

Water and Sanitation Services for Informal Settlements in Honiara, Solomon Islands

SUMMARY REPORT

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OCTOBER 2019

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Please cite the work as follows: World Bank. 2019. "Water and Sanitation Services for Informal Settlements in Honiara, Solomon Islands: Summary Report." World Bank, Washington, DC.

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Cover design: Jean Franz, Franz & Company, Inc.

Acknowledgements

The report has been written by Regina Souter from the International Water Centre. The report was commissioned by the World Bank Group's Water Global Practice. The Bank team, led by Stephane Dahan, worked closely with the International Water Centre.

Assistance to complete this assessment was provided by a range of people and organizations.

The staff of Solomon Water provided critical inputs to the feasibility of different water and sanitation service options. Representatives from local and national government provided important inputs to the feasibility and possibilities to improve water and sanitation in settlement. These included Ministry of Lands, Housing and Survey, Ministry of Health, Ministry of Environment, Climate Change, Disaster Management and Meteorology, Honiara City Council.

Solomon Islands National University provided assistance with community consultations in informal settlements in and around Honiara. Resident of several settlements in Honiara (Burns Creek, Fulisango, Ohiola, Namoliki, RenLau) providing critical inputs to the demand, acceptability and feasibility of water and sanitation service approaches. The Community Access and Urban Services Enhancement Project (CAUSE) program, a partnership between Solomon Islands government and World Bank, provided valuable GIS information about Honiara's settlements,

Jose Fernandez (MIWM, IWC) provided critical capabilities to undertake GIS analyses.

Finally, the team is grateful to the Global Water and Sanitation Program (GWSP) for its support to this work.

The objective of this study was to inform Solomon Water of potential service delivery models for the expansion of water and sanitation services in informal settlements in Honiara. Currently, a range of water service delivery models are in use by residents of settlements. As described below, many of do not result in safe and affordable drinking and domestic water. Similarly, a range of sanitation practices are in use, most are not likely to result in safe containment of human waste.

Solomon Water is currently expanding and improving its water and sanitation services in Honiara, and other regional towns urban centres. As a part of this improvement and expansion agenda, there is the opportunity to improve the water and sanitation services used by residents of informal settlements.

In recognition of the diversity of environmental, social and economic diversity amongst urban residents in Honiara's informal settlements, a range of water and sanitation service delivery models may need to be offered.

This assessment identifies the range of possible water and sanitation service models, and, with input from Solomon Water, informal settlement residents and other stakeholders, together with analytical information and lessons about service delivery models used elsewhere, makes recommendations about the water and sanitation service options best suited to informal Honiara's settlements.

Methodology

To generate evidence about possible effective water and sanitation service delivery models for Solomon Islands urban informal settlements, the following approach was used.

1. CHARACTERIZATION OF HONIARA'S INFORMAL SETTLEMENTS

Existing data and information describing environmental, social and economic features of informal settlements was collated. The objective was to describe Honiara's settlements with regard to features such as range of location and size of settlements, land tenure, socio-economic parameters, access and use of existing urban services, vulnerability to flooding and disasters. The project aimed to provide a general description of the types of settlements characteristics that exist. In addition to describing conditions in settlements, sufficient GIS information was collated to link provide further spatial identification of settlements and conditions.

2. DESK-BASED IDENTIFICATION OF POSSIBLE WATER AND SANITATION SERVICE MODELS WITH SHORTLISTING BASED ON STAKEHOLDER INPUT.

A desk review of water and sanitation options was conducted to prepare an initial list, with critical information, about the possible options. This was used to elicit feedback from Solomon Water about service options considered of interest and for further assessment.

The options included service delivery models currently provided by Solomon Water, in the case of sanitation this included options implemented by other organizations in Solomon Islands. In addition, water and sanitation options that are not currently used in Solomon Islands were included, by drawing on information and lessons from elsewhere.

A summary of technical and experience-based information describing the operational and user aspects of each of the remaining water and sanitation service options was prepared, for further consultation.

This information about operational and user aspects of the water and sanitation options was discussed during a workshop with cross-section of Solomon Water staff from across work units (Customer relations, water operations, wastewater operations, and executive). The workshop discussions discussed the potential suitability or unsuitability of different options, particular regarding feasibility for Solomon Water to implement. Only a small number of water service delivery options was removed at this time. Whilst it is likely that more than one service delivery model will be required to expand services to many/all informal settlements in Honiara, consideration was also given to inefficiencies associated with maintaining many different service delivery models across the city by minimizing the requirement for many very different service delivery models.

The shortlisted options were shared with residents of informal settlements through consultations in 5 settlements, with the assistance of local facilitators (independent consultants and recent graduates from Solomon Islands National University). Eight group discussions were conducted eliciting feedback on the attitudes about different options, including opinions on potential challenges and how these could be overcome.

Consultation insights were shared with Solomon Water staff during a second workshop, and final decisions made about the service delivery models to provide further information (Step 3).

3. DESCRIBE SERVICE DELIVERY MODELS WITH POTENTIAL APPLICABILITY TO URBAN INFORMAL SETTLEMENTS IN SOLOMON ISLANDS

A summary of operational and user information on the final shortlisted water and sanitation options, with a focus on information relevant to the context of Solomon Islands was prepared through review of literature. This included analysis and evaluations of models from elsewhere, as well as case study documentation, to identify critical lessons to be considered before progressing further with piloting unfamiliar models in Solomon Islands.

4. IDENTIFY WHICH WATER AND SANITATION OPTIONS SUIT DIFFERENT INFORMAL SETTLEMENT SITUATIONS

This step integrated the information from Step 1 (Characterization of settlers and settlements), with Steps 3 and 4, to develop a decision-tree to guide identification of suitable water and sanitation service models for settlements based on key criteria relevant to the suitability of water and sanitation options.

Honiara's Informal settlers – a growing population with diverse characteristics

Existing definitions of 'informal settlement', such as UNHabitat's¹ focus on household-scale criteria including land tenure status at the time of assessment. However, this current study required a definition of that could be used to identify settlements and households, at scales appropriate for planning purposes, that need improved water and sanitation services as a result of their unplanned settlement processes. As such, the **operational definition of informal settlements adopted in this study is: a spatially-defined area which has been settled over time through informal and unplanned processes, but which now comprises multiple households that may or may not have formal approval to occupy land, and, which lacks access to safe water and safe sanitation services.**

There are no recent accurate counts of people considered to be informal settlers. The recent census (2019) may provide data that can be used to provide an up-to-date estimate (this may require GIS analysis overlay to confirm households in settlements). The most recent estimates, based on extrapolations from the 2009 census, indicate that in Honiara, around 28,000 of Honiara's total population of around 70,000 live in around 4000 households in informal settlements¹. The Greater Honiara area, which includes peri urban areas to the east and west of the Honiara town boundary, in Guadalcanal Province, includes an additional estimated 7,000 people¹. This **total number of approximately 35,000 informal settlers in Greater Honiara** is likely an underestimate; the forthcoming census should provide more accurate population numbers.

Urban population growth in Honiara is significant, but evidence indicates it is even higher in informal settlements. Urban growth in Honiara has generally been the most rapid at the fringes of the city, e.g. Tandai and Malango wards in Guadalcanal Province grew at an average rate of 16.4% per annum across 1999–2009¹.

Urban migration from rural villagers is characterized by a strong preference to settle near kinship groups, and as a consequence the **population density in some settlements is extremely high and growth is likely to continue despite land shortage.** For example, Ontong Java / Lord Settlement has a population density of 218 people per hectare²

Most settlements are not temporary, some have been settled for many decades. Most settlements inside Honiara town boundary are located on government-owned, with a smaller number on privately-owned land. Outside the town boundary, settlements are either on privately-owned land or customary land of Guadalcanal Province customary land holders. Inside Honiara boundary, some informal settlements have been designated as '**informal settlement zones**' by the Ministry of Lands, Housing and Survey (MLHS) for administrative purposes; most of these zones are undergoing a formalisation process that will provide land tenure security. But many other settlements do not appear to be administratively recognised yet, including some smaller land areas on roadsides, or set aside for public services or utilities.

Currently there is no consolidated and up-to-date map identifying informal settlements of Honiara or Greater Honiara. This study has collated and combined several disparate datasets to identify **90 potential**

¹ UNHabitat (2016). Honiara City-Wide Informal Settlement Analysis: A report prepared for the Solomon Islands Government and Honiara City Council supported by UN-Habitat as part of the Participatory Slum Upgrading Programme.

² UNHabitat & RMIT (2016) Honiara Urban Resilience & Climate Action Plan. for Honiara City Council and the Solomon Islands Government.

informal settlements, as shown in Figure 1. The focus has been on Honiara municipal area, although where possible, informal settlements known in the peri-urban areas have been included.

Most of these 90 settlements appear not to be formally recognised by MLHS yet, and some of those that are close together may represent smaller clusters of households or communities within larger areas contiguous settlement areas. Eighty of these were identified by the CAUSE program (World Bank and Honiara City Council: Community Access and Urban Services Enhancement Project) who are engaging with poor and vulnerable populations in Honiara.

This study reviewed existing data and reports to describe some of the key characteristics that vary amongst informal settlements, focusing on those relevant to water and sanitation services. Key sources of information included UNHabitat's 2016 situation analysis of informal settlements of Honiara¹, GIS information from the CAUSE program, Solomon Water including flood-mapping prepared by EGIS, MLHS and public datasets.

The full report provides more detailed account of characteristics that vary amongst informal settlers and settlements; the following is a brief overview:

- **Settlement population size:** varies significantly; at least one (of the 90) were less than 100, and 15 less than 300, and 68 greater than 300 (anecdotally some are several thousand, though not accurate data exists).
- **Access to water:** based on case study data from 8 settlements in Greater Honiara, access to Solomon Water varied from 1-94% of households. Other sources included groundwater from springs, bores and shallow wells, rainwater tanks, and a small number relying for drinking water from bottled water and surface flows (rivers, streams)
- **Access to sanitation:** all use on-site sanitation options, with the type being highly variable across 8 case study settlements; up to 50% households have a private household toilet, though most are basic water-based pits. It is likely that none have sanitation considered 'safe' by SDG³ standards.
- **Land tenure:** 3 settlements have been formalized by MLHS, 3 were identified as too hazardous for formalization, 38 were in ISZs undergoing formalization, and the status of the remainder is unknown.
- **Social cohesion:** larger settlements are comprised of many 'communities', whereby a community represents a group of people that socially-networked, with common characteristics such as faith or ethnicity and usually following some shared rules (formal, informal).
- **Income:** no recent reliable data, estimates from case studies range from \$1200-5500 SBD per month for household income. Anecdotally there appears to be variation amongst settlers within a settlement.
- **Environmental hazards:** at least 17 settlements were identified as being in flood or landslip zones, and although there is no settlement-specific data describing the depth to groundwater, many settlements are on the coastal floodplain where groundwater is shallow (less than 3m).
- **Accessibility:** around 32 settlements had all-weather road access, though many households do not live roadside and access their houses using footpaths, sometimes through steep areas and across waterways; only a small number of pathways in settlements are easily accessible (concrete with steps).

³ SDG: Sustainable Development Goal 6: safe water and sanitation

The need for safe and reliable water and sanitation in informal settlements

Across all informal settlements, those recognised as informal settlements and those not, residents utilize a range of water and sanitation options, and few of these provide reliable and safe water and sanitation.

The MLHS process to formalize informal settlements does not currently include provisions for installation or promotion of water or sanitation services. Although many residents of informal settlements can fairly easily arrange power services, arranging water services has been more difficult historically, and it is very difficult to arrange safe sanitation and they are not encouraged to do this during the process of acquiring an FTE or TOL.

As indicated above, access to safe water amongst informal settlers varies at household and settlement, with many making use of local water sources, such as springs and shallow groundwater (wells). In some settlements, bores have been installed by organizations other than Solomon Water, including when a utility water main runs close by.

Householders that rely on local water resources or carting of water in containers, and that have inadequate sanitation and irregular handwashing-with-soap practices, are at greater risk of consuming water contaminated with human pathogens.

The urban population of Solomon Islands (nationally) that has access to basic sanitation = 68% (UNICEF Urban WASH Survey 2018). At present, 15% of houses in Honiara have access to piped sewerage and 85% of houses have on-site sanitation, such as septic tanks, or pit latrines, or they have no sanitation.

Safe collection, treatment and disposal of septage sludge is not common practice.

Many people use on-site sanitation that does not safely manage human waste, or open defecation. Human waste, containing many pathogens causing illness, is contaminating water and food and environments, and causing health problems. The most common health problem caused by inadequate sanitation is diarrhoea – this causes people to not work, not go to school, and limits their opportunity to participate in society. For young children, inadequate sanitation causes lifelong problems – in the Solomon Islands 33% of children are stunted⁴; stunted children are less likely to be successful at school, and less likely to have good jobs when they are adults.

Safe sanitation means toilets and waste systems that manage human waste so that it is treated and disposed safely and it cannot contaminate water, food or environments.

Sanitation can no longer be a problem for each household to address by themselves. This is because

- If even a small number of households don't have good sanitation, the health of everyone in the community around them can be affected.
- In urban areas, most households cannot properly dispose of toilet waste safely – they need access to services.

WATER SERVICES ASSESSMENT

In addition to the technical and operational aspects of different water service delivery models, the following key points were identified:

⁴ SIG (2017) Solomon Islands Detailed National Sustainable Sanitation Plan, September 2017

- 1) Recognizing that the greatest health and wellbeing benefits are delivered only through internal household water connections, the objective is to provide this level of service where-ever possible. However, it is also recognised that this highest level of service is not suited to some settlements, primarily due to the preference of residents to not commit to household connections and to be able to purchase smaller volumes of water. In these cases, the preference is to provide a service that has the flexibility to be transitioned to individual household connections as demand and willingness to pay/commit changes. An alternative service that delivers affordable safe water may increase the demand for internal household connections, thus serving as a **transitional service**.
- 2) There is a current perception that secure land tenure, such as a Fixed Term Estate agreement, or Temporary Occupancy License, is required before an application for a domestic water connection would be approved by Solomon Water. This is not a formal regulation, and consultation with Solomon Water and MLHS, has determined this need not be required. Solomon Power, the electricity provider, no longer requires an FTE or TOL before an electricity connection is installed; lessons from their process of approval can be applied to Solomon Water's processing of water connections. Relaxing the **land tenure requirements** would mean residents of most informal settlements are eligible for a household water connection. The exception would be for the small number of settlements that have been assessed by MLHS as being in highly hazardous environment. These settlements have been identified by MLHS as requiring relocation and installation of significantly infrastructure such as individual household water connections would not be supported by SIG; an alternative water service delivery model must be implemented for these settlements.
- 3) There appears to be a **low awareness and/or attitudes about (i) the importance of safe drinking water (ii) the safety of water provided by Solomon Water**. Well-strategized communication efforts are required to influence behaviours regarding the value of water from Solomon Water in comparison to other options (e.g. bottle water, free water from unsafe local sources).
- 4) Past estimates of non-revenue water lost through theft were overestimated, and there may be a lagging perception this problem is more significant than it is. However concerns about water theft are legitimate (if not at the scale previously believed), and **water theft** can be reduced if (i) water services reach settlements and residents are more easily able to access water (ii) there is early and effective consultation and communications about the value of Solomon Water as a safe and accessible water supply (iii) most people in a settlement adopt Solomon Water connections (iv) engineering solutions are implemented to reduce tampering and theft, and (v) monitoring of non-revenue water at the settlement-scale (or finer resolution) is used to identify possible problems.
- 5) All service delivery models apart from private internal household water connections, involve consumers carrying and storing water in containers. Local and global evidence indicates **significant risk of water quality contamination arises when water handling and storing in containers is required**, especially when local sanitation and handwashing practices are weak. Education and behaviours change strategies will be required to ensure water service models that include container-based transport and storage of water do not increase water quality health problems due to contamination.
- 6) Regarding **volumes of water to be supplied per person** (to assist with calculations of cost), the WHO standard is (at least) 50 l/p/d, the SIG Rural WASH standards for design requires providing (at least) 50 l/p/d. The Solomon Water strategic plan considers an aspirational average water supply of 140 l/p/d, and as such this value has been used to estimate affordability of water services.
- 7) Strategies used elsewhere by water utilities to provide different support specifically targeting lowest-income households (**Pro-poor strategies**) were discussed as being difficult to implement in Honiara because (i) identifying and maintaining an accurate register of low-income households is not within the current capacity of government (ii) targeting whole settlements, as an alternative to identifying individual low-income households, could mean inequitable access by wealthier households to pro-poor

allowances – this is due to the high variability of wealth within settlements, and this appears to be a widely held believe amongst locals and stakeholders. The preferred approach is to ensure the lowest tariff level is affordable by the lowest income households.

- 8) Even inside the town boundary where it is clear Solomon Water have a lead role in managing water supplies, coordination of water supply systems needs improving. The history of limited access for informal settlers to utility water has meant other organizations, such as civil society organizations have installed alternative (local) water supplies, such as bore pumps, usually with limited or no consultation with the water utility. However these on-site water systems are not as cost-effective especially when many settlements are located near water main pipes, and potentially not as safe (wrt water quality) nor sustainable (wrt maintenance). With Solomon Water’s intention to expand services to better service informal settlements, communication and coordination with other actors would assist in avoiding installation of alternative water systems if utility water is a feasible option.

Following desktop reviews and consultations and feedback from Solomon Water and residents of informal settlements, the **following water service delivery models were determined as having potential applicability to Honiara’s informal settlements:**

<p>Individual private household water connections using Cash Water</p>	<p>As for the existing Cash Water service delivery model, which is a pre-paid and metered water connection. Additional considerations for increasing financial accessibility through options to pay connection fees in installments or reductions to connection or monthly service fees.</p>
<p>Shared private water connections using Cash Water</p>	<p>Private household water connections, as above, registered to an identified householder, but shared with neighbouring householders through informal and self-determined arrangements. Access is usually to an outside tap, and households will carry smaller volumes of water to where it is needed. Some may use hoses to convey the water closer to ech house (and potentially store in larger containers).</p> <p>Not formally promoted by Solomon Water, but not disallowed, and possibly further enabled (e.g. assessing tariff steps for shared connections to ensure cost-effectiveness for householders, and providing information on a range of methods for bill-splitting).</p>
<p>Water store (kiosk)</p>	<p>A formal water retailer located within the settlement, selling pay-per-use water by refilling containers provided by consumers (option to sell containers). Preferred by residents that don’t want to commit to ongoing water connection service fees or raise funds for connection fees. Store (locally-preferred language for a kiosk) design and operations are regulated, including the retail price of water. Options for management include owned and operated by Solomon Water, or a delegated management model; fully private water stores are not recommended (unless highly regulated).</p>

In addition, it was recognised that **additional water accessibility** to informal residents as well as rural residents returning to villages after visiting Honiara could be provided by **installing and operating pay-per-use automated water dispersers, such as Water ATMs, at key locations**. Water ATM’s can provide larger

quantities of water in containers than is currently purchasable from stores. In particular, the installation of Water ATMs at major public transport hubs could provide access to affordable and safe water in larger volumes close to transport (to reduce carrying distances).

Other service models considered but not deemed suitability to informal settlements of Honiara included:

- Public shared tap-stands
- Trucking of water to settlements (to individual or shared tanks, or to kiosks)
- On-site water source supply, treatment and distribution (e.g. local bores with storage and distribution networks).

The following characteristics of settlements were determined as critical in influencing the suitability of the different shortlisted service delivery models to different settlements, or residents within settlements.

- **Classification of settlement as hazardous by MLHS:** large investments in water infrastructure, such as for individual household water connections are discouraged by SIG. Water kiosk may be a suitable alternative
- **Water connection history:** previous experiences of high rates of non-payment of water bills, tampering or theft of water or water infrastructure and/or violence to utility personnel
- **Ability and willingness to pay for water:** low ability and/or willingness to pay for water exists in some settlements. Access to safe and affordable water from shared water connections, or from a water store, may increase value and demand of utility water.

A Water services decision tree was developed based on the above criteria, and preferred water service options (Figure 2).

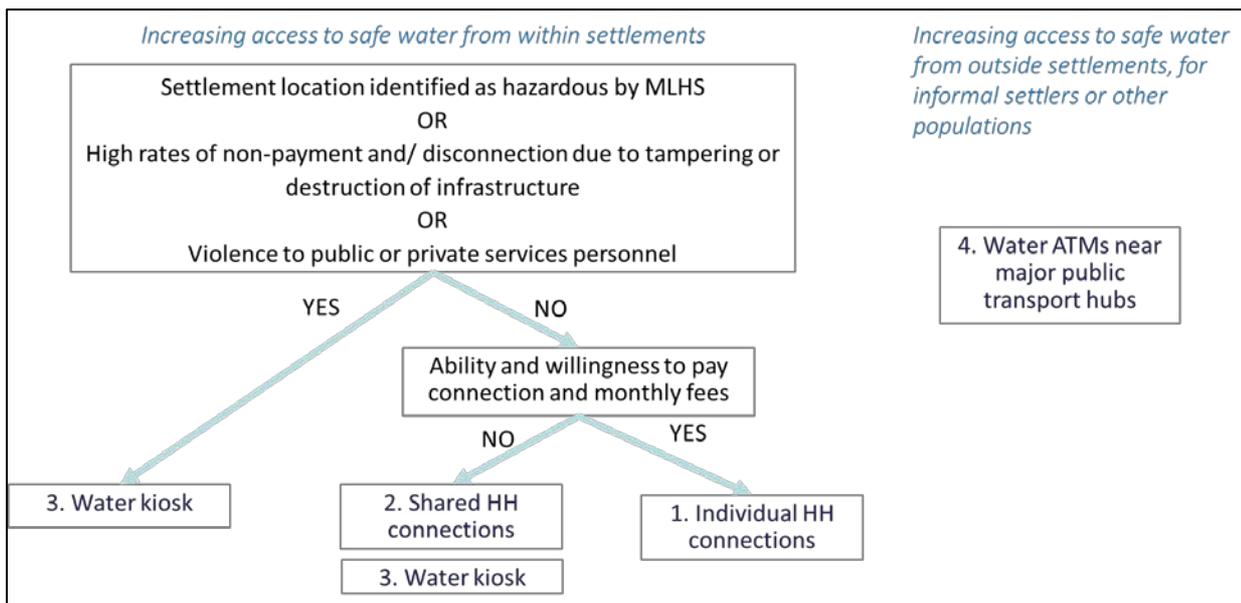


Figure 2: Water services decision tree for informal settlements, Honiara.

Improvements to water services in informal settlements will need to consider drainage and wastewater services, as increasing accessibility to water will likely increase water usage.

SANITATION SERVICES ASSESSMENT

Improving sanitation will require **three types of actions**

- **Users adopt safe sanitation behaviours** – this will require communications and behaviour change strategies to influence people’s motivation and commitment to using safe sanitation
- **Toilets that support safe sanitation practices are accessible** at households, as well as schools, offices, health clinics, markets, to safely capture human waste
- **Infrastructure and service delivery models exist to collect, treat and dispose** of human waste safely.

Different sanitation technologies suit different environmental (natural and man-made), social, economic situations. **Many of Honiara’s settlements are not suited to piped sewerage or septic tanks**, which are currently the most common type of sanitation in the formal residential areas of Honiara.

Based on the review of different sanitation technologies and their requirements/suitability, and the range of environmental, social and economic characteristics of and within Honiara’s settlements, the **following factors were identified as critical to influencing which types of sanitation services could potentially work in different places.**

- **Distance away from sewer line** – Honiara’s sewer network currently covers small areas – it is not possible to join every house to the sewer network, but some may be close enough that they can be connected
- **Dense settlements** – many informal settlements are dense with houses, and do not have sufficient space for proper on-site sanitation that treats and disposes of waste in the community, such as septic tanks

- **Road access to houses** – many houses inside informal settlements are not close to the road – they are too far away for septage trucks to access their septic toilets or pits to empty them
- **Groundwater** – some areas of Honiara has shallow groundwater, and in some of these areas, people use this groundwater for drinking and other household uses. Shallow groundwater can be easily contaminated by unsafe sanitation. Shallow groundwater is also difficult to dig and construct in – there is not deep enough dry ground to construct pits.
- **Flood vulnerability** – areas that experience river, stream or coastal flooding are not suited to many in-ground sanitation options, because during floods, the human waste is carried around the community in flood waters, causing ill-health
- **Water availability** – some houses don't have access to a lot of water at their house (many are sharing water connections), and low-water using sanitation options may be required. For settlements with low availability, consideration should be given to the likelihood of improvements to water availability occurring in the near future (such as improved access to Solomon Water water services).
- **Land tenure** – some settlements have been identified as being in hazardous areas and will not be formalised. These areas require sanitation that is not too expensive, or that can be moved when people move
- **Settlement or area population size and social cohesion** – the size of the population in an area and their ability to work together to maintain infrastructure affects the suitability of some community-wide sanitation system.

A mix of sanitation services are required, to suit this range of conditions in Honiara. This is because the diversity of situations for informal settlement residents, as well as formal residents, across Honiara means there is no single sanitation service delivery options to suit the whole city's population.

Ensuring everyone is using safe sanitation is necessary for the health and wellbeing of people using sanitation, but also because the **health of all residents is at risk when even only few people are not using safe sanitation** (unsafe sanitation leads to the spread of pathogens throughout the environment, so that other people with sanitation can still be exposed and suffer ill-health).

Based on a desktop assessment of different sanitation technologies, together with input from Solomon Water, and residents of informal settlements, the following sanitation options were shortlisted:

- **Flushing toilets with piped sewerage** (operated by Solomon Water) or household septic tanks (with septage collection, treatment and disposal); water-saving cisterns can improve water efficiency
- **Community sewer and septic system:** Flushing toilets with community simple sewers and community septic tanks (operated by Solomon Water); water-saving cisterns can improve water efficiency.
- **Pour-flush** (or water saving equivalents such as Sato-pan toilets) **with pits** (with pit emptying or burying)
- **Ventilated Improved Pit (VIP)** toilets (with pit emptying or burying)
- **Above ground-sanitation** (container-based sanitation or composting toilets).

Regarding sanitation in their communities, informal settlers had a **strong preference for household-based toilets, rather than public** (pay-per-use) or shared private toilets (toilets owned and shared by a small number of households).

Assessing the status of above factors influencing sanitation options for each settlement guides the identification of sanitation technologies for consideration by stakeholders, including resident informal settlers. The following Sanitation decision tree (Figure 3) combines the above factors to assist in identifying which sanitation technologies suit different situations.

The flow chart is designed to be used early in planning processes including for use by planners and programmers about which options may be suitable for consideration by stakeholders and residents. It is not a decision-making tool in-itself, and early community engagement will be critical – discussion of options and pros and cons of each. Genuine community-participation will be critical for any service delivery model to work successfully. Additionally, for sanitation technologies common to those used in rural settings, there should be alignment (where appropriate) with RWASH technical advice for households on toilet types.

Consideration should be given to whether water availability may change in settlements currently with low water availability, For example, if improved access to water services provided by Solomon Water are planned for the near-future, the options identified as suitable using the Sanitation decision-tree may be considered undesirable, particularly by consumers who may express a strong preference for water-based sanitation.

The above sanitation options do not describe full sanitation service delivery models. A full sanitation service delivery model must also describe:

- Service provision arrangements for toilet parts and construction services (where households cannot/prefer not to provide their own parts and construction)
- Provision of technical support for householder construction (where appropriate), and maintenance (where appropriate) and use
- Provision of behaviour change communication services (to ensure demand, knowledge and attitudes are supportive of adoption of sanitation services)
- Service provision arrangements for safe collection of faecal sludge and effluent from toilet systems requiring emptying
- Service provision arrangements for safe treatment and disposal of collected faecal sludge and effluent.
- Regulation and monitoring of waste management services.

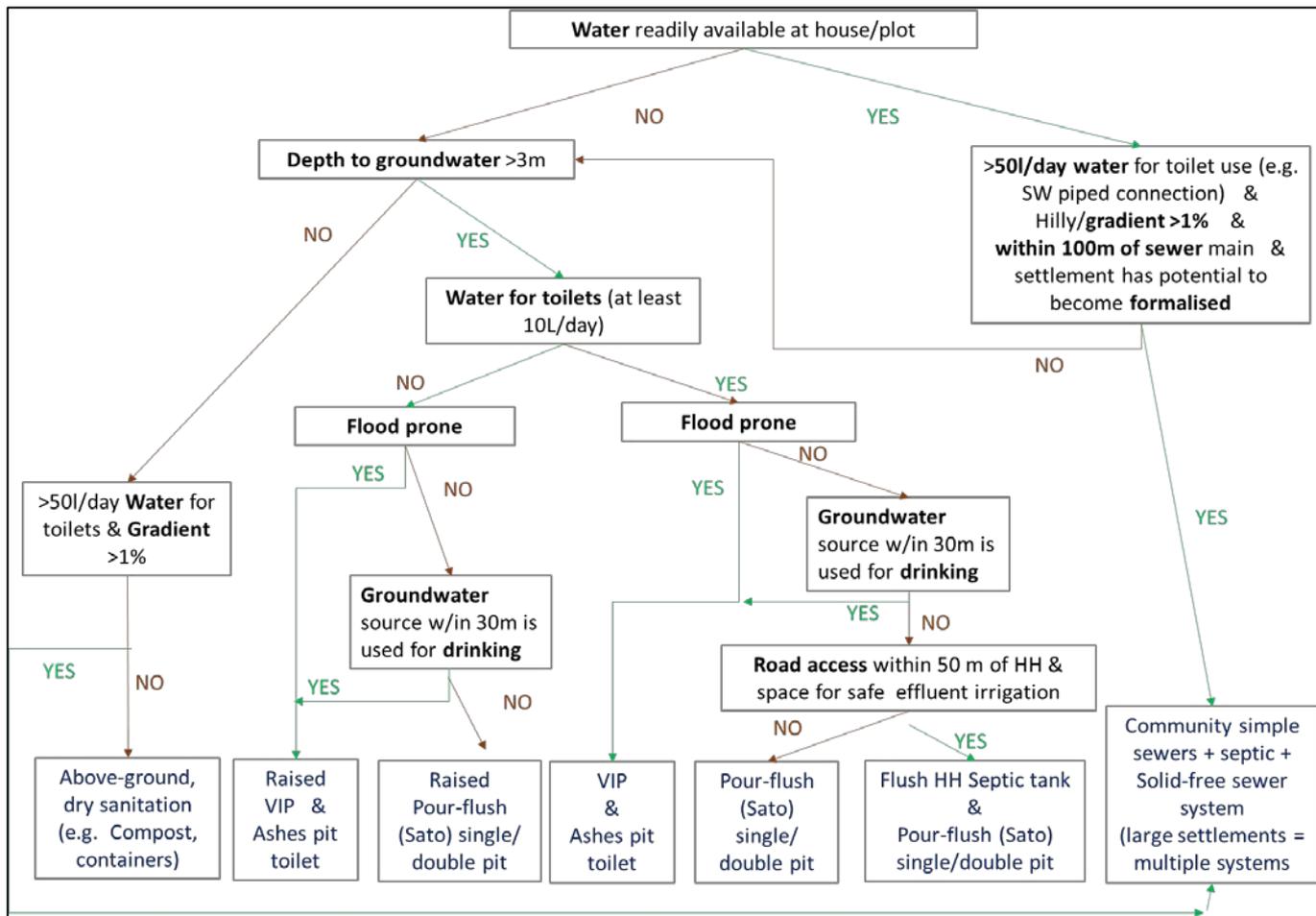


Figure 3: Sanitation decision tree for informal settlements, Honiara. Full service delivery models need to be associated with each sanitation option to ensure safe management of faecal sludge and effluent.

RECOMMENDATIONS

Improve management of services to informal settlements through the following recommendations.

1. UTILIZE INFORMATION ABOUT SETTLEMENTS TO GUIDE CONSULTATIONS AND PLANNING WITH RESIDENTS AND OTHER STAKEHOLDERS ABOUT WATER SERVICES:

- 1.1. Work with MLHS, HCC and other organizations linked with informal settlements, to establish a database of settlements and information. The database (spreadsheet) developed during this study may be a useful starting point.
- 1.2. Improve existing information about settlements, in particular
 - a) Census 2019 data could provide updated and more detailed information about: variability of wealth within settlements; population estimates for individual settlements; growth rates of individual settlements.
 - b) MLHS data regarding land tenure status of different settlements.
- 1.3. Build on the newly collated GIS information to update and use GIS-linked information to inform planning of services. In particular, maintain and update as available settlement population and socio-economic data, with environmental data such as hazard mapping (coastal flooding, riverine flooding, flash flooding, landslips), and with utility asset data (water and sewerage assets).

2. IMPROVE WATER SERVICE DELIVERY TO RESIDENTS OF INFORMAL SETTLEMENTS:

- 2.1. **Provide internal household water connections where-ever possible**, to maximise health and wellbeing benefits
- 2.2. Recognise that not all residents of all settlements will be able/want to access private internal household water connections, and that a **mix of water service delivery options** may be required. Identify potential service delivery options using the **water decision-tree** developed in this study (Figure 2 above) **to guide** identification of water service delivery models to be considered during planning and consultation activities.
- 2.3. **Ensure the lowest tariff level is affordable by the lowest income households.**
- 2.4. Where internal household water connections are not being provided, provide a service that has the flexibility to be transitioned to individual household connections as demand and willingness to pay/commit changes, that is, **consider these services as transitional services**. This does not apply to settlements identified by MLHS as hazardous.
- 2.5. Accommodate a **mix of water service delivery models in settlements with larger diversity of wealth and demand**. For example, consider providing both water kiosks and household water connections in settlements with lowest income households and high wealth households. Census 2019 information can be used to identify these settlements.
- 2.6. **Improve the awareness and attitudes about safe drinking water** in particular (i) the importance of safe drinking water (ii) the safety of water provided by Solomon Water using an evidence-based behaviour change communication strategy.
- 2.7. **Mitigate water theft** from water pipes in high risk locations by:

- a) Increase accessibility of household water services by planning reticulation through settlements, and ensuring the lowest tariff is affordable by lowest income households
- b) early and effective consultation and communications about the value of water from Solomon Water and its cost to supply
- c) encourage uptake by majority of households
- d) utilize engineering solutions, such as resistant pipes and deeper installations, to reduce tampering and theft,
- e) monitoring of non-revenue water at the settlement-scale (or finer resolution) to identify possible problems.

2.8. Notwithstanding that shared household connections will not be actively promoted by Solomon Water due to difficulty of regulating on-selling and ensuring the quality of service (e.g. reliability and water quality), acknowledge that sharing one household connection amongst multiple households is common practice and a currently is preferred amongst many residents of informal settlements as a way to increase the accessibility to water from Solomon Water (by cost-sharing the fixed costs), and **improve the effectiveness of shared household connections** by

- a) reassessing the tariff (or other aspects of the cost) arrangements for these connections. This is because (ii) connections supplying water to multiple houses may use sufficient volumes to be charged a higher-use tariff – thus effectively paying more per litre than single-household connections.
- b) Making accessible information about different ways water use can be calculated (e.g. through community meetings or ‘water supply training’, which could include other aspects of demand management and water quality (containers & storage)
- c) Consider cluster metering to reduce connection costs (provided settlement residents agree to take responsibility for management of pipes and non-revenue water from the meter to the house).

2.9. Pilot **water stores (kiosks)** in one or two settlements to build experience and understanding of (i) operational requirements (ii) demand from residents of informal settlements. Specific recommendations relating to piloting of water stores:

- a) Pilot a delegated-management model and/or utility owned-and-operated model (rather than a private retailer), to ensure (i) retail price is regulated (ii) minimum service standards are adhered to (e.g. opening hours, hygiene and maintenance of store equipment). An alternative would be to start with utility-owned-and-operated and transition to delegated management.
- b) Recognise the lower service standard that will be provided (compared with household water connections) and that this is likely a transitional service to create demand and willingness to pay by providing low cost water (this may require subsidizing the cost of the service, depending upon the potential market size).

- c) Design and locate the store considering: (i) vulnerability to vandalism (ii) personal safety of operators (ii) accessibility to residents carrying water containers (iii) hazardous locations (floods, landslips, proximity to rubbish piles) (iv) ability to maintain hygiene and to prevent contamination or supplies (e.g. through back-flows) (v) some on-site storage to mitigate short-term mains water disruptions (vi) density of stores within larger settlements to balance cost-effectiveness with accessibility.

2.10. Pilot the installation and operation of **pay-per-use automated water dispensers**, such as Water ATMs, at key locations such as major public transport hubs (large bus stops, the port).

- a) The location of the Water ATMs should consider (i) security of the ATM (ii) accessibility of the ATM with regard to hours/days it is accessible for both consumers and service operators (iii) proximity to transport departure locations to minimise carrying distances
- b) Retail cost of water should be regulated by the utility, and set at a level commensurate with affordability for likely consumers (including lowest income households) and the level of service being provided.

2.11. Recognising there will remain (for the near future) many residents that use service delivery models requiring them to carry and store water in containers (e.g. water kiosks/stores, shared HH connections), **mitigate health risks from use of water containers:**

- a) Mitigate the risk of contamination of water during handling and storing of water by consumers in containers (including drums, barrels, tanks) through education and behaviours change strategies (which should also identify poor sanitation and hygiene (handwashing) and important factors increasing contamination of water in containers.
- b) Mitigate the health problems associated with carrying water in containers by encouraging local hardware stores to stock wheeled-water containers.
- c) Consider whether household water treatment options should be promoted (acknowledging the requirements for consistent and proper adherence to treatment procedures for these to be effective).

2.12. **Adjust the land tenure requirements and the current beliefs regarding these:**

- a) adjust internal utility processes, and external communication messages regarding land tenure requirements to clarify that a Fixed Term Estate, or Temporary Occupancy License is not required for residents inside Honiara City Council boundary to apply for a private water connection.
- b) For residents living in settlements that have been assessed by MLHS as being in highly hazardous locations, inform them (if they apply for water connections) that private household water connections are not currently allowed, but that an alternative water service delivery model can be discussed with Solomon Water, such as a water kiosk.

2.13. **Communicate and coordinate water supply service options with all organizations active in informal settlements**, to ensure where feasible, utility water is provided, as the more cost-effective, safe and sustainable water supply system, rather than installation of on-site water supplies such as bore pumps which have minimal long-term maintenance support and may interact with Solomon Water's water supplies and network.

3. IMPROVE SANITATION SERVICE DELIVERY AND BEHAVIOURS IN INFORMAL SETTLEMENTS:

- 3.1. Recognise that a **mix of sanitation service options** will be required to service Honiara’s urban and peri-urban populations. Achieving sanitation service provision for all people is required to ensure the health and wellbeing of all of Honiara’s population, and to maximise resident’s participation in society, education and economic activities.
- 3.2. Identify sanitation options to suit different settlement characteristics, such as by using the **sanitation decision-tree** (Figure 3) to guide identification of the range of sanitation services that may be required and their suitability to different local situations.
- 3.3. The required mix of sanitation services cannot be provided by any one organization, and a **mix of sanitation service providers will be required**. Coordination and cooperation is required to ensure that all people living in Honiara can access a sanitation service that will safely manage their human waste.
- 3.4. Promote amongst key stakeholders (Solomon Water, HCC and MoH) the **critical need for a coordinated strategy to address sanitation across Honiara**. A strategy or plan for **Honiara’s sanitation** could include information:
 - Identifying which **types of sanitation services** should be made available in which parts of the city
 - Identifying **which organizations** should play a role in supporting or delivering each sanitation service
 - Confirming there are no parts of the city that can’t access a safe sanitation service.
 - Describing **targets** to encourage progress on sanitation and these will be **monitored**.
- 3.5. The sanitation strategy or plan should also require **coordinated communication to promote sanitation** behaviours, to improve their motivation and commitment to using safe sanitation. It is important that all organizations have the same types of messages about sanitation – the best way to achieve this is for stakeholders to develop a sanitation communication strategy, with communication resources, that many organizations can use.
- 3.6. **Coordinate with MoH to improve awareness amongst residents of informal settlements about types of on-site sanitation options** suitable in different informal settlements, in particular to unfamiliar sanitation options such as VIP dry pit latrines, and container-based or composting toilets. Coordinate with MoH on the communication of acceptable sanitation technologies.
- 3.7. **Pilot the new service delivery model of “Community sewer and septic system”** which combines on- and off-site collection and treatment.
 - This model involves:
 - water-based (flushing) toilets with low-cost community simple sewers (installed with assistance from residents, and oversight by Solomon Water). Water-saving cisterns can improve water efficiency, although a minimum water flow will be required to ensure functionality of the community simple sewers.
 - connected to community septic tanks (operated by Solomon Water). Multiple septic tanks may be required depending upon the scale and topography of the settlement.

- conveyance of effluent from septic to mains sewer using low cost solids-free sewer systems
 - septage emptying from the septic tank.
- Significant community engagement and consultation will be required before piloting such a model. Consider partnering with organizations already with established relationships and experience engaging with informal settlements
- Use the sanitation decision-tree to assist in identifying a pilot settlement. An additional criteria would be to select settlement in which there has previously been promotion of sanitation. An example of a settlement that meets most of these criteria is Namoliki/Gwaimaoa.
- Ensure there is capture of the processes, strengths and weaknesses of the pilot model to provide evidence for future service model assessments.

4. IMPROVE COORDINATION AND INTEGRATION OF WATER, SANITATION AND HYGIENE IN INFORMAL SETTLEMENTS

4.1. Water, sanitation and hygiene are critically linked, both operationally and from a health perspective (e.g. the need and use of water to practice safe hygiene; the potential contamination of local water, and container-based water, through inadequate sanitation and hygiene; the increase consumption of water associated with water-based sanitation), these three areas of activity must be planned and operationalized in a coordinated way to avoid ineffective communication or operations, which would prevent WASH-related health and wellbeing being achieved.

- Engage with other WASH actors active in Solomon Islands to ensure coordinated approaches, similarly for sanitation above. Discuss communication approaches and resources using the same messages. Synergising urban and rural WASH communications and messages would provide benefits to both urban and rural WASH outcomes – this could be achieved through expansion of the rural WASH stakeholder group to include urban WASH actors.
- Engage with other actors active in informal settlements, not necessarily focused on WASH, such as CAUSE and UNHabitat, to raise awareness of WASH-related approaches and activities being promoted by the government and Solomon Water.

