Initial Environmental Examination

November 2021

Solomon Islands: Urban Water Supply and Sanitation Sector Project

Part 2


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3.0 PROJECT DESCRIPTION

3.1 PROJECT COMPONENT’S LOCATION

52. The Project is located in Greater Honiara (comprising Honiara City itself and external linked suburban areas) in the Province of Guadalcanal, in the Solomon Islands. The Greater Honiara is the largest urban area and Honiara City is the capital of the Solomon Islands.

53. The water supply subprojects covered in this IEE and to be financed under UWSSSP cover the following:

   - Trunk mains
   - Reservoir

54. **Figure 3-1** shows the location map of proposed Project for Honiara water supply.
Figure 3-1: Proposed Project for Honiara Water Supply
3.1.1 Honiara Trunk Mains Subproject

This sub-project consists of the

- Replacement of an existing trunk main in the White River Section;
- New trunk main from East Kola tank to Kukum Highway;
- New trunk main from Panatina reservoir towards the Eastern Part of the City – King George VI and Burns Creek.

A corridor of maximum 2.5m from each side of the pipe (i.e. 5m maximum corridor) is defined. All impacts have been based upon this level of disturbance.

White River Trunk Main

Project Objectives: The aim of the sub-project is to secure and reinforce the western part of Honiara network and the gravity system from Kongulai spring, in relation to the construction of the new Water Treatment Plant (WTP) at Kongulai (additionally financed under UWSSSP). The benefits of the new transmission system are: many:

- Improve existing water supply service and solve pressure issues;
- Ensure distribution capacity for long term requirements of White River area;
- Enhance system resilience by developing interconnections and transfer capacity with adjacent distribution system, notably Rove. Interconnection with White River tanks will also provide a back-up option or complement to the boreholes; and
- Rationalize existing distribution and enable better monitoring of the system.
- Contribute to reducing NRW in the White River DMAs.

Location of Pipeline. In line with the outline design, the White River trunk main is proposed to be installed between Kongulai production site and Rove interconnection. It is envisaged that the trunk main will start from the future clear water tank at Kongulai WTP site and connect by pipeline with White River tanks along the pipeline route.

The total length of the White River trunk main is 6 km. The pipeline route includes approximately 2.5 km along Mendana Avenue. The envisaged location of the pipeline is presented in Figure 3-2.
Figure 3-2: Proposed Location of White River Trunk Main

Source: SW PRF BOD Honiara WS, September 2019
The pipeline will replace the existing transmission main between Kongulai and White River area, up to 01 Bus Stop area (connection with Mendana Avenue). The new pipe will be installed along the existing pipe route which will be decommissioned upon completion of the works. For the lower part, from White River to Rove, the new trunk main will be installed in parallel with existing lines and will be used as a conveyance pipe with interconnections with existing system at strategic locations.

It should be noticed that the upcoming road works along Mendana Avenue is likely to change the organization of the network should existing pipes be removed from the new road footprint.

It is proposed to connect the new trunk main with the White River tank, possibly using the existing pipe. Although White River tanks would normally be supplied from the bore field, this would provide greater flexibility should the tanks be supplied from Kongulai.

**Design Flow.** The design flow for this trunk main is 7 MLD. This design flow is consistent with:

- Short term demand of both White River and Rove areas according to the strategic plan: 7.2 MLD in the 5 Year plan. Hence, the pipe will have the capacity to supply both zones if required (e.g. interruption of Rove source).
- Long term demand of White River considering future development according to the strategic plan: 7.2 MLD in the 30 Year plan
- The majority of the flow (i.e. not less than 8 MLD out of the expected 15 MLD) from Kongulai will be directed toward Tasahe reservoir to benefit from the available head.

Furthermore, this pipe will be used for distribution with storage upstream. Consequently, hourly peak needs to be applied to determine the design flow for pipe sizing purpose. Based upon a maximum daily flow of 7 MLD and an hourly peak of 1.75, the design flow is fixed at 510 m³/h.

**Figure 3-3** summarizes the future functioning of the Kongulai/White River system, highlighting the location of the trunk main.
Figure 3-3: Flow Diagram of Kongulai, Tasahe and White River Future Functioning

Source: SW PRF BOD Honiara WS, September 2019
Pipe Sizing. The existing pipeline is insufficient to supply the design flow. Therefore, it is necessary to increase the transfer capacity by strengthening the pipeline. Based on hydraulic calculation, 400 mm (external diameter) appears to be the most suitable pipe diameter for White River trunk main. For hydraulic optimization, it is proposed to reduce the diameter for the last part of the main trunk, between Bus Stop and Rove where the maximum expected flow would be reduced from the design flow. Based on hydraulic calculations, a 315 mm pipe is sufficient to ensure an adequate hydraulic performance while reducing the investment cost.

**East Kola Trunk Main**

Objective: The aim of the work is to increase the transfer capacity in the eastern part of the distribution system from East Kola reservoir. In doing so, the benefits of the new transmission system are:

- Improve existing water supply service, especially in the northern edge of the distribution zone;
- Ensure distribution capacity for long term requirements and future development;
- Enhance system resilience by developing interconnections and transfer capacity with adjacent distribution systems, notably Lower West Kola and Panatina; and
- Improve flexibility with regard to long term plans with the possibility of supplying East Kola tank from the coastal zone.

Location of Pipeline: East Kola trunk main is proposed to be installed between East Kola tank and Kukum Highway. Starting from the reservoir, the trunk main will go down to the coastal area where it will then connect to existing mains along Kukum Highway at two locations: at Kukum and Vura.

Accordingly, the total length of East Kola trunk main is expected to be approximately 1.8 km. The envisaged location of the pipeline is presented in Figure 3-4.
It is envisaged that the trunk main will start from the interconnection point in front of the reservoir site. It is proposed to install the pipe along the existing line and then further extend it to Kukum Highway. The existing pipe would then be decommissioned upon completion of the works. Once reaching Kukum highway, two connections will be made by extending the pipeline, corresponding to two distribution zone (East and West). Interconnection will be made with existing trunk main along the highway. In the case of several parallel mains, Solomon Water shall confirm to which pipeline the interconnection should be made.

As the high elevation of the reservoir generates significant head, pressure regulation is envisaged to maintain an acceptable pressure in the low-lying areas. Furthermore, the pipe design will enable water supply in both directions, provided minor changes in case the future water resource development plan requires supply the tank from the coastal area.

**Design Flow.** The design flow for this trunk main is proposed to be set at 4 MLD, corresponding to the total volume of the reservoir. This flow is therefore significantly higher than current average flowrate, which is estimated to be less than 2 MLD. The underlying hypothesis is that, in the future, the trunk main has the capacity to supply (or be supplied) in one with the entire volume of the storage. Hence, considering a maximum daily flow of 4 MLD and an hourly peak of 1.75, the design flow is 292 m$^3$/h.

**Pipe Sizing.** The existing pipeline cannot supply water from the reservoir to Kukum highway under acceptable conditions with very limited transfer capacity due to network sizing. Therefore, it is necessary while extending the length of the main to also increase its transfer capacity by increasing the size of the pipeline.
Based on hydraulic calculation, 315 mm (external diameter) is the most suitable pipe diameter for East Kola trunk main. Indeed, diameters below 315 mm are not acceptable due to very high hydraulic gradient (>10 m/km). High velocity generates a high level of head losses. On the other hand, diameter above 315 mm would appear oversized given the high hydraulic head available at East Kola. In order to rationalize the distribution system and avoid a multiplicity of different diameters which would become more difficult to operate (spare parts, etc.), it is proposed to select 315mm (similar size as White River and Panatina trunk mains).

Panatina Trunk Main

Objective: The aim of the work is to increase the transfer capacity in the eastern part of the distribution system from Panatina reservoir. In doing so, the benefits of the new transmission system are:

- Improve existing water supply service in the Airport area;
- Ensure distribution capacity with on-going and future development of the eastern Honiara and new sport facilities; and
- Improve flexibility for long term plan and future resource development from Lungga

Location: Panatina trunk main is proposed to be installed from Panatina reservoir to the eastern part of the city in the direction of the Airport. The pipeline route would follow Panatina Ridge before continuing along the highway, passing in front of SINU, King George VI (KGVI) school, all the way to Burns Creek.

Accordingly, the length of Panatina trunk main is 2.1km between Panatina reservoir and KGVI, plus an additional 1.1km to Burns Creek, thereby a total length of 3.2km. The envisaged location of the pipeline is presented in Figure 3-5.
Figure 3-5: Proposed Location of Panatina Trunk Main

Source: SW PRF BOD Honiara WS, September 2019
It is envisaged that the trunk main will start from the interconnection between the existing reservoir site and the existing network.

It is proposed to use the existing system to supply the industrial zone while using the trunk main to transfer water to Burns Creek and Eastern Honiara. In this configuration, there would be two main outlets from the storage site. The new trunk main will follow Panatina ridge and then run parallel with the existing line. Interconnections will be made with the existing main at KGVI and further down at Burns Creek. The proposed functioning is presented in Figure 3-6.

Furthermore, the pipe design will enable water supply in both directions, provided minor changes in case the future water resource development plan requires to supply the tank from the Eastern area.
Figure 3-6: Flow Diagram of Panatina Future Functioning

Source: SW PRF BOD Honiara WS, September 2019
Design Flow. Across the entire distribution zone, it is assumed that a sharp increase of the distributed volume; a total of 5.5 MLD; is to be supplied from Panatina tank, corresponding to an increase of 175%. The estimated flow increase per District Metered Areas (DMA) is presented in the Table 3-1. This plan is generally consistent with the demand estimated in the 5 Year Plan (7.4 MLD for Kombito spring and Panatina area).

Table 3-1: Design Flow per DMA for Panatina DMZ

<table>
<thead>
<tr>
<th>Zone / DMA</th>
<th>Demand 2019 (MLD)</th>
<th>Design Flow (MLD)</th>
<th>Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial Zone</td>
<td>1.4</td>
<td>3</td>
<td>x 2.1</td>
</tr>
<tr>
<td>Burns Creek</td>
<td>0.5</td>
<td>1.5</td>
<td>x 3</td>
</tr>
<tr>
<td>Lungga Airport</td>
<td>0.1</td>
<td>1</td>
<td>x 10</td>
</tr>
<tr>
<td>Total</td>
<td>2</td>
<td>5.5</td>
<td>x 2.75</td>
</tr>
</tbody>
</table>

Source: SW PRF BOD Honiara WS, September 2019

Accordingly, the design flow for this trunk main is proposed to be set at 2.5 MLD, which is much higher than current average flowrate, which is estimated to be less than 0.6 MLD (Burns Creek and Lungga Airport District Metered Areas (DMAs)). This corresponds to the growth and development expected in the area. Hence, considering a maximum daily flow of 2.5 MLD and an hourly peak of 1.75, the design flow is 182 m³/h.

Pipe Sizing. The existing pipeline cannot supply water from Panatina reservoir to eastern Honiara under acceptable conditions. Looking at future demand, the situation will continue to deteriorate. Therefore, it is necessary to increase the transfer capacity by strengthening the pipeline, while adapting the network configuration.

Based on hydraulic calculation, 315 mm (external diameter) appears to be the most suitable pipe diameter for Panatina trunk main. Indeed, diameters below 315mm are not acceptable due to relatively high hydraulic gradient (>5 m/km). High velocity generates high level of head losses which is critical due to the limited head available at the reservoir. On the other hand, diameter above 315 mm would appear oversized.

Pipe Installation

Pipelines will generally be installed using trenching methods along roads except for the Kongulai-White River section where mains will go under the creek with concrete casing to protect against scouring and other obstructions (see typical design in Figure 3-7). Wherever possible, roadsides will be favored so as to limit formed road surface damage and reinstatement as well as potential settlement. It is expected that most of the network will be installed under existing formed road surfaces given the limited space available and obstacles such as trees, services, signs, poles and drains in the road edges.
Pipes will be laid according to SW standards (SIWA Construction Code). Figure 3-8 provides general requirements for pipe trenching and installation which will depend on the type and quality of the road. Based on above diameter selection, the minimum width of the trench at the bottom would then be 1 m.

Temporary Areas

Temporary areas for construction materials will be established nearby to each location of major works. These areas will be clearly identified in the site-specific CESMP to be prepared by the contractor. Many of these locations are to be decided between the contractor and SW prior to construction. Site inspections will be undertaken as required to determine sites which minimize environmental and social impacts.
Material Sources

88. The contractor is expected to extract locally sources materials from areas already permitted. If not available, the contractor will be required to apply for a BMP to open a new site/source.

89. Gravel extraction sites at river systems within the subproject areas maybe logistically more useful. The gravel extraction site at Lungga River and Tamboko River can be considered for the project. Land-based quarry sites can also be considered but it must be noted that these sites create dust, stability and health and safety issues. The existing Guadalcanal quarry sites, stockpiled materials and crushing yards can be considered for the project.

Many of these locations are to be decided between the contractor and SW prior to construction. Site inspections will be undertaken as required to determine sites which minimize environmental and social impacts.

Access Paths/Roads

90. Construction vehicles will use local access paths/roads or negotiate access with landowners to obtain access to private lands. Where local access roads are used, the contractor will return these roads to the original condition after the completion of work.

Many of these locations are to be decided between the contractor and SW prior to construction. Site inspections will be undertaken as required to determine sites which minimize environmental and social impacts.

Ancillary Facilities

91. It is unlikely that a construction camp will be required but work sites and yards will be sited on appropriate land, identified through consultation with stakeholders. It is also suggested to use the previously cleared sites for equipment and materials storage.

Many of these locations are to be decided between the contractor and SW prior to construction. Site inspections will be undertaken as required to determine sites which minimize environmental and social impacts.

92. Plate 3-1 shows some of the photographs of proposed sites for trunk mains.
Plate 3-1: Photographs of Proposed Sites for Trunk Mains

A. White River Trunk Main from Kongulai to White River
B. White River Trunk Main from Kongulai to Rove
C. East Kola Trunk Main
### D. Panatina Trunk Main

<table>
<thead>
<tr>
<th>![Image 1]</th>
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<td>![Image 7]</td>
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3.1.2 Honiara Reservoir SubProject

Tasahe Reservoir

93. **Objective**: Increase and secure storage at Tasahe by replacing the old steel tank (0.9 ML) with a new reservoir with higher volume (3 ML reservoir) following the installation of a new WTP at Kongulai and a pumping main from Kongulai to Tasahe (these latter facilities are financed under UWSSSP)

94. **Location**: The new reservoir will be constructed at the location of the existing old steel tank with coordinates system WGS84 of X = 601050, Y = 8956040, Z = 154 m. The footprint and dimensions of the new reservoir will be extended in order to maximize the storage volume within the available space. This will require the demolition of the existing tank and chlorination house.

95. Pipe gallery and outflow will be located on the roadside where the interconnection with the existing network will be made. Existing pipe work will have to be modified accordingly. The proposed layout of the reservoir is presented in Figure 3-9.
Function. The reservoir will be balanced with the existing tank with similar water inlet (above maximum water level) and bottom distribution outlet (same level as existing reservoir). Water inlets will be installed on the opposite side from the outlets to promote water circulation within the tank. The reservoir will be divided in two compartments to facilitate routine maintenance and cleaning.

Outlets, washout and overflow will be located within the pipe gallery, together with control valves and flowmeters. Interconnection with the outlet from existing tank will be made inside the pipe gallery.

A pressure transducer will be installed within the gallery on each outlet pipe or washout. In terms of control, the tank will have the same functioning as existing tank with inflow regulated on water level (stop at maximum water level / start at pre-defined water level). Pressure transducer will be used to generate alarm on low and very high (overflow) water levels.

Data transmission system will be installed inside the pipe gallery if required, able to transmit operational data (water level, flow, Cl, alarm, etc.) to the SCADA system. Electrical supply for the equipment (lighting, EMF, data transmission, etc.) will be made from nearby low-tension electrical line.

Figure 3-10 summarizes the proposed functioning of the reservoir.
Panatina Reservoir

Objective: Increase the storage capacity in the eastern part of the city to cope with future development by implementing a new reservoir at the Panatina site (new 2.5 ML reservoir).

Location: A new reservoir will be constructed at the location of the existing old steel tank with coordinate system WGS84 of X = 609820, Y = 8957190, Z = 44 m. The footprint and dimensions of the new reservoir will be extended in order to maximize the storage volume within the available space. This will require the demolition of the existing tank and chlorination house.

Pipe gallery and outflow will be located on the roadside where the interconnection with the existing network will be made. Existing pipe work will have to be modified accordingly. A new chlorine house will also be installed to treat the incoming water from the Panatina borefield. Initially, liquid chlorine will be used and replaced with gas chlorination at a later stage; the new chlorine house will be designed following ANZ standards for gas chlorination.

During operations, the amount of chlorine dosing water is adjusted so that the amount of free chlorine residual should be always over 0.4 mg/L and less than 1.0 mg/L in the system. Estimated normal dosing rates will be up to 2 mg/L for the Panatina borefield requiring between 20 to 40 bottles to be stored on a monthly basis. Dependent on the future source of water, treatment at the source and operational adjustments, the system will switch to gas chlorination in the future.

The proposed layout of the reservoir is presented in the Figure 3-11.
Function. The proposed function of Panatina reservoir is similar as Tasahe and is summarized in Figure 3-12. However, unlike Tasahe and the pumped supply from Kongulai, the inflow from Kombito spring is under gravity conditions. Therefore, a regulation or floating valve would be necessary to control the inflow from the source.
Figure 3-12: Proposed Functioning of Panatina Reservoir

Source: SW PRF BOD Honiara WS, September 2019

Titinge Reservoir

Objective: Increase storage at Titingge. (new 3 ML reservoir)

Location: The existing reservoir site is insufficient to provide for additional storage. The reservoir capacity augmentation cannot be achieved using existing storage site and a new site has been selected in the vicinity of the existing one with coordinate system WGS84 of X = 602840, Y = 8955840, Z = 135 m.

Outflow will be located on the roadside where the interconnection with the existing network will be made, in front of the existing reservoir. Existing pipe work will have to be modified accordingly.

The proposed layout of the reservoir is presented Figure 3-13.
Figure 3-13: Proposed Location for Titinge Reservoir

Figure 3-14 shows the proposed functioning of Titinge reservoir.

Figure 3-14: Proposed Functioning of Titinge Reservoir

Source: SW PRF BOD Honiara WS, September 2019
 Plate 3-2 shows the photographs of proposed sites for reservoirs.

Plate 3-2: Photographs of Proposed Sites for Reservoirs

View of Tasahe reservoirs and old steel tank to be replaced

View of Panatina reservoirs and old steel tank to be replaced

View of Titinge existing reservoir and proposed site for new one

Source: SW PRF BOD Honiara WS, September 2019

3.2 ASSOCIATED OR LINKED FACILITIES

Kongulai Water Treatment Plant and Pipeline Sub-Project: This sub-project covers the installation of a water treatment plant at Kongulai Spring to provide potable water during rainfall events currently causing stopping the resource; the sub-project covers the
treatment plant and the pumping station and associated force main from Kongulai to the Tasahe Reservoirs. The Kongulai-White River Trunk Main will start from the clear water tank of this WTP.

114. **Wastewater & Septage Management:** UWSSSP includes the development of wastewater and septage management sub-projects which cover the collection of wastewater, treatment and disposal of wastewater via marine outfalls and the development of a septage management component. In this way UWSSSP will cater for the increase in water supply and consequent wastewater resultant from UWSSSP.

115. Environmental and social safeguard documentation has been developed for these sub-projects following the EARF and RF developed under UWSSSP.

116. There are a number of ongoing road projects notably those financed by the ADB in the White River Rove section and in Kukum Highway (via JICA). The impact of these road projects on the proposed infrastructure, notably the White River-Rove Trunk main and the Panatina trunk main is taken into account in this project.

### 3.3 SCHEDULE

117. Construction of the facilities is envisaged to take 18 to 26 months (work inputs include 350 employees for all contracts including provinces, of which 60 are foreign).