudice, retaliation or consequences.</p> <ul style="list-style-type: none"> • Provide temporary toilet arrangement and drinking water for workers during construction. 				specialist
C13	Hygiene practices	<ul style="list-style-type: none"> • Wash hands thoroughly with soap and water after handling sewage, before eating, and after using the toilet. • Avoid touching the face, mouth, eyes, or open wounds while working. • Keep any cuts or sores covered with clean, dry bandages. • Do not smoke, chew gum, or eat in areas where sewage is handled. • Wear goggles to protect eyes from splashes • Use a protective face mask or splash-proof face shield for nose and mouth protection. • Wear liquid-repellent coveralls to keep sewage off clothing. • Use waterproof gloves and rubber boots to prevent direct contact with sewage. • Encourage workers to seek medical attention if they experience symptoms like vomiting, diarrhoea, or stomach cramps. 	Construction Contractor	Hygiene practices are implemented.	Fortnightly updates provided to the PMU.	PMU safeguards officers, PIAC safeguard specialist
C14	Solid Waste	<ul style="list-style-type: none"> • All demolition waste should be segregated into reusable material, green waste, general waste and hazardous. • Consult with local HH about potential reuse of demolition waste. • All waste that cannot be reused should be transported and disposed at the licenced landfill. • All construction-related waste must be properly collected, stored and disposed of at designated waste facilities to avoid social and 	Construction Contractor	All waste is disposed appropriately.	Fortnightly updates provided to the PMU.	PMU safeguards officers, PIAC safeguard specialist

Ref	E&S impact	Mitigation measures	Implementation responsibility	Monitoring		
				Monitoring parameter	Reporting	Responsibility
		<p>environmental impacts – aligning with national waste management regulations.</p> <ul style="list-style-type: none"> • Provide waste bins onsite for offcuts, packaging and general waste from construction worker. • Construction areas should be kept tidy with designated areas provided for the storage of waste. • All waste must be removed from site as soon as practical. 				
C15	Aggregate sourcing	<ul style="list-style-type: none"> • All sand and gravel must be obtained exclusively from Te Atinimarawa Company Limited as constructions are to take place on South Tarawa and Betio (the only one supplier on the island) 	Construction Contractor	Check invoices, delivery docket and supply contracts to confirm materials are sourced by Te Atinimarawa Company Limited	Fortnightly updates provided to the PMU	PMU safeguards officers, PIAC safeguard specialist
OPERATIONAL PHASE						
O1	Air quality and odour, ground water, soil and community health	<ul style="list-style-type: none"> • Routine maintenance: Regular inspection and cleaning of sewer lines and pump stations to prevent odour build-up. • Odour control systems: Install vent filters or odour traps in key locations if warranted – only if there is a significant odour issue, justifying its use. • Community education: Encourage proper use of the system to reduce blockages (e.g., no solid waste down toilets). • Implement rapid response protocols for overflows or ruptures to prevent contamination and potential adverse impacts on soil quality such as soil contamination, groundwater pollution risk, salinization and nutrient imbalance, spread of waterborne diseases and structural instability and erosion by using absorbent materials and disinfectants, doing emergency pumping of contaminated water, repairing leaks promptly (reporting to PMU within 12 hours and fix within 24 hours), 	PUB, HH	System is operating as designed.	Issues raised as needed.	PUB, HH

Ref	E&S impact	Mitigation measures	Implementation responsibility	Monitoring		
				Monitoring parameter	Reporting	Responsibility
		restrict access to affected areas and stabilizing affected areas with sandbags or temporary barriers.				
O2	Network upgrades	<ul style="list-style-type: none"> • Inform nearby communities, 7 days prior, about the cleaning schedule to avoid disruptions and ensure safety. • Schedule work during daylight hours and avoid peak public activity hours. • Implement temporary traffic controls if cleaning affects public roads. • Ensure workers have proper disposable PPEs and have access to disinfectants; to maintain hygiene and prevent cross-contamination when moving between manholes. • Use vacuum trucks or jetting equipment to remove sludge and debris without spillage. Ensure no leakage or overflow occurs during cleaning that could seep into the groundwater. • Where manual desludging is involved, prevent spillage by using sealed containers when transporting the sludge to the vacuum truck and have a spill response plan, ensure quick and efficient operations to reduce exposure time, monitor for exposure to harmful gases such as methane and hydrogen sulphide, and ensure proper ventilation. • Maintain a log of waste volumes and disposal locations to support monitoring and additional mitigation controls if necessary. • Use sealed equipment to minimise unpleasant smells. • Engage with local residents to address any concerns or issues that arose during the process and provide contact information for reporting concerns and complaints. 	PUB and Contractors	Sewer system is functioning properly after cleaning	Daily manhole report updates to PMU	PMU safeguards officers, PIAC safeguard specialist PUB
O3	Institutional capacity	<ul style="list-style-type: none"> • Conduct targeted O&M capacity building for PUB staff to reduce dependency on external 	International Contractor/TA	Staff is well equipped; Maintenance procedures in	Daily progress reported to PMU	PMU PIAC

Ref	E&S impact	Mitigation measures	Implementation responsibility	Monitoring		
				Monitoring parameter	Reporting	Responsibility
	building	<p>expertise</p> <ul style="list-style-type: none"> • Prepare routine maintenance procedures including inspection schedules, cleaning protocols, blockage prevention. • Keep record of maintenance activities including logs of desludging and repairs. • Report system for faults and incidents. • Identify roles and responsibilities within PUB O&M teams such as the water and sanitation sector. • Coordinate with contractors and local government authorities 		place and operational; reporting system is established.		SBCC
O4	Water quality monitoring and implementation support	<ul style="list-style-type: none"> • Deliver targeted training to national counterparts to reduce dependency on external expertise and to reduce operational risks while improving sustainability. • Develop clear, practical procedures for sampling and analysis to minimise errors, ensure consistency and align with international and national standards such as WHO and American Public Health Association. • Minimise physical disturbance to natural marine habitats during site access and sampling • Align frequency with seasonal patterns and resource capacity • Inform communities, 7 days prior of sampling schedules to avoid disturbing the sampling activity, i.e. fishing and swimming • Train staff on handling and hygiene to prevent cross-contamination from the outfalls to the labs. • Ensure proper transport and storage and disposal of chemical waste as specified in the TOR and Scope of Works. • Maintain chain of custody 	International Contractor/TA	Water quality is monitored and maintained to the standard.	Fortnightly report to PMU	PMU PUB

Ref	E&S impact	Mitigation measures	Implementation responsibility	Monitoring		
				Monitoring parameter	Reporting	Responsibility
O5	Protection of cultural heritage (Find chance procedure)	<ul style="list-style-type: none"> ● Ensure to include a find chance procedure in the contractor's CESMP, where if any human remains, artifacts, or culturally significant items (refer to Appendix J for photos) are uncovered during demolition or construction, the contractors must: <ul style="list-style-type: none"> - Immediately halt all earthworks, construction or land clearing in the area of the discovery - Mark off the area where the find occurred - Secure the site to prevent damage or theft. If the find includes removable artifacts or sensitive remains, a night guard must be stationed until the Ministry of Tourism, Commerce, Industry and Cooperatives (MTCIC) and the Kiribati Police Service (KPS) take over - Inform the Project safeguards, site engineer or Manager, who will then notify the appropriate local authorities and relevant Ministry without delay. - Construction may only resume once formal approval is granted by the KPS and MTCIC 	Contractor	Documentation of finds	Immediate (within 24 hours) reporting to PMU	PMU Safeguard

8. Conclusion

The Ministry of Infrastructure and Sustainable Energy (MISE) proposes to undertake Household Sewer Connection Improvement Works to connect approximately 965 HH to the existing sewer network in Betio, Bairiki and Bikenibeu (the Project). The Project is being implemented as part of the STSP with financial support from the World Bank. The Project will increase access to sanitation services in selected areas of South Tarawa, resulting in substantial public and environmental health benefits.

The purpose of this ESMP is to identify and assess the potential E&S impacts associated with construction and operation of the proposed Household Sewer Connection Improvements. The ESMP serves as a binding safeguard instrument that defines the mandatory mitigation and management measures to be implemented to avoid, minimize, and manage adverse impacts throughout the Project lifecycle. It has been prepared in accordance with the requirements of the World Bank ESMF, and the Kiribati Environment Act of 1999 (along with its 2007 Amendments).

This ESMP will be submitted to MELAD to be assessed as part of the application process for the EL. In accordance with Part IV of the Environment (Amendment) Act 2007, an Environment Licence must be obtained prior to any construction work commencing onsite. Additionally, it will be submitted to the World Bank for their clearance prior to initiating the bidding for the Construction Contract.

A Building Permit also needs to be obtained from the MELAD Lands Management Division, which involves the Public Utilities Board and the Ministry of Infrastructure Sustainable Energy. The PMU assists and supports contractors and implementing partners to ensure that all required Building Permits are obtained in accordance with the Kiribati Building Act 2021 and Building Code before construction works start.

The potential E&S impacts associated with construction and operation of the Household Sewer Connection Improvements has been assessed as substantial. This includes potential OHS risks to workers.

This ESMP also outlines a framework for monitoring implementation of mitigation measures, including the roles and responsibilities of the PMU and the construction contractors.

Appendix A – Inflow Rates Detailed Calculations

Sewer Network Project Areas	Connected population (2024 ChildFund + KHC residential connections)	Total HH Population connected. (Child Fund + KHC)	Connected HH (2024 ChildFund + KHC)	Avg current inflow HH (Child Fund + KHC+ Industrial / Commercial) (L/s) (A)	Avg expected inflow (L/s) after Project interventions (B)	Total flow for current connections and new connections (L/s) (A+B)	Peak flow for current connections and new connections (L/s) (A+B) x 3
Betio	7,072 + 3,556	10,625	1,088 + 544 = 1642	7.37 + 3.7 + 0.96 = 12.03	4.35	12.03 + 4.35 = 16.38	49.14
Bairiki	1,573 + 1,749	3,322	242 + 269 = 519	1.64 + 1.82 + 0.96 = 4.45	0.65	4.45 + 0.65 = 5.07	15.21
Bikenibeu	2,658 + 2,009	4,668	409 + 309 = 718	2.77 + 2.09 + 0.96 = 5.82	1.53	5.82 + 1.53 = 7.35	22.05

Appendix B - Differentiation of Pump Rates and Number of Pumps

The following table shows number of pumps and associated discharge volume ratings in the 3 outfall pump stations.

Location	Pumping Configuration	New Pumping Capacity (L/s) for both Duty and Standby Pumps
Betio	1 × Duty Pump and 1x Standby Pump	46.7
Bairiki	1 × Duty Pump and 1 x Standby Pump	28.61
Bikenibeu	1 × Duty Pump and 1 x Standby Pump	28.61

Interpretation: Routine discharges occur under the single-pump duty rate of approximately 46.7L/s for Betio, 28.61 Bairiki and 28.61 Bikenibeu at the outfalls which is several orders of magnitude greater than current inflow volume ranging from 16.38/s, Betio, 5.07 Bairiki, and 7.35 L/s Bikenibeu after Project.

In the event that both pumps operate, the combined mechanical throughput will be doubled up to approximately 93.4 L/s for Betio, 57.22 L/s for Bairiki and Bikenibeu.

This design configuration provides a vast hydraulic safety margin in terms of outfall capacities being greater than inflow volume flow rates. It reduces the risk of overflow or environmental impact during the operations of pumps in different outfall stations.

In simple terms, reference to Tables at Appendix A & Appendix B above:

- The peak capacities are theoretical upper limit used for safe design.
- The 2× pump capacities are the real operational limit.
- The gap between them is safely managed by temporary storage in the wet-well and pipes, which smooths the flow before it reaches the pumps.

The final column shows the “peak outfall capacity” as three times the average outfall capacity $((A+B) \times 3)$. This value does not represent the mechanical pumping capacity (which is 2 × the single-pump rate) but instead reflects the network’s theoretical hydraulic carrying capacity under short-term peak flow conditions.

The Pumping Sequence

Location	(A) Proposed Volume of Sewer Production m ³ /day	(B) Flow Time (hrs)	Volume Discharge Rate m ³ /hr (A/B)	(PR) Pump Rate m ³ /hr	(R) Discharge Rate Ratio (A/B)/(PR)	(POT) Pump On-Time (Rx60 minutes)	Pump off time (60 minute- OT)	PR x (POT/60) Pump Volume Discharge at running time. (m ³ /hr)	Wastewater volume discharge by pump during on-time at outfalls (L/s)	Outfall Capacity (L/s)
Betio	1,415.23	24	58.97	168	0.351	21.06	36.716	58.97	16.38	46.7
Bairiki	438.05	24	18.25	103	0.177	10.62	49.892	18.23	5.07	26.81
Bikenibeu	635.04	24	26.46	103	0.257	15.42	39.994	26.47	7.35	26.81

Appendix C - 2021 for Trees, Crops and Building Structures



GOVERNMENT OF KIRIBATI
MINISTRY OF ENVIRONMENT, LANDS & AGRICULTURAL DEVELOPMENT
LAND MANAGEMENT DIVISION
 PO Box 7, Bairiki, Tarawa. Republic of Kiribati.
 Phone No: 686 75021283 Fax No: 686 21463

File ref: F 7/5

Date: 09/11/2021

TO WHOM IT MAY CONCERN:

Approved Compensation Rate 2021 for Trees, Crops and Building Structures

Please kindly find hereunder the 2021 Government newly approved compensation rates for Trees, Crops and Building Structures as approved by Cabinet in September 2021.

Kindly note that this new rate is effective from 14th September 2021.

Name of Crop/Tree	Rate
Coconut (Te Nii)	AUD\$
Fruit Bearing	\$ 120.00
Non- Bearing with trunk	\$ 60.00
Non- Bearing without trunk top	\$ 3.00
Pandanus Tree (Te Kaina)	AUD\$
Fruit Bearing	\$56.00
Non Bearing	\$29.00
Newly Planted	\$2.00
Local Fig Tree (Te Bero)	AUD\$
Fruit Bearing	\$24.00
Non Bearing	\$8.00
Newly Planted	\$2.00
Breadfruit (Te Mai)	AUD\$
Te Mai Kora, Mai Keang, Bukiraro	AUD\$
Fruit Bearing	\$290.00
Non- Bearing with trunk	\$146.00
Non- Bearing without trunk top	\$12.00
Te Bokeke & Te Motiniwae	AUD\$
Fruit Bearing	\$483.00
Non- Bearing with trunk	-
Non- Bearing without trunk top	-
Papaya (Te Bwabwaia)	AUD\$
Fruit Bearing	\$29.00
Non- Bearing and above 3 ft high	\$6.00

LAND MANAGEMENT DIVISION
 Tarawa
 Republic of Kiribati

Banana	AUDS
Fruit Bearing	\$24.00
Non- Bearing	\$8.00
Bwabwai Plant (Te Bwabwai)	AUDS
Per Pound	\$3.00
Bwabwai Pit (Te Rua ni Bwabwai)	AUDS
Filling in (per cubic meter)	\$5.00
Pumpkin (Bwaukin)	AUDS
Per Square Meter	\$8.00
Sweet Potato (Kumwara)	AUDS
Per Square Meter	\$12.00
Buildings/ Structures	AUDS
Permanent (Concrete) Per m ²	\$242.00
Semi Permanent (Timber) Per m ²	\$120.00
Local Building (Per m ²)	\$84.00

For further information or clarification, please do not hesitate to contact the Land Management Division on 75021283.

Ko rabwa

LAND MANAGEMENT DIVISION

 Director of Lands
 For Secretary MELAD

Appendix D - Consultation Summary

#	Date	Venue	Purpose	Target Stakeholders/ Audiences	Total participants	
1	12/05/2023	Red Cross Office	Orientation Workshop before the start of STSP survey - Project scope and rationale, awareness	Red Cross enumerators	30	10
2	04/03/2024	Betio Town Council Boardroom	Consultation with 3B target village - Betio Maiaki - Project components, objective, timeline, GRM, Project background information, Component 1 update on the start of the sewer connection, beneficiaries and safeguard compliance	3B target community Betio Meang	9	15
3	04/04/2024	Betio Town Council Boardroom	Consultation with 3B target village - Betio Maiaki - Project components, objective, timeline, GRM, Project background information, Component 1 update on the start of the sewer connection, beneficiaries and safeguard compliance	3B target community - Betio Maiaki	8	12
4	04/05/2024	Betio Town Council Boardroom	Consultation with 3B target village - Betio Maiaki - Project components, objective, timeline, GRM, Project background information, Component 1 update on the start of the sewer connection, beneficiaries and safeguard compliance	3B target community - Betio Nuka	9	10

#	Date	Venue	Purpose	Target Stakeholders/ Audiences	Total participants	
5	29/10/2024	Betio Town Council Boardroom	Orientation Workshop with Child Fund Enumerators, 3B baseline data collection - Project scope and rationale, awareness, GRM, timeline, most common asked questions from previous surveys, trials and role plays	Child Fund Enumerators and Staff	28	9
6	02/04/2025	Betio Town Council Boardroom	Full Council meeting - Development of Sewer Connection selection Criteria for HH connection for the 3Bs	Key Stakeholders - MOE, MCIA, MLAD, PUB, MWYSSA and MISE	8	9
7	24/08/2025	Tekaibangaki Maneaba	Consultation with 3B target village - Bikenibeu East - Project components, objective, timeline, GRM, Project background information	Target communities and HH - Project affected people (PAPs)	25	17
8	03/10/2025	3B villages	Focus group discussion STSP awareness	Selected group groups from each 3B villages	45	30
9	15/04/2025	Betio Town Council Boardroom	Full Council meeting - Updating the BTC council prior to the commencement of the KHC communal toilet rehabilitation, assessment and Safeguards guidelines- (PUB Stakeholders and Community Engagement Taskforce)	Local Council members BTC	9	15
10	04/11/2025	Police Line Betio	Scope of work for the KHC rehabilitation - Project information, objectives, timeline, Safeguard requirements, GRM	PAPs - Tenants of the KHC at the police line Betio	7	18

#	Date	Venue	Purpose	Target Stakeholders/ Audiences	Total participants	
11	23/09/2024	St Maria Bikenibeu	Consultation with 3B target village Bikenibeu- Project components, objective, timeline, GRM, Project background information, Component 1 update on the start of the sewer connection, beneficiaries and safeguard compliance	Target communities and HH - PAPs	17	12
12	04/11/2025	Tiaro Maneaba BTC	Scope of work for the KHC rehabilitation - Project information, objectives, timeline, Safeguard requirements, GRM	PAPs - Tenants of the KHC Takoronga BTC	21	15
13	26/04/2025	St Betero Maneaba BTC	Scope of work for the KHC rehabilitation - Project information, objectives, timeline, Safeguard requirements, GRM	PAPs - Tenants of the KHC Takoronga BTC	20	15
14	11/04/2025	Teinainano Urban Council	Consultation with local council executive team before the start of the pilot activity in Abarao Village. Project background, GRM, Timeline, objectives, and pilot village scope	Local council members	7	4
15	21/08/2025	Te Bikenikua Maneaba	Consultation with 3B target village - Bikenibeu Central - Project components, objective, timeline, GRM, Project background information	Target communities and HH - PAPs	20	22
16	19/09/2025	Te Bikenikua Maneaba	Consultation on the ESMP Draft	Target communities and HH - PAPs	30	26

Appendix E – 3 Bs Meeting Minutes



Consultation Report template

Date: 22/09/2024	Location: St Maria Bikenibeu	Facilitators: Christina, Matea, Titan STSP																														
Purpose of consultation:	The community has informed about the project information background, scope and objectives. The team explained all these with additional questions that will get the views and insight of the communities																															
Program	<p>Consultation Objective: Awareness campaign, project background and informaton, component, collect baseline information regarding sanitation situation in Bikenibeu, and seeking community suppot in order to promote community ownership and support to the STSP.</p> <table border="1"> <thead> <tr> <th colspan="3">Betio Consultation Program</th> </tr> <tr> <th colspan="3">For Bikenibeu East</th> </tr> <tr> <th>Time</th> <th>Activity</th> <th>Facilitator</th> </tr> </thead> <tbody> <tr> <td>2:00 PM</td> <td>Opening of the consultation</td> <td>Mayor</td> </tr> <tr> <td></td> <td>Project background information</td> <td>Christina PMU</td> </tr> <tr> <td>02:30pm</td> <td>Bikenibeu, beneficiaries, activities in the 3B areas</td> <td>Matea PMU</td> </tr> <tr> <td>03:30pm</td> <td>Break time</td> <td>all</td> </tr> <tr> <td>1:30pm</td> <td>Current sanitation situation in Bikenibeu</td> <td>Christina PMU</td> </tr> <tr> <td>2:30pm</td> <td>Presentation of Result/seek support of the community</td> <td>all</td> </tr> <tr> <td>3:30pm</td> <td>Wrap up and closing</td> <td>Matea PMU</td> </tr> </tbody> </table>		Betio Consultation Program			For Bikenibeu East			Time	Activity	Facilitator	2:00 PM	Opening of the consultation	Mayor		Project background information	Christina PMU	02:30pm	Bikenibeu, beneficiaries, activities in the 3B areas	Matea PMU	03:30pm	Break time	all	1:30pm	Current sanitation situation in Bikenibeu	Christina PMU	2:30pm	Presentation of Result/seek support of the community	all	3:30pm	Wrap up and closing	Matea PMU
Betio Consultation Program																																
For Bikenibeu East																																
Time	Activity	Facilitator																														
2:00 PM	Opening of the consultation	Mayor																														
	Project background information	Christina PMU																														
02:30pm	Bikenibeu, beneficiaries, activities in the 3B areas	Matea PMU																														
03:30pm	Break time	all																														
1:30pm	Current sanitation situation in Bikenibeu	Christina PMU																														
2:30pm	Presentation of Result/seek support of the community	all																														
3:30pm	Wrap up and closing	Matea PMU																														
Number of participants:	# of males: 17	#of females: 12																														
		 Bikenibeu East Participants List.pdf																														
Consultation Method:	<ul style="list-style-type: none"> ✓ Power point presentation ✓ Maneaba system ✓ Open discussion ✓ Questions and answer session ✓ Pamphlets ✓ Printed designs ✓ Posters 																															
Questions raised during the consultation - feedbacks	<ul style="list-style-type: none"> - The septic tank overflowed due to a leak, leading to the excavation of a large hole to drain the black water from the tank. There's no flush water, as only poured water is used. - Open defecation on the beach has caused a foul smell, potentially leading to poor hygiene and unhealthy air quality. 																															



Consultation Report template

	<ul style="list-style-type: none">- There is no proper drainage for grey water, causing it to flow outside and around the house.- A concern raised was the effectiveness of the project in aiding communities and households if they cannot afford a vacuum truck to remove the sludge. The project team addressed this by assuring that among the 16 designs, one or two could be suitable for crowded areas.- The open septic system drains directly into the ground without being connected to a sewer.- The toilet bowl is cracked and unsafe for use.- When will the project start here in Bikenibeu?- Will there be new connections to every HH?- Who will pay for maintenance of these new toilets?- We are very grateful for the project and are very looking forward to give our support to STSP.
Capacity of community and preferences	<ul style="list-style-type: none">- A family-based community is preferred over a mixed-family community. This type of community offers better assurance of being well-maintained, and it is easier to establish and enforce rules among family members.- Mixed-family communities are not favored by these two groups, as they are likely to lead to conflicts, disorganization, and difficulties in maintenance.- Household toilets are generally preferred over community toilets, although the decision depends on the available space and land within the household.- Both communities can construct their own household toilets at no cost, with assistance from the STSP's Engineer and Supervisor. <p>In family-based communities, members can contribute</p>
Challenges	<ul style="list-style-type: none">- The community as reported need urgent sanitation intervention to address the issue of open defecation –- Community refusal to use communal toilets except for family based shared toilet-
Attachments	



Consultation Report template





Te karikirake ibukin katamaroa n irekereke ma kainanoan te roki ae tamaroa laon SOUTH TARAWA

Bon ana karikirake te Tauteka ibukin katamaroa nakon kai n nako tinaniku laon South Tarawa. Te karikirake aei are ena kaitarai kanganga n irekereke ma kainano n aki taun te roki laon South Tarawa, ao aki toman roki nakon te main ao ai rootakin ibukin ranin te aba man barekan kaai n nako tinaniku. Te karikirake aei bon onoua te riki maanna ao ena waaki man 2022 - 2028. E kamwakuraki te karikirake aei man te MISE ke te Ministry of Infrastructure and Sustainable Energy rinanon te project ae te South Tarawa Sanitation Project.

E MWANENAKI AM KARIKIRAKE AEI IROUN TE Banke n Aonnaba ke te WORLD BANK

Ana taakete te karikirake

Kanimwan Auti nakon te main sewage line.
 Katean roki laon Auti ao n Communities, Public toilet.
 Te reirei laon anua aika Tamaroa ibukin mauakinan te kakaitaki ao kabonganaan raoi te roki
 Taketenan Kawa laon South Tarawa ao Betio ake a rang rootaki riki ibukin kainanoan te roki
 Kauarerekean te nakotaari n aki akaka (Open defecation)

Mauakoon te karikirake Components of the STSP

Makero 1
 Katamaroa laon kabonganaan te roki laon South Tarawa ao kainanoan ranin te aba lwo enaki rootaki.
 Katean roki mo te main sewer system laon Betio, Bikedibe ao Baiiki.
 Katean ao katamaroaan roki (laon auti, communities) laon Marikaa, Teorareke west, Anamu Caseway, ao Aboro.

Makero 2
 Katean mo kateimatoan roki ake a kabongana laon (Bukin) te Bank. Betiokele ma Karikirake laon mwekeri laon kateimatoan tamanaa te roki.

Makero 3
 Kateimatoan te netaki ma communities

Makero 4
 Kabutan rooi te karikirake aei.



South Tarawa sanitation project contact
 Email: stsp@mise.gov.ki
 Phone: 74025192, 63031120
Opening Hours
 9:00 am to 05:15 pm Monday to Friday
Location
 Betio: Near Betio JSS campus



Consultation Report template

Date:	Location: Betio – Police line, Teiaro, St Betero	Facilitators: STSP – Matea, Christina																						
Team members	STSP - SSS Matea - JBO Katarina - CES Christina - Driver Titan - PIAC Reenate Foon - PIAC Greg																							
Purpose of consultation:	Disclosure of the following information - Project scope - Project progress - Start of the KHC construction of the 30 communal toilets in Betio. - Design of KHC communal toilets - Safeguards requirements - GRM - Q and A																							
Target audience	KHC tenants Neighbors of the KHC tenants HH close to the KHC communal toilets General community																							
<table border="1" style="width: 100%; border-collapse: collapse; background-color: #f2f2f2;"> <thead> <tr> <th style="width: 25%;">Location</th> <th style="width: 35%;">Target audience</th> <th style="width: 10%;">M</th> <th style="width: 10%;">F</th> <th style="width: 20%;">Total</th> </tr> </thead> <tbody> <tr> <td>Betio West – Police line</td> <td>Tenants of the KHC – communal toilets</td> <td style="text-align: center;">18</td> <td style="text-align: center;">7</td> <td style="text-align: center;">25</td> </tr> <tr> <td>Betio Central</td> <td>Tenants of the KHC – Communal toilet</td> <td style="text-align: center;">15</td> <td style="text-align: center;">21</td> <td style="text-align: center;">36</td> </tr> <tr> <td>Betio East – St Betero</td> <td>Tenants of the KHC Communal toilets</td> <td style="text-align: center;">15</td> <td style="text-align: center;">20</td> <td style="text-align: center;">35</td> </tr> </tbody> </table>					Location	Target audience	M	F	Total	Betio West – Police line	Tenants of the KHC – communal toilets	18	7	25	Betio Central	Tenants of the KHC – Communal toilet	15	21	36	Betio East – St Betero	Tenants of the KHC Communal toilets	15	20	35
Location	Target audience	M	F	Total																				
Betio West – Police line	Tenants of the KHC – communal toilets	18	7	25																				
Betio Central	Tenants of the KHC – Communal toilet	15	21	36																				
Betio East – St Betero	Tenants of the KHC Communal toilets	15	20	35																				
Consultation Method:	<ul style="list-style-type: none"> ✓ Power point presentation ✓ Maneaba system ✓ Open discussion ✓ Questions and answer session ✓ Pamphlets ✓ Printed designs ✓ Posters 																							



Consultation Report template

	<ul style="list-style-type: none">✓ GRM✓ E and S safeguards print out✓ JBL portable microphones
Questions raised during the consultation	<p>Location 1: Police line</p> <p>Q1 Participants were asking about the timeline of the project and will this rehabilitation work will start, how long it will take to complete the construction work.</p> <ul style="list-style-type: none">- STSP responded to this question by showing the timeline of the project and the rehabilitation work which is about to start probably next year.- PIAC responded by explaining to the participants the construction process will depend on many circumstances and will take a few months to complete these toilets. <p>Q2 The participants want to know if the disability toilet for everyone or just for the tenants and who will be responsible for cleaning the disability toilet if it is to be shared by tenants?</p> <ul style="list-style-type: none">- PIAC responded by stating that the responsibility will be shared by those utilising the disability toilet. <p>Q4 Participants from private HH near the KHC communal toilets want the project to state its target population, if it only targeting the KHC tenant and what the plan for private HH who are also currently utilizing the KHC toilets.</p> <ul style="list-style-type: none">- STSP stated that the projects' beneficiaries varies from communities and HH level and if they are not KHC tenants they might be beneficiaries of 3B, Households or community toilets.- The KHC will decide if the private HH can continue using the KHC after rehabilitation or not. But the main project will note this concern and discuss how they will address this issue with this project. <p>Q5 What is the KHC tenants alternative for toilet when the project demolish the current communal toilets?</p> <ul style="list-style-type: none">- PIAC responded by explaining how the project will build temporary toilets to use during the duration of the construction. <p>Q6 What is the boundary for the construction site, how far from the nearby tenants HH and the private HH?</p> <ul style="list-style-type: none">- PIAC it will be in a safe distant that will be decided by the construction, this is part of the safeguard requirement to build a safety wall around the construction site to prevent noise, dust and for people safety. It is about 2 to 3 meters.



Consultation Report template

	<p>Q7 How many toilets blocks to be used in each communal toilets?</p> <ul style="list-style-type: none">- PIAC this will be depending on the number of the original block, it will be the same but one extra for the disability. <p>Q8 Can the tenant make changes to the current design?</p> <ul style="list-style-type: none">- PIAC yes but not at this stage as everything has been finalized and this has taken a long time to come to this stage as it takes a long process.- It the contract between the STSP and KHC to rehabilitate the KHC communal toilets and improve the current infrastructure with a new structure. <p>Location 2: Teiara Community</p> <p>Q1 Participants were asking about the timeline of the project and will this rehabilitation work will start, how long it will take to complete the construction work.</p> <ul style="list-style-type: none">- STSP responded to this question by showing the timeline of the project and the rehabilitation work which is about to start probably next year.- PIAC responded by explaining to the participants the construction process will depend on many circumstances and will take a few months to complete these toilets. <p>Q2 The participants want to know if the disability toilet for everyone or just for the tenants and who will be responsible for cleaning the disability toilet if it is to be shar ed by tenants?</p> <ul style="list-style-type: none">- PIAC responded by stating that the responsibility will be shared by those utilising the disability toilet. <p>Q4 Participants from private HH near the KHC communal toilets want the project to state its target population, if it only targeting the KHC tenant and what the plan for private HH who are also currently utilizing the KHC toilets.</p> <ul style="list-style-type: none">- STSP stated that the projects' beneficiaries varies from communities and HH level and if they are not KHC tenants they might be beneficiaries of 3B, Households or community toilets.- The KHC will decide if the private HH can continue using the KHC after rehabilitation or not. But the main project will note this concern and discuss how they will address this issue with this project. <p>Q5 What is the KHC tenants alternative for toilet when the project demolish the current communal toilets?</p>
--	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Consultation Report template

	<p>- PIAC responded by explaining how the project will build temporary toilets to use during the duration of the construction.</p> <p>Q6 What is the boundary for the construction site, how far from the nearby tenants HH and the private HH?</p> <p>- PIAC it will be in a safe distant that will be decided by the construction, this is part of the safeguard requirement to build a safety wall around the construction site to prevent noise, dust and for people safety. It is about 2 to 3 meters.</p> <p>Q7 How many toilets blocks to be used in each communal toilets?</p> <p>- PIAC this will be depending on the number of the original block, it will be the same but one extra for the disability.</p> <p>Q8 Can the tenant make changes to the current design?</p> <p>- PIAC yes but not at this stage as everything has been finalized and this has taken a long time to come to this stage as it takes a long process.</p> <p>- It the contract between the STSP and KHC to rehabilitate the KHC communal toilets and improve the current infrastructure with a new structure.</p> <p>Location 3: St Betero</p> <p>Q1 For space not available, how can this project help us those without space but really need a toilet</p> <p>Matea:</p> <ul style="list-style-type: none">- If space not available, we will help them through a communal toilets blocks sharing in a space agreed by the community or island council <p>Q2 If you can consider HH to target each HH as we are not keen to the idea of sharing toilet blocks, it seems not working, it better to have individual HH toilets</p> <ul style="list-style-type: none">- For private HH, we already experience space unavailbe with the housing blocks as well. <p>Q3 Many people using the KHC communal toilets – it uncomfortable Secondly, for safety during the night time, for young children to access this toilet. Thirdly, as too many people using the block there is an issue with hygiene – nearby neighborhood keep using the KHC blocks and not taking care of the toilet. If can be considered 2 HH per unit to minimize issues.</p>
--	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------



Consultation Report template

	<p>Q4 The best way to support the tenants is to build each HH with a single toilet unit. It is easier to maintain rather than a toilet block. Many people still miss using the communal blocks and it is not fair to some people</p> <ul style="list-style-type: none">- Each tenants HH will be allocated with their block to take responsibility in maintaining and keeping their own toilet.- All this toilets will be maintained regularly by the KHC to for cleaning and maintenance to be inspected weekly <p>Q5 For those who are not living in the KHC, do we also use the KHC blocks?</p> <ul style="list-style-type: none">- The main project can also address those outside the KHC from the community – all questions related to the KHC can be directed to the KHC, STSP is helping with the design. <p>Q6 Those close to the sea, can the line from the manhole can be extended to HH far away from the main for us to connect ourselves to the main line</p> <ul style="list-style-type: none">- This are the information that were collected in the CFK survey and the result will be reviewed and considered. It is under the PUB but the project can also discuss and consider this. Will note <p>Q7 Housing designs facing one side, just to consider which side it will face to consider which side the toilet will face to make it convenient to tenants</p> <ul style="list-style-type: none">- The design is already decided and final, note your concern if we can change but we are not certain at this point. <p>Q8 The space we have for shower is enough to install a toilet, can this be considered if they can provide us with the toilet in our HH.</p> <ul style="list-style-type: none">- We consider at the first place the number of blocks and the tanks and pump.- The second question can be asked directly to the KHC <p>Q9 Which body can be contacted to adjust this design to address the concern from the public</p> <ul style="list-style-type: none">- You can lodge your complaints through the KHC and MISE
--	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------



Consultation Report template

	<ul style="list-style-type: none">- PUB is another body can also answer queries <p>Q10 Is this the only country who are forcing people to use the shared toilet blocks or just Kiribati</p> <ul style="list-style-type: none">- We have taken this into consideration but there are many other things to be considered like space, all will be addressed by the project through HH and community considering the access road and space availability			
Lesson learnt	<ul style="list-style-type: none">- Planning the consultation for the design and build earlier to avoid last minutes design changes- Planning police consultations through the police headquarters to secure larger turnout for the consultation- To make sure next consultation, KHC officials attend the consultation to address questions directed to KHC			
Challenges	<ul style="list-style-type: none">- Low turn out during the consultation- Police community is a working community and very difficult to have free time for consultations – abnormal working hours- Challenges related to heat and hot weather during the day			
Way forward	<p>To share report to Safeguards</p> <p>To plan for next construction prior to construction</p> <p>Use TV, Facebook, Radio for further update on the above information that needed to be disclosed</p>			
Attachments	Participation list	Feedback form	Receipts and claims	Invitation letter
Pamphlets				



Consultation Report template



Te karikirake ibukin katamaroa n irekereke ma kainanoan te roki ae tamaroa iaon SOUTH TARAWA

Bon ana karikirake te Tautaeke ibukin katamaroa nakon kai n nako tiraniku iaon South Tarawa. Te karikirake aei are ena kaitara kanganga n irekereke ma kainano n aki taun te roki iaon South Tarawa, ao aki toman roki nakon te main ao ai rotaikin itikin ranin te aba man barekan kaai n nako tiraniku. Te karikirake aei bon onous te tiriki maana ao ena waaki man 2022 - 2028. E kamwakuraki te karikirake aei man te MISE ke te Ministry of Infrastructure and Sustainable Energy rinanon te project ae te South Tarawa Sanitation Project.

E MWANENAKI AM KARIKIRAKE AEI IROUN TE Banke n Aonnaba ke te WORLD BANK

Ana taakete te karikirake

Kanimwan Audi nakon te main sewerage line.
Kataan roki iaon Audi ao n Communities, Public toilet.
Te reirei iaon anua aka Tamaroa ibukin mauakinan te kakaitaki ao kabonganaan raoi te roki
Taketenan Kawa iaon South Tarawa ao Betio ake a rang rootaki riki ibukin kainanoan te roki
Kaurerekean te nakotaa n aki akaka (Open defecation)



Mwakanon te karikirake Components of the STSP

Makoro 1
Katamaroa iaon kabonganaan te roki iaon South Tarawa ao kainanoan ranin te aba iwa ewaki rootaki.
Katomaan roki ma te main sewer system iaon Betio, Abanbeu ao Betio.
Kataan ao kutumaraan roki (am aui, communities) iaon Narakai, Tearereke west, Ananau Caunway, ao Abaraa.

Mwakoro 2
Kataan ma kateimatoan roki ake a kabongana taai itikin te Bush, Kelakina ma Karikiraala taan mwakui iaon kateimatoan tamaman te roki.

Mwakoro 3
Kateimatoan te ritaki ma communities

Makoro 4
Kabutan raai te karikirake aei.



South Tarawa sanitation project contact
Email: stsp@mise.gov.ki
Phone: 7402152, 4303120
Opening Hours
9:00 am to 05:15 pm Monday to Friday
Location
Betio: Near Betio JSS campus

ESMP 2707 (JANUARY 2022) - 2028

Contact information: Office Number: South Call 1919 in Betio

EMAIL: STSP@MISE.GOV.KI

Environmental and Social Safeguard
Environmental and social safeguards are policies and procedures aimed at preventing and reducing potential harm to both the environment and communities affected by a project. Their primary purpose is to protect people and the environment from any risks or negative impacts associated with project activities.

WORLD BANK ENVIRONMENTAL AND SOCIAL STANDARDS



ENVIRONMENTAL AND SOCIAL SCREENING



Grievance Redress Mechanism: For enquiries, comments and grievances, use STSP contact details above

Environmental Risk, Impact and Mitigation

Risk	Substance
Water pollution	Single event measures to prevent contamination from construction, waste tanks or connecting pipes to, water lines.
Habitat disruption	Conduct a thorough Environmental Impact Assessment before the construction project begins to identify potential environmental risks and develop strategies to mitigate them.
Excavation	Conduct a thorough survey with the Office of the Registrar to ensure excavated material and human remains.
Waste disposal	The contractor should follow the Public Hygiene Act, ensure correct use and water pipe leak, make ground.
	Implement effective waste management practices, including recycling and proper disposal of non-recyclable materials and effectively use eco-friendly construction material, where possible.

Risks

Health Pollution - Disrupting the wastewater and fecal sludge management system to treat wastes before soil-bank.

Social Risk, Impact and Mitigation

Risk	Substance
Noise	Machines that will be used for construction must comply with the noise limit set by PUB or well-use noise reducing material/equipment for government and businesses premises for land used for the project - in terms of adjoining areas and noise contamination, some action.
Land loss/landed space	Secure removal of trees, fence and pig pens as much as possible. If required, then consult with the owners of those property and provide necessary compensation.
Labour Issues (Conflict, Abuse, Inequal Pay, Grievance & Road Safety Issues)	Ensure compliance with labor management procedures and Road Safety Laws, Regulations & Code of Conduct and OHS&P compliance and feedback.

Your Role Matters

We value your input and ideas. Register us via radio (the easiest way) or email. Register us via radio (the easiest way) or email. Register us via radio (the easiest way) or email.

Call Us Now!

We can join our community (and help) to support the project in various ways. Your participation is vital to our project. All information shared are kept.

Date: 7th June 2024	Location: Bairiki – Tabonkabwauea and Kawan Bairiki	Facilitators: SSS Matea and CES Christina Reiher		
Purpose of consultation:	To verify information collected by Red Cross survey, identify pilot location, seek community support and views and to share Project information to the community			
Number of participants: 26	# of males: 21		#of females: 5	
Consultation Method:	<input type="radio"/> PowerPoint presentation <input type="radio"/> Focus group	<input type="radio"/> Informal Meeting <input type="radio"/> One on one	<input type="radio"/> Pamphlet <input type="radio"/> Survey	<input type="radio"/> Questionnaire <input type="radio"/> Other:
Findings	Printed materials distributed		Pamphlets: 26	Map of surveyed area: 20
Feedback from the community regarding the project	<ul style="list-style-type: none"> • Bairiki Communities looking forward to the start of the project physical implementation • Shows interest and the need of the STSP project • Shared issues from the last sanitation project where resources and funding were not well monitored and the target was not met, only few people benefit from the project. The original plan and number of toilets to be built was not achieved and ended up with only few and toilets with small room space that not even could fit into the toilet door. • Most Bairiki participants proposed that each HH is allocated their own toilet as they can individually manage the toilet better. • Women and girls are not safe in a public toilet and that also leads to participants favor more to household toilet • Proposed by participants that the Project may use space behind government buildings for septic tanks and community toilets. • Space is limited in Kawan Bairiki, and they are not sure if they can accommodate communal toilets anymore, they can only provide space for household toilets • Sharing toilets amongst HH is a common practice in Kawan Bairiki where more than 10 HH uses one toilet. • Tenarikai Maneaba has sold its toilet to the public for 20 cent per use. • Tabonkabwauea participants have more space, and they are willing to provide space for the communal toilets and as well as HH toilets. 			
Feedback on KRCS Household survey	<ul style="list-style-type: none"> • 20 out of 25 participants reported to be approached by surveyors • Participants confirmed Kiribati Red Cross Society conducted Household survey related to Sanitation situation in Bairiki 			

	<ul style="list-style-type: none"> • No complaints reported regarding the survey's performance and behavior in Bairiki • Participants agreed and confirmed situation, mapping of pollution, flooding in Bairiki Village • Data for con compliance with building code, vulnerable groups situation and the number of people without toilet in Bairiki is also confirmed and agreed by the Bairiki Community. 			
Questions raised during the consultation	<p>When will the Project start in Bairiki?</p> <p>Do all HH benefit from the Project or only a few HH?</p> <p>Can the STSP Project do damage maintenance to existing toilets?</p> <p>If we have space, can we offer it to the Project to build our communal toilet in Tabonkabwaua?</p>			
Lesson learnt	<ul style="list-style-type: none"> • It is important to make sure all communications reach the community through Village Councils, • When the Island council make plans to cancel the consultation, we STSP team will make sure the message reaches the community, • We learned that the last consultation was cancelled by the Village Council but did not reach the community in Kawan Bairiki and the result was people turned up expecting STSP consultation team. • This is not good practice and should be avoided in the future • A checklist of resources to be taken to the community is helpful, CES forgot a file with important documents – will result in consultation delays 			
Challenges	<ul style="list-style-type: none"> • Open consultation may result in over budgeting as anyone can just walk in the Maneaba 			
Recommendations	<ul style="list-style-type: none"> • Making sure we control our consultation audience and communicating with whoever wants to join in with catering which they may not be included in. 			
Way forward	<ul style="list-style-type: none"> • Continue consultation with Nanikaai, Abarao and Ananau Kotueei 			
Attachments	Participation list  Participants list Bairiki.pdf	Copy of presentation  TUC presentation.pptx	Receipts and claims Venue cost: TBC	Invitation letter
	Pictures	Other supporting documents	Feedback form	



Appendix F – Bikenibeu Pilot One-on-one HH Consultations

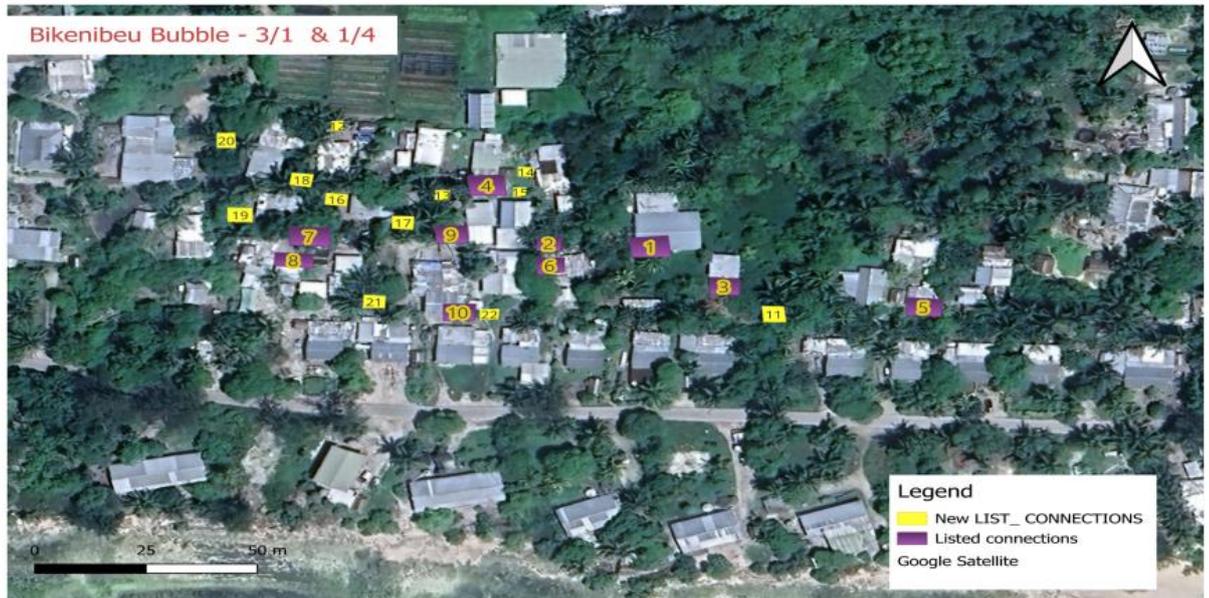
Safeguards Site Visit Data Table

Date of Visit: 05/07

Location: Bikenibeu – Kaibangaki/Ununiki

NB: At this stage, there are a couple of GRM recorded under the Household feedback in the table below.

Bubble Bikenibeu 3/1 and 1/4 Map



No.	Site/Zone Visited-Name	Environmental Observations	Social Observations	Health & Safety Concerns	New Toilet + Connection	Connection Only
1	[REDACTED]	During the recent site inspection in Bikenibeu, key environmental concerns were noted in relation to ongoing sewer connection and toilet construction activities.	Land Access Issues: No. 10 (Greg) has a land dispute with No. 13 & 17 (Bwaati), hoping to get approval for connection through the project. No. 13 (Bwaati) understands the scope of the project, however, does not want work to proceed, fearing if he gives consent for sewer connection for No.10, by law, he is consenting for him to permanently reside on the land. (NB: SBBC please refer to notes on background information)	<ul style="list-style-type: none"> - Overflow of the manhole - Electrical meter box (bwaokiniiti) - PUB water pipe 	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2	[REDACTED]	Households #1#3 and #11 are located in low lying, flood prone areas, with visible water pooling and poor surface drainage. Construction materials such as pipes and cement were observed being stored directly on open ground, without any containment or protective cover.			<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	[REDACTED]				<input checked="" type="checkbox"/>	<input type="checkbox"/>
4	[REDACTED]				<input type="checkbox"/>	<input checked="" type="checkbox"/>
5	[REDACTED]		Community concerns:		<input checked="" type="checkbox"/>	<input type="checkbox"/>

		While no major environmental damage was noted at this stage, preventive actions are strongly recommended to avoid issues as works progress.	<ol style="list-style-type: none"> Gravesites near homes There is enough walking and working space for a group of 6-8 people and small machines such as cement mixers, however; limits large machines to pass through to/access inner HH. There is no driving access to the residential areas behind the KHC from the mainroad, except for HH No. 5. No.5 has driveway from the ocean-side mainroad No Maneaba on-site PUB does not have ground maps for the existing Private Household connects of wiring. They only 		
6				<input checked="" type="checkbox"/>	<input type="checkbox"/>
7				<input checked="" type="checkbox"/>	<input type="checkbox"/>
8				<input checked="" type="checkbox"/>	<input type="checkbox"/>
9				<input checked="" type="checkbox"/>	<input type="checkbox"/>
10				<input type="checkbox"/>	<input checked="" type="checkbox"/>
11				<input checked="" type="checkbox"/>	<input type="checkbox"/>
12		<input type="checkbox"/>	<input checked="" type="checkbox"/>		
13			<u>have in record, connections to Government housings.</u>		
			Household feedback:		
			<ol style="list-style-type: none"> To beware of many dogs not on leash To be mindful of pigs located on-site near homes, mostly leashed,not in a pen. They are willing to help clear the sites in which they propose to have their toilets built. Worried that if the HHs 10 & 13's dispute is not resolved, they would not be able to get sewer connection. To approach and send requests for the land lady's consent to restore the existing 		
14		<input checked="" type="checkbox"/>	<input type="checkbox"/>		
15		<input checked="" type="checkbox"/>	<input type="checkbox"/>		
16		<input checked="" type="checkbox"/>	<input type="checkbox"/>		
17		<input checked="" type="checkbox"/>	<input type="checkbox"/>		
18		<input checked="" type="checkbox"/>	<input type="checkbox"/>		
19			communal (squat) toilet on her land to be used by the HHs in the Bubble 3/1.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
20		<input checked="" type="checkbox"/>		<input type="checkbox"/>	
21		<input checked="" type="checkbox"/>		<input type="checkbox"/>	
22		<input type="checkbox"/>		<input checked="" type="checkbox"/>	

Appendix G - Review of Wastewater Flow and Nutrient-load Calculations in the ESMP

1. Data sources and key assumptions

The draft ESMP for the Household Sewer Connections estimates the capacity of the existing sewer network and the additional flows and pollutant loads that will result from connecting approximately 965 HH to the existing salt-water-flush sewerage system. Key assumptions drawn from the ESMP are summarized below:

Proposed outfall capacities: Ability of a sewer system at discharge end to dewater inflow sewer volume in certain period of time is known as Outfall Capacity.

2. Existing total outfall capacities

Sewer network Project area	Population (census data 2024)	Connected population (2024 ChildFund + KHC)	Connected HH (2024 ChildFund + KHC)	Industrial and commercial population equivalent	Avg current inflow HH (Child Fund + KHC+ Commercial & Industrial) (L/s)	Existing Outfall capacities (L/s)
Betio	19,337 (18,429 in 2020 census with 1.21 % annual growth)	10,673	1,642	925	12.03	41.54
Bairiki	5,132 (4,151 in 2015 census with 2.38 % annual growth)	3,372	519	925	4.42	25.62
Bikenibeu	11,855 (9,589 in 2015 census with 2.38 % annual growth)	4,667	718	925	5.82	25.62

3. Household size and wastewater production

The average HH in Kiribati is assumed to contain 6.5 people and each person produces 90L of wastewater per day. This equates to, $6.5 \times 90L = 585L/HH/day$.

4. Current connections

The existing sewer network serves PUB household Connections, KHC Household Connections and connected a population equivalent of 2,775 sewer users combined in Commercial and Industrial Buildings across Betio, Bairiki and Bikenibeu. We have the following flow rate, $6.5 \times 90L = 585 L/HH/day$. Refer to the associate flows for current connections from the following sections (5, 6, 7 & 8).

5. Associated average flows from current PUB connections

Location	HH (A)	Per Person/HH (B)	L/person per day (C)	Avg. L/Day (AxBxC)	Avg. L/s
Betio	1,088	6.5	90	636,480	7.37
Bairiki	242	6.5	90	141,570	1.64
Bikenibeu	409	6.5	90	239,265	2.77

SOURCE: Child-fund Household survey data for 2024 & 2025.

6. Associated average flows from current KHC connections

Location	HH (A)	Per Person/HH (B)	L/person / day (C)	Avg. L/Day (AxBxC)	Avg. L/s
Betio	547	6.5	90	319,995	3.70
Bairiki	269	6.5	90	157,365	1.82
Bikenibeu	309	6.5	90	180,765	2.09

SOURCE: KHC /PUB Data.

7. Associated average flows for current commercial and industrial discharge from sewer users as per PUB Data

The estimation of current inflows accounts for existing household connections based on ChildFund data, along with KHC residential links and institutional or commercial buildings. Commercial and industrial wastewater flows are not actively monitored in South Tarawa. While PUB maintains several commercial and industrial connections, detailed information on water consumption, wastewater volumes, and characteristics is limited. To approximate the contribution of these sectors to baseline discharge, a population-equivalent approach is applied: commercial clients in the three Bs are assigned a factor of 10 (estimated at 55 connections in 2015), and industrial properties a factor of 50 (estimated at 23 connections in 2015). This method likely underestimates some facilities and overestimates others; however, given the absence of large-scale operations such as slaughterhouses or breweries with high organic loads, it is considered sufficient for capturing additional risk. Overall, this approach represents an additional 1,700 person equivalents across the three Bs, which, when adjusted for 2025 projections, totals approximately 2,775. In the absence of community-specific data, the

analysis assumes an even distribution across the three Bs—roughly 925 per village with an estimated average discharge flow of 3.96 L/s.

Location	L/Person /Day (A)	Population equivalent (B)	Avg. L/Day (AxB)	Avg. L/s
Betio	90	925	83,250	0.96
Bairiki	90	925	83,250	0.96
Bikenibeu	90	925	83,250	0.96

8. Total associated average flow and number of people currently connected to the sewer network

Location	HH connections (PUB + KHC)	Population connected to the existing sewer system	Avg. flow rate (L/day)	Avg. flow rate (L/s)
Betio	1,642	7,072 + 3,556 + 925 = 11,553	636,480 + 319,995 + 83,250 = 1,038,725	7.37+3.70+0.96 = 12.03
Bairiki	519	1,573 + 1,749 + 925 = 4,247	141,570 + 15,7365 + 83,250 = 382,185	1.64+2.09+0.96 = 4.42
Bikenibeu	718	2,659 + 2,009 + 925 = 5,593	118,896.3 + 180,765 + 83,250 = 503,280	2.77+1.04+0.96 = 5.82

New connections: The Project proposes 643 new connections at Betio, 96 at Bairiki and 226 at Bikenibeu, comprising both new toilets and conversions of existing toilets. On the basis of following flow rate, $6.5 \times 90L = 585$ L/HH/Day the estimated additional flows are in Section 9 below.

9. Associated flows for proposed connection.

Location	Person/HH (A)	L/Person/Day (B)	HH (C)	Flow rate (L/Day) (AxBxC)	Avg. flow rate (L/s)	Av. population connected to system (AxC)
Betio	6.5	90	643	376,155	4.35	4,180
Bairiki	6.5	90	96	56,160	0.65	624
Bikenibeu	6.5	90	226	132,210	1.53	1,469

Total Flow for Current Connections and New Connections

10. Total population connected and production of total waste water flow rate in L/S

Location	Current Connections		New Connection		HH total Avg. flow rate (A+B)	Total Population Connected (C+D)
	Avg. flow rate (A)	Population (C)	Avg. flow rate (B)	Population (D)		
Betio	12.03 L/s	11,553	4.35L/s	4,180	16.38 L/s	15,733
Bairiki	4.42 L/s	4,247	0.65L/s	624	5.07 L/s	4,871
Bikenibeu	5.82 L/s	5,593	1.53L/s	1,469	7.35 L/s	7,062

11. Comparison of wastewater inflow and outflow in sewerage system

The volume of wastewater that will enter the sewer system in certain period of time from every HH is known as Household Inflow Rate and ability of an outfall system to discharge wastewater out of the sewer system is known as Outfall Capacity.

The following comparison is for normal and peak flow.

Location	HH total avg. inflow volume rate (L/s) (A)	Peak HH Inflow (L/s) (Ax3)	Outfall Capacity (L/S) (B)	Comment	Requirement	Action required
Betio	16.38	49.14	46.7	Total is <i>below</i> and peak inflow is <i>above</i> outfall capacity	NOT Approved required standard for peak inflow	Intermittent pump operation (the peak period will be approximately two to three hours therefore, during the peak hours both the main and standby pump will work concurrently to discharge the peak inflow. The pumping capacity will be two times 46.7 L/s which is equivalent to 93.4 L/s)
Bairiki	5.07	15.21	26.81	Total and peak inflow are <i>below</i> outfall capacity	Approved required standard	n.a.
Bikenibeu	7.35	22.05	26.81	Total and peak inflow are <i>below</i> outfall capacity	Approved required standard	n.a.

12. Pumping Sequence

Location	(A) Proposed Volume of sewer production m ³ /day	(B) Flow time (hrs)	Volume discharge rate m ³ /hr (A/B)	(PR) Pump rate m ³ /hr	(R) Discharge rate ratio (A/B)/(PR)	(POT) Pump on-time (Rx60 minutes)	Pump off time (60minutes - OT)	PR x (POT/60) Pump volume discharge at running time. (m ³ /hr)	Wastewater volume discharge by pump during on-time at outfalls (L/s)	Outfall capacity (L/s)
Betio	1,415.23	24	58.97	168	0.351	21.06	36.716	58.97	16.38	46.7
Bairiki	438.05	24	18.25	103	0.177	10.62	49.892	18.23	5.07	26.81
Bikenibeu	635.04	24	26.46	103	0.257	15.42	39.994	26.47	7.35	26.81

This table demonstrates that, for each location, intermittent pump operation is sufficient to efficiently manage and discharge the daily wastewater volume, with pump run-times requiring only a fraction of each hour and enough system capacity remaining to accommodate both current and future flows.

Verification of nutrient-load calculations

The ESMP estimates increased pollutant loads at Betio, Bairiki and Bikenibeu outfall using the sum of existing and new connection flow respectively (16.38 L/s, 5.07 L/s and 7.35 L/s) and assumed concentrations.

Pollutant concentrations

To estimate nutrient loading at the outfalls, the ESMP assumes typical domestic wastewater concentrations of Biochemical Oxygen Demand (BOD)=250mg/L, Total Suspended Solids (TSS)= 250 mg/L, Total Nitrogen (TN)=40mg/L and Total Phosphorus (TP) = 7 mg.

Betio outfall pollutant loads

Parameter	Assumed concentr. (mg/L)	Existing connection (A)	New connection (B)	Calculated load (A+B)	ESMP load (kg/day)	Calculated annual load (t/yr)
Biochemical Oxygen De- mand (BOD)	250	$250\text{mg/L} = 2.5 \times 10^{-4}$ Kg/L \times 12.03 L/s \times 86 400s/day = 207.88 kg/day	$250\text{mg/L} = 2.5 \times 10^{-4}$ Kg/L \times 4.35 L/s \times 86 400s/day = 94.04 kg/day	$250\text{mg/L} = 2.5 \times 10^{-4}$ Kg/L \times 16.38 L/s \times 86 400s/day = 353.81 kg/day	353.81	129.14
Total Sus- pended Sol- ids (TSS)	250	207.88 kg/day	94.04 kg/day	353.81 kg/day	353.81	129.14
Total Nitrogen (TN)	40	$40\text{mg/L} = 4 \times 10^{-5}$ Kg/L \times 12.03 L/s \times 86 400s/day = 41.58 kg/day	$40\text{mg/L} = 4 \times 10^{-5}$ Kg/L \times 4.35L/s \times 86 400s/day = 15.05 kg/day	$40\text{mg/L} = 4 \times 10^{-5}$ Kg/L \times 16.38 L/s \times 86 400s/day = 56.61 kg/day	56.61	20.66
Total Phosphorus (TP)	7	$7\text{mg/L} = 7 \times 10^{-6}$ Kg/L \times 12.03 L/s \times 86 400s/day = 7.28 kg/day	$7\text{mg/L} = 7 \times 10^{-6}$ Kg/L \times 4.35L/s \times 86 400s/day = 2.63kg/day	$7\text{mg/L} = 7 \times 10^{-6}$ Kg/L \times 16.38 L/s \times 86 400s/day = 9.91 kg/day	9.91	3.62

Bairiki outfall pollutant loads

Parameter	Assumed concentr. (mg/L)	Existing connection (A)	New connection (B)	Calculated load (A+B)	ESMP load (kg/day)	Calculated annual load (t/yr)
Biochemical Oxygen Demand (BOD)	250	$250\text{mg/L} = 2.5 \times 10^{-4} \text{ Kg/L} \times 4.42 \text{ L/s} \times 86\,400 \text{ s/day} = 95.47 \text{ Kg/day}$	$250\text{mg/L} = 2.5 \times 10^{-4} \text{ Kg/L} \times 0.65 \text{ L/s} \times 86\,400 \text{ s/day} = 14.04 \text{ Kg/day}$	$250\text{mg/L} = 2.5 \times 10^{-4} \text{ Kg/L} \times 5.07 \text{ L/s} \times 86\,400 \text{ s/day} = 109.51 \text{ Kg/day}$	109.51	39.97
Total Suspended Solids	250	95.47 Kg/day	14.04 Kg/day	109.51 Kg/day	109.51	39.97
Total Nitrogen (TN)	40	$40\text{mg/L} = 4 \times 10^{-5} \text{ Kg/L} \times 4.42 \text{ L/s} \times 86\,400 \text{ s/day} = 15.28 \text{ Kg/day}$	$40\text{mg/L} = 4 \times 10^{-5} \text{ Kg/L} \times 0.65 \text{ L/s} \times 86\,400 \text{ s/day} = 2.25 \text{ Kg/day}$	$40\text{mg/L} = 4 \times 10^{-5} \text{ Kg/L} \times 5.07 \text{ L/s} \times 86\,400 \text{ s/day} = 17.52 \text{ Kg/day}$	17.52	6.39
Total Phosphorus (TP)	7	$7 \text{ mg/L} = 7 \times 10^{-6} \text{ Kg/L} \times 4.42 \text{ L/s} \times 86\,400 \text{ s/day} = 2.67 \text{ Kg/day}$	$7 \text{ mg/L} = 7 \times 10^{-6} \text{ Kg/L} \times 0.65 \text{ L/s} \times 86\,400 \text{ s/day} = 0.39 \text{ Kg/day}$	$7 \text{ mg/L} = 7 \times 10^{-6} \text{ Kg/L} \times 5.07 \text{ L/s} \times 86\,400 \text{ s/day} = 3.07 \text{ Kg/day}$	3.07	1.12

Bikenibeu outfall pollutant loads

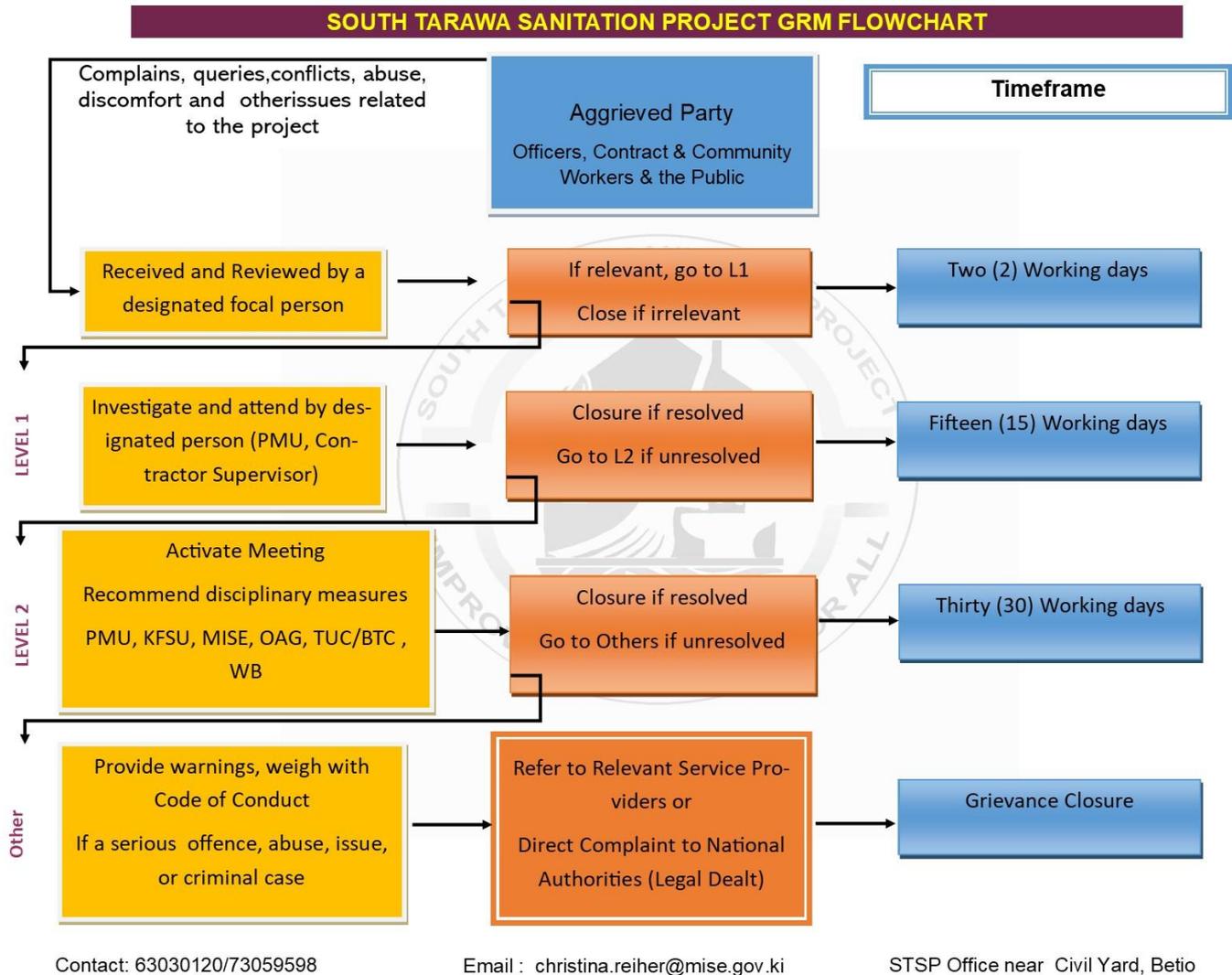
Parameter	Assumed concentr (mg/L)	Existing connection (A)	New connection (B)	Calculated load (A+B)	ESMP load (kg/day)	Calculated annual load (t/yr)
Biochemical Oxygen Demand (BOD)	250	$250\text{mg/L} = 2.5 \times 10^{-4} \text{ Kg/L} \times 5.82 \text{ L/s} \times 86\,400 \text{ s/day} = 125.71 \text{ Kg/day}$	$250\text{mg/L} = 2.5 \times 10^{-4} \text{ Kg/L} \times 1.53 \text{ L/s} \times 86\,400 \text{ s/day} = 33.05 \text{ Kg/day}$	$250\text{mg/L} = 2.5 \times 10^{-4} \text{ Kg/L} \times 7.35 \text{ L/s} \times 86\,400 \text{ s/day} = 158.76 \text{ Kg/day}$	158.76	57.95
Total Suspended Solids (TSS)	250	125.71 Kg/day	33.05 Kg/day	158.76 Kg/day	158.76	57.95
Total Nitrogen (TN)	40	$40\text{mg/L} = 4 \times 10^{-5} \text{ Kg/L} \times 5.82 \text{ L/s} \times 86\,400 \text{ s/day} = 20.11 \text{ Kg/day}$	$40\text{mg/L} = 4 \times 10^{-5} \text{ Kg/L} \times 1.53 \text{ L/s} \times 86\,400 \text{ s/day} = 5.29 \text{ Kg/day}$	$40\text{mg/L} = 4 \times 10^{-5} \text{ Kg/L} \times 7.35 \text{ L/s} \times 86\,400 \text{ s/day} = 25.40 \text{ Kg/day}$	25.40	9.27
Total Phosphorus (TP)	7	$7\text{mg/L} = 7 \times 10^{-6} \text{ Kg/L} \times 5.82 \text{ L/s} \times 86\,400 \text{ s/day} = 3.52 \text{ Kg/day}$	$7\text{mg/L} = 7 \times 10^{-6} \text{ Kg/L} \times 1.53 \text{ L/s} \times 86\,400 \text{ s/day} = 0.93 \text{ Kg/day}$	$7\text{mg/L} = 7 \times 10^{-6} \text{ Kg/L} \times 7.35 \text{ L/s} \times 86\,400 \text{ s/day} = 4.45 \text{ Kg/day}$	4.45	1.62

Conclusions and Considerations

Outfall capacities are sufficient:

Even after adding 643, 96, and 226 households, the combined average flows are 16.38 L/s at Betio, 5.07 L/s at Bairiki, and 7.35 L/s at Bikenibeu. With the pumping sequence in place, the system can effectively handle these flows. This indicates that the network can accommodate the proposed connections.

Appendix H – GRM Flowchart



Appendix I – Consultation Information Materials

E&S STSP LEAFLET 2022 – 2028

Contact Information: Office Building - Beside Civil Yard in Betio

Contact: 63030120/73059598

Environmental and Social Safeguard
Kamanoan te botannaomata ao te otabwanin bon te kainibaire ae rang kakawaki nte karikirake ae te South Tarawa Sanitation Project (STSP) bwa e na iraki nanona ibukin kamanoaia aomata, communities ao te otabwanin bwa ana aki rootaki man mwakurian te karikirake. Te moan bwai ae kakawaki bwa ana riai ni mano aomata ma aia otabwanin man kakamwakuri ake a irekereke ma te karikirake ae te STSP.

Kainibaire man te World Bank ibukin Kamanoaia Aomata ao te Otabwanin.



Kamatebwaian te Otabwanin



(GRM) Grievance Redress Mechanism: For enquiries, comments and grievances, use STSP contact details above

Kamatebwaian te Botannaomata



Rootakin te Otabwanin ma Kawai n Totoko

Kangaanga aika a kona n riki	Kawai n ibuabuoki ao n totoko man te STSP
Te bubu	- Kamawaiwaaki aontano ma n totokoi ao n kanakoi bwariko n tano aika a taburake
Te kabarekareka nakon aontano ma te ran	- Iraki tuan te kamawakuri iroou kait te tabo n mwakuri
Te kabarekareka nakon aontano ma te ran (involves a risk of accidental hydrocarbon spills)	- Taraki faoi hazard material bwa a na aika -inanon te tabo n mwakuri - E na lai nnon oera aika aika kabonganaaki - A na kamwaingaki bwai ake a bwapaki man te tabo n mwakuri - Tutuo n taai nako (Monitoring)
Te kahakinakoaki (soil erosion), man miin keniken ibukin bwai bu ake a kaawenaki	- Karaaki te bono ke kabwarioan te atibu ake a bubura n totokoa nakon te tano
Te urubwai imilin te kenken	- Kaokaki te tano are e kenaki nakon arona are mai miwana
Rootakin taari (ocean pollution)	- Manga kabouaki mitiin ibukin kaikatan kamanoan te manole man PUB imwaan kaitinakoana nako taari.

Rootakin te Otabwanin ma Kawai n Totoko

Kangaanga aika a kona n riki	Kawai n ibuabuoki ao n totoko man STSP
Kakarongoaa (Noise pollution)	- Kabonganaaki mitiin aika a tia ni katauki bwa a na aki rang karika te karongoaa - Kabonganaaki aanga n totokoa te kaboroa, n ai aron kateon oo n taabo n katei
Aki taun te aba, ao kangaanga n irekereke ma taan ababa.	- Karekei raai teaba n ababa man te taataka ao te kaitala ibukin kabonganaan te aba anne ibukin te mwakuri man STSP.
Koutan aroka ma kamwaingan tenaan oo ma oia ni beweki ao ai bwai riki tabeua.	- Kabanea te komaa n kataia n totokoa koutan aroka ao kamwaingan bwai aika kakawaki - Ngkana ea bon riai kamwaingana ao e na lai te kabomwi nakon te tia bewai bwa.
Kangaanga n irekereke ma te kamwakuri - (Te aki boraoi n lango, mwakuri n losawa, te iloaki, kamanoaia taan mwakuri)	- Te karikirake e na bon irai te kainibaire man te Tautaka ibukin tuan te kamwakuri tuan te kawai ao kamanoaia taan mwakuri laan te tua - Iai te kawai n tangtang ibukia te botannaomata ae te GRM

E Kakawaki Bwanaam

E rang kakawaki bwanaam ao am lango n ara karikirake ae te STSP. E boutokaa kabutan rai ara karikirake n akea te kangaanga. Taitaoka kaota am lango ao am raraoama nakoi!!

Tangtang ao lango nakon te STSP a bon hane ni kamanoaki rai - Strictly Confidential

Rinnakoa Ara Karikirake ae te STSP

Ko kona n iri ara kaogoraa inanon kaawa bwa kaotan am boutokaa nakon te STSP.

E&S STSP LEAFLET 2022 – 2028

Contact Information: Office Building - Beside Civil Yard in Betio

Contact: 63030120/73059598

Environmental and Social Safeguard

Environmental and social safeguards are policies and procedures aimed at preventing and minimizing potential harm to both the environment and communities affected by a project. Their primary purpose is to protect people and the environment from any risks or negative impacts associated with project activities

WORLD BANK ENVIRONMENTAL AND SOCIAL STANDARDS



ENVIRONMENTAL AND SOCIAL SCREENING



Grievance Redress Mechanism: For enquiries, comments and grievances, use STSP contact details above

Environmental Risks, Impacts and Mitigation

Risks	Solutions
Water pollution	Implement measures to prevent contamination from constructing septic tanks or connecting septic to sewer lines.
Habitat disruption	Conduct a thorough Environment Impact Assessment before the construction project begins to identify potential environmental risks and develop strategies to mitigate them
Excavation	Conduct a thorough survey with the Office of the President to areas suspected to have left behind exploded materials and human skeletons. The contractor should know from PUB electricity wires, sewer connections and water pipe laid below ground.
Waste disposal	Implement effective waste management practices, including recycling and proper disposal of construction materials and effectively use eco-friendly construction material when possible

Ocean Pollution	Upgrading the wastewater and fecal sludge management system to treat wastes before out-falling
------------------------	------------------------------------------------------------------------------------------------

Social Risks, Impact and Mitigation

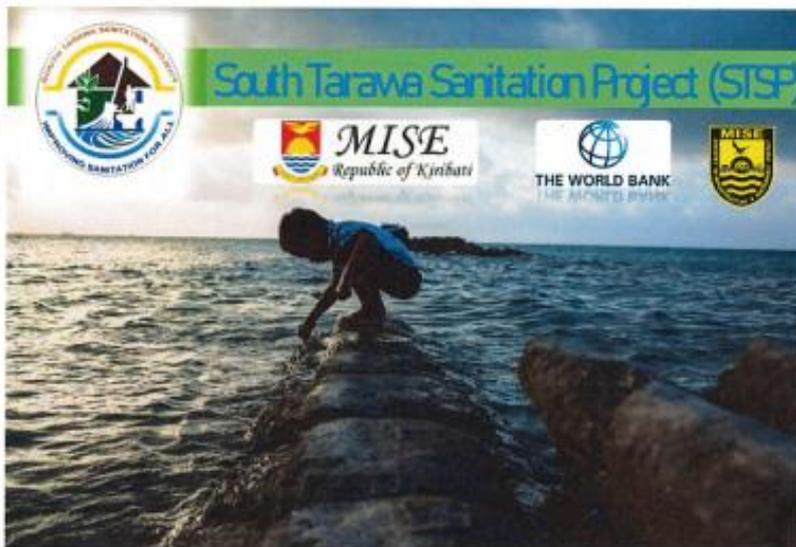
Risks	Solutions
Noises	Machines that will be used for construction must comply with the noise limit set by PUB or will use noise reducing materials/equipment
Land issue/limited space	Get government and landowners permission for land used for the project – in terms of allowing access and mini rehabilitation-construction
Removal of trees, fence, pig pens	Avoid removal of trees, fence and pig pens as much as possible. If required, then consult with the owners of those property and provide necessary compensation
Labor issues (Conflict, Abuse, immoral Practices, GBV Cases & Road Safety Issues)	Ensure compliance with labor management procedures and Road Safety (Laws, Regulations & Code of Conducts) and GRM for complains and feedback

Your Voice Matters

We value your input and ideas. Together we can make this project successful. Please share your thoughts and concerns with us.

Get Involved

You can join our community consultation to support the project in various ways. Your participation is vital to our project. All information shared are kept



Te karikirake ibukin katamaroa n irekereke ma kainanoan te roki ae tamaroa iaon SOUTH TARAWA

Bon ana karikirake te Tautaeaka ibukin katamaroa nakon kai n nako tinaniku iaon South Tarawa. Te karikirake aei are ena kaitarai kanganga n irekereke ma kainano n aki taun te roki iaon South Tarawa, ao aki toman rooki nakon te main ao ai rootakin itiakin ranin te aba man barekan kaai n nako tinaniku. Te karikirake aei bon onoua te ririki maanna ao ena waaki man 2022 - 2028. E kamwakuraki te karikirake aei man te MISE ke te Ministry of Infrastructure and Sustainable Energy rinanon te project ae te South Tarawa Sanitation Project.

E MWANENAKI AM KARIKIRAKE AEI IROUN TE Banke n Aonaba ke te WORLD BANK

Ana taakete te karikirake

Kanimwan Auti nakon te main sewage line.
Katean rooki iaan Auti ao n Communities, Public toilet.
Te reirei iaon anua aika Tamaroa ibukin mauakinan te kakaitaki ao kabonganaan raoi te roki
Taketenan Kawa iaon South Tarawa ao Betio ake a rang rootaki riki ibukin kainanoan te roki
Kauarerekean te nakotaari n aki akaka (Open defecation)



Mwakoron te karikirake Components of the STSP

Makoro 1

Katamaroa iaon kabonganaan te roki iaon south Tarawa ao kamanoan ranin te aba bwa enaaki rootaki.

Katomaan rooki ma te main sewer system iaon Betio, Bikenibeu ao Bairiki.

Katean ao katamaroan rooki (iaan auti, communities) iaon Nanikaai, Teaoraereke west, Ananau Causeway, ao Abarao.

Mwakoro 2

Katean ma kateimatoaan rooki ake a kabonganaa taari ibukin te flush. Reiakinaia ma Karikiraeaia taan mwakuri iaon kateimatoaan tamaroan te roki.

Mwakoro 3

Kateimatoaan te reitaki ma communities

Makoro 4

Kabutan raoi te karikirake aei.



South Tarawa sanitation project contact

Email: stsp@mise.gov.ki
 Phone: 74026192, 63030120
Opening Hours
 9:00 am to 05:15 pm Monday to Friday
Location
 Betio: Near Betio JSS campus

Appendix J - Visual Examples of Chance Finds

Human Remains



UXO

