www.pwc.in

Second Progress Report (Contract No. 3000067788)

UNIDO–CTCN: Technical Assistance to Solomon Water for Energy Efficiency and Self-Generation Plan

February 2020

Draft

Strictly Private and Confidential

pwc

February 2020

To,

Mr Rajiv Garg
Regional Manager
Climate Technology Centre & Network (CTCN)
UN City, Marmorvej 51,
2100 Copenhagen, Denmark

Dear Ma'am,

Subject: Second Progress Report (Deliverable 3) for "**Technical Assistance to Solomon Water for Energy Efficiency and Self-Generation Plan**" (Ref - UNIDO Contract No. 3000067788)

We sincerely thank you for giving us an opportunity to undertake the assignment on "Technical Assistance to Solomon Water for Energy Efficiency and Self-Generation Plan".

As per the scope of the assignment outlined in the Terms of Reference, we are pleased to submit the Second Progress Report. The Second Progress includes the details of the services undertaken within Section 3 - Deliverable 3 of the Terms of Reference and covers: (a) A detailed feasibility report with technical and financial analysis and funding options of EE and renewable energy options recommended for Solomon Water, and (b) Tender documents for recommended energy efficiency options.

We eagerly look forward to your inputs on this. Further, we would be happy to provide any clarifications or additional information necessary. We can be reached on the mentioned contact details or on my email id (amit2.kumar@pwc.com).

Yours sincerely,

Amit Kumar, Partner

PricewaterhouseCoopers (P) Ltd.
Building No. 10, 17th Floor, Tower C
DLF Cyber City, Gurgaon 122002, India
Land line: +91 124 3306413, Fax: +91 124 3306999
Email: amit2.kumar@pwc.com

Table of Contents

List of Tables

List of Figures

Abbreviations

ADB	Asian Development Bank
CTCN	Climate Technology Centre & Network
EE	Energy Efficiency
JICA	Japan International Cooperation Agency
NDE	National Designated Entity
RE	Renewable Energy
SGO	Self-generation Option
SIWA	Solomon Island Water Authority
SPV	Solar Photovoltaic
SW	Solomon Water (Short form of SIWA)
TA	Technical Assistance
UNFCCC	United Nations Framework Convention on Climate Change
UNIDO	United Nations Industrial Development Organization

1. Introduction and progress status

1.1. Background

Solomon Islands comprise hundreds of islands; of these, the main islands include Honiara (capital of Solomon Islands) and provincial urban centres of Auki, Noro and Tulagi. Solomon Islands Water Authority (SW), a state-owned enterprise, is mandated to operate as the provider of municipal water and wastewater services in Solomon Islands under the SIWA Act and State-Owned Enterprise Act. SW supplies and manages water only in these four main islands. It provides water services to an estimated population of about 100,000 in Honiara and over 8,000 in the provincial centres. The municipal wastewater services are provided to about 30,000 people in Honiara.[1] The Solomon Waters body reports to Minister of Mines, Energy and Rural Electrification and to the Minister of Finance of Solomon Islands.

The water pumping facilities of Solomon Island Water Authority comprise of the following:

- Borehole pumps (Honiara and Auki)
- Raw water supply and pumping stations (in all four islands)
- Wastewater collection facilities (Honiara)

Typical view of pump stations located in Honiara is presented in **Figure 1**.

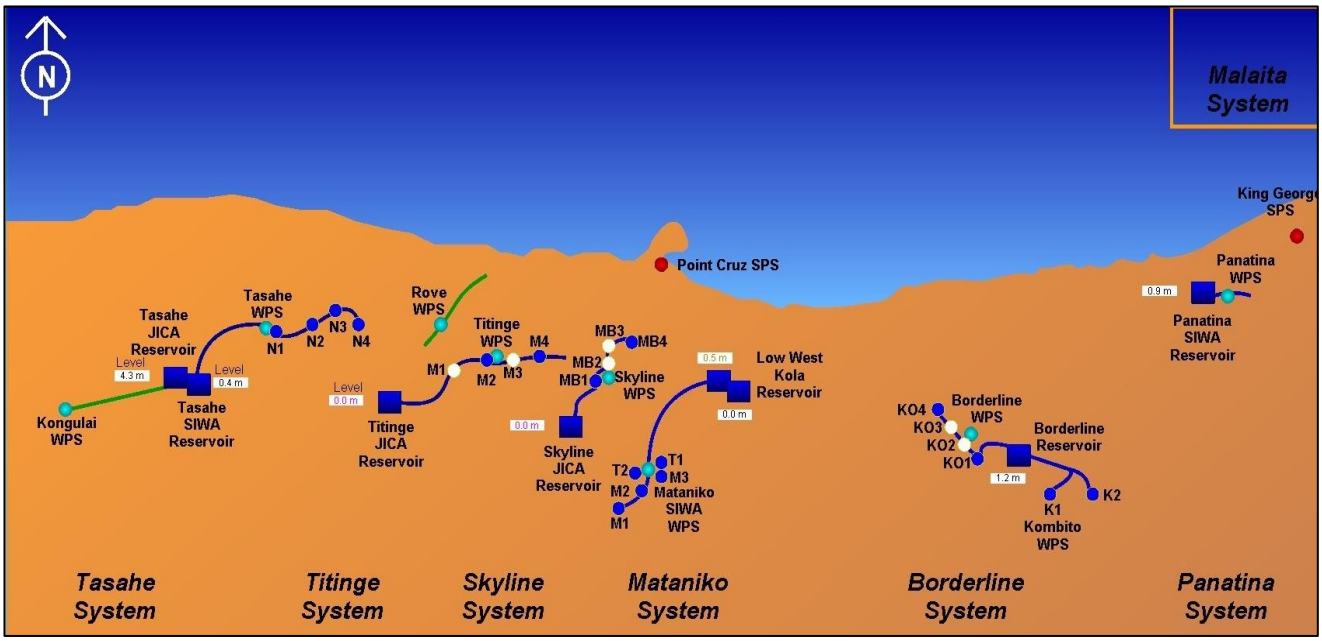

Figure 1 Pump stations in Honiara

About 95% of total installed capacity of electricity generation in Solomon Islands is based on fossil fuels, and the balance 5% is through renewable energy sources. The electricity tariff of Solomon Islands is one of the highest in the Pacific (and the World), since a major share of electricity in the Islands is met through fossil fuels (diesel generators).

Solomon Water is using diesel-based electricity generators to meet its electricity requirements in its various facilities. In addition, most of the equipment and system installed in various facilities of SW have not incorporated energy efficiency options.[1]

[1] *Terms of Reference, CTCN request ref: 2017000039*

1.2. Problem Statement

The expense towards energy consumption were more than 35% in year 2013-14 for Solomon Water. The total energy consumption of Solomon Water is almost 10% of total energy consumption of Solomon Islands. The energy consumption is further expected to increase to cater the projected escalation of demand pertaining to the increasing population and to reach out to un-serviced population. The main source of electricity generation in the island is fossil fuel and the increase in fuel cost would directly affect the operation cost and GHG footprint of Solomon Water. This in turn put upward pressure and wrongly influence the expansion plans of its services. In addition, low importance is provided to efficiency in selection of equipment related to water services. Therefore, it is vital for Solomon Water to explore sustainable energy solutions that would help reducing energy consumption and contribute towards national GHG emission reduction targets.[2]

1.3. Objectives of the Technical Assistance

The objective of the technical assistance is to support the planning and implementation of Energy Efficiency (EE) measures and Self-Generation Options (SGO) through renewable energy to reduce the reliance of Solomon Water on fossil fuel for energy requirements. **Figure 2** presents the objectives of technical assistance:

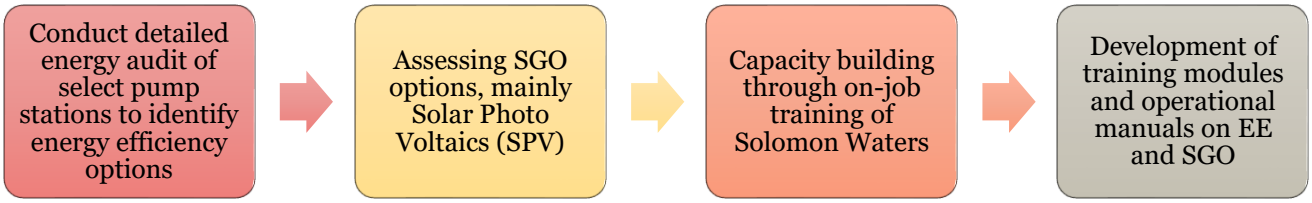

Figure 2 Objectives of the technical assistance

The assistance would lead to preparation of detailed feasibility reports covering technical and economic feasibility for EE and SGO options as well as support for selection of equipment and system by preparing tender specifications for procurement of energy efficient equipment/systems and implementation by Solomon Water.

1.4. Scope of work

The scope of work is divided in four parts:

- Output 1: Implementation plan and communication documents for the projects
- Output 2: Assessment of EE and renewable energy options
- Output 3: Detail assessments of shortlisted EE and SGO options for Solomon Water
- Output 4: Capacity building through on-job training of Solomon Water on EE and RE implementation and monitoring of impacts

Output 1 is the CTCN communication documents such as monitoring & evaluation plan, impact description and closure & data collection reports. **Figure 3** presents the details of output 2 to 4. The study focused on seven pump stations, six in Honiara and one in Auki. The list of pump station is presented in **Table 1**.

Table 1 List of pump stations covered

Borderline pump station – Honiara	Tuvaruhu JICA pump station – Honiara
Skyline pump station – Honiara	Tuvaruhu SIWA pump station – Honiara
Tasahe pump station – Honiara	Kwaibala pump station - Auki
Titinge pump station – Honiara	

[2] *Response Plan, CTCN request ID: 2017000039*

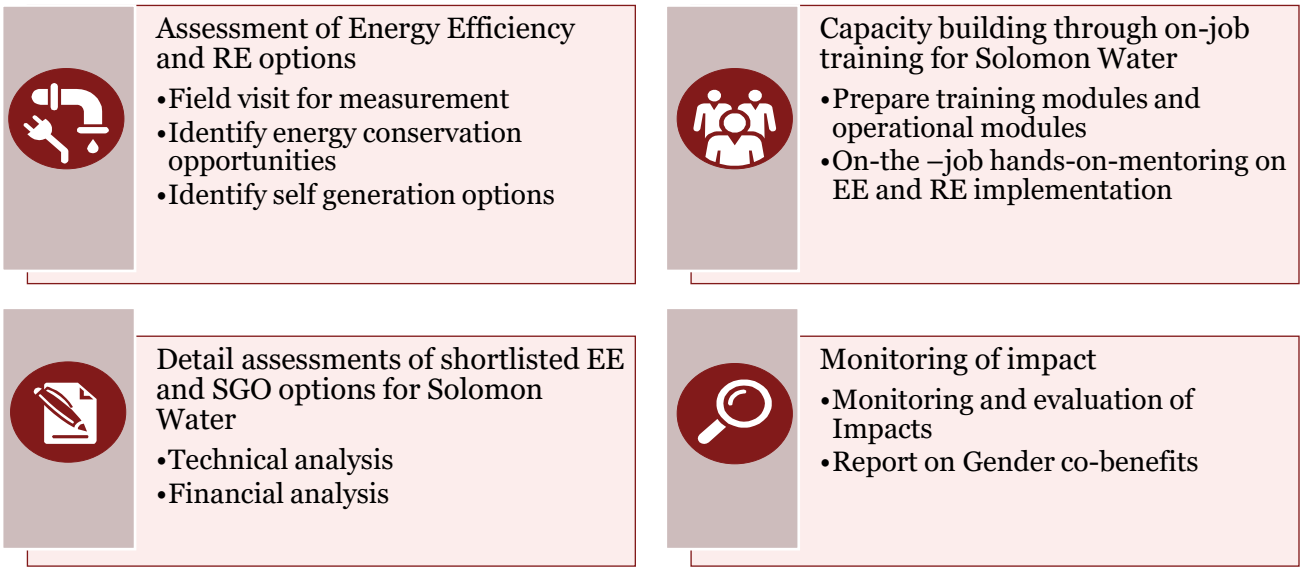

Figure 3 Details of output

1.5. Expected benefits

The proposed technical assistance is expected to expedite the uptake of energy efficiency and renewable energy by Solomon Water in Solomon Islands. **Figure 4** presents some of anticipated environmental, economic and social benefits of technical assistance.

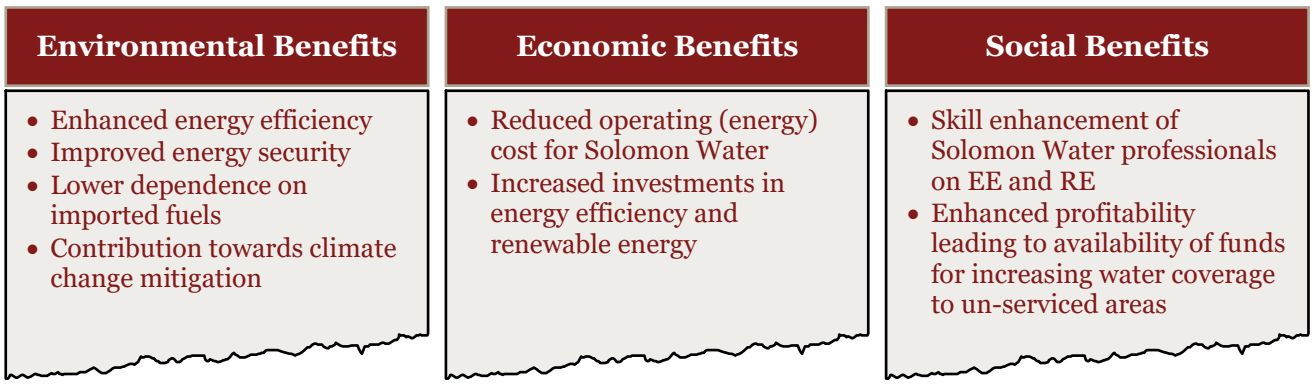

Figure 4 Expected benefits from the assignment

1.6. Progress status

The project is executed in four steps according to the work plan, the steps are defined as ***Outputs*** and each output is linked with a set of project deliverables. The overall outcomes of the TA are to reduce intensity of energy consumption in the 7 pump stations of Solomon Island Water Authority, identification of renewable energy options for self-generation and training of local technical staff to replicate interventions.

The project team developed the deliverables in Output 1, 2 and 3. First, the deliverables were submitted to Solomon Water, after incorporating their comments, revised reports are submitted to CTCN / UNIDO for review. Deliverables in output 1 and 2 were submitted back to CTCN incorporating the suggestions/comments. The same was accepted by CTCN.

The details of completed deliverables are shown in **Table 2**.

Table 2 Completed deliverables

Output 1: Implementation plan and communication documents	1. Detailed work plan 2. Monitoring and evaluation plan 3. CTCN impact description 4. Closure and data collection report
Output 2: Assessment of EE and renewable energy options	1. Presentation to Solomon Water and other stakeholders on the key findings 2. Report on the list of EE and renewable energy (SGO) options identified with potential energy savings and GHG reductions detailing the underlying data collected, energy audit and assessment conducted for EE and RE options.
Output 3: Shortlist and conduct detail assessments of EE and SGO options for SW	1. A detailed feasibility report with technical and financial analysis and funding options of EE and renewable energy options recommended for Solomon Water 2. Tender documents for identified recommendations

Field visits for Output 2 & 3 were covered in the month of September 2019. Detailed feasibility report including EE and SGO potential assessment has been prepared and shared with CTCN, UNIDO, NDE and SIWA and is attached along with this progress report. Team has conducted training programme (January 2020) as part of Output 4 and is presently finalizing the operation manual. Detailed work progress is presented in **Figure 5**.

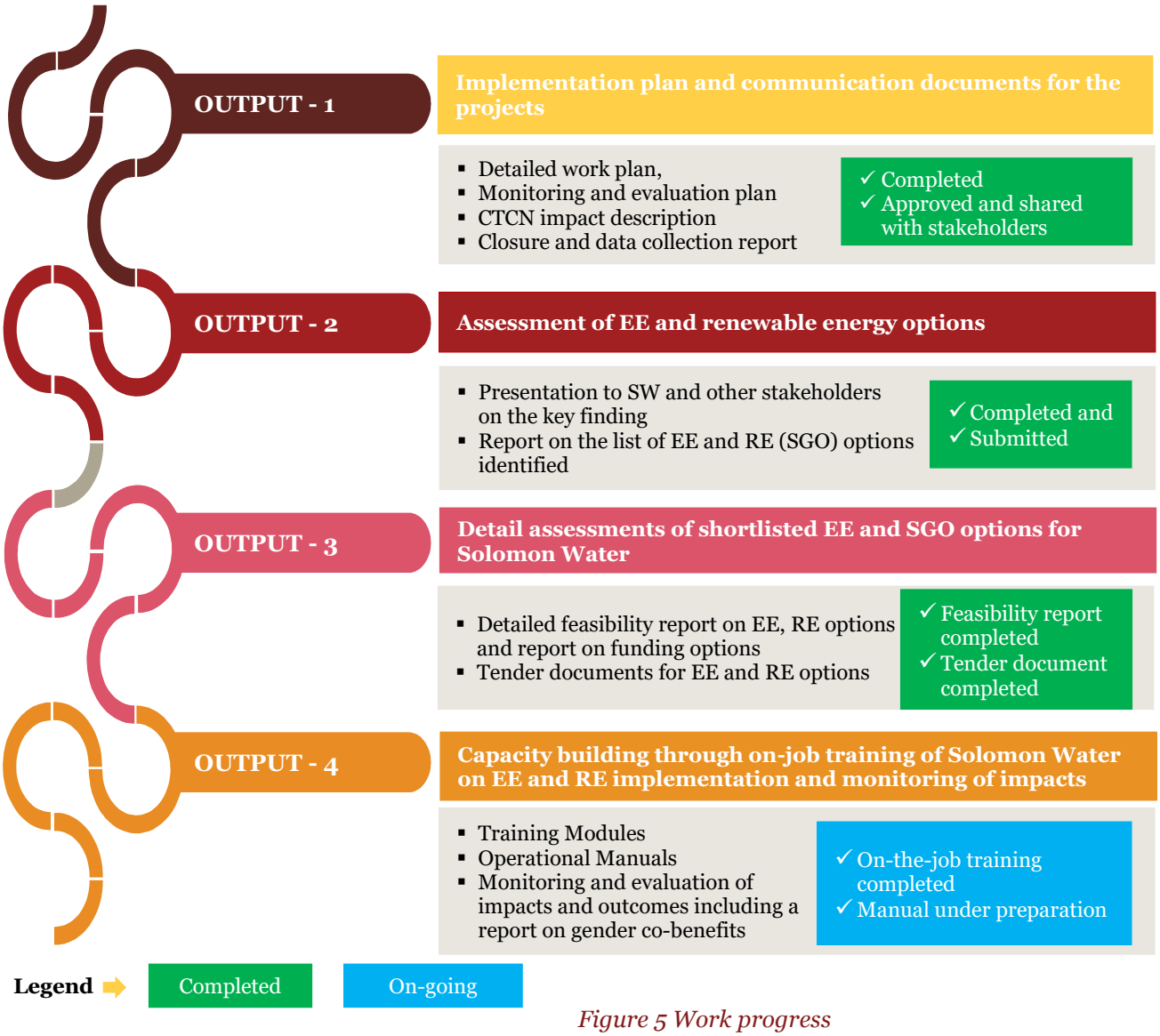

Figure 5 Work progress

2. Deliverables 3

2.1. Background

The technical assistance to support Solomon Water on the planning and implementation of Energy Efficiency (EE) measures and Self-Generation Options (SGO) through renewable energy. This has led to preparation of detailed feasibility reports covering the technical and financial feasibility for EE and SGO options across 7 pump stations of Solomon Waters. The list of pump stations along with their location is presented in **Table 3.**

Table 3 List of pump stations

Sr. No.	Pump Station	Location
1	Tasahe Station	Tasahe, Honiara, Guadalcanal province
2	Titinge Station	Honiara, Guadalcanal province
3	Skyline Station	Mbokonavera, Honiara, Guadalcanal province
4	Tuvaruhu SIWA pump station	Mataniko, Honiara, Guadalcanal province
5	Borderline Station	Green Valley, Honiara, Guadalcanal province
6	Tuvaruhu JICA pump station	Mataniko, Honiara, Guadalcanal province
7	Kwaibala System	Auki, Malaita Province

The deliverable 3 of the technical assistance included (a) detailed feasibility reports for EE and SGO options and (b) tender documents for implementation of the proposed recommendations. Details are provided in next section.

2.2. Deliverable 3

The data collation and field visits at the 7 pump stations were conducted in phase manner in the month of September 2019. For each of the 7 pump stations, historical data and measured data was analysed. A long list of energy efficiency and SGO options were identified and same were discussed with Solomon Water during the field visit mission. The deliberations with SW were with reference to suitability of recommendations, feasibility and ease of implementation. Based on these discussions with SW, the list of possible measures for energy efficiency and self-generation was prepared for detailed techno-financial analysis for the 7 pump stations. A consolidated feasibility report was prepared for each of the pump station. The report included following:

The detailed feasibility reports are discussed with Solomon Water and then revised as per the delibrations. Further, when the project team conducted third mission to conduct training programme for Solomon Water officials, the detailed feasibility reports were discussed and updated the reports accordingly. The financial analysis was conducted for each report, indicating the funds required for the respective EE and SGO options and the potential source of tapping these funds for Solomon Water. The final reports were circulated to Solomon Water and same are acceptable to them.

A tender document including the technical specifications, procurement modalities and other relevant information for bidding for the proposed recommendations in 7 pump stations was prepared by the project team. Prior to this, the project team had discussion with Solomon Water team for the format to be followed for tender document. Solomon Water requested to make the tender in ADB's small works package format. The tender document for the techno-financially feasible measures was shared with Solomon Water in December-19 and later revised based on their input during the final mission.

The tender document comprises of following scetions:

Invitation for Bids

1. Works-Small (1S1E) Section 1	Instructions to Bidders
2. Works-Small (1S1E) Section 2	Bid Data Sheet
3. Works-Small (1S1E) Section 3	Evaluation and Qualification Criteria
4. Works-Small (1S1E) Section 4	Bidding Forms
5. Works-Small (1S1E) Section 5	Eligible Countries
6. Works-Small (1S1E) Section 6	Employer's Requirements
7. Works-Small (1S1E) Section 7	General Conditions of Contract
8. Works-Small (1S1E) Section 8	Particular Conditions of Contract
9. Works-Small (1S1E) Section 9	Contract Forms

The **Table 4** shows the tasks covered under deliverable no.3. Appendix gives a snap shot of findings from detailed feasibility.

Table 4 Deliverable 3 coverage

Deliverable 2	Details
1. A detailed feasibility report with technical and financial analysis and funding options of EE and renewable energy options recommended for Solomon Water	Detailed feasibility reports of 7 pump stations attached separately
2. Tender documents for EE and SGO options	Tender documents are attached separately

Appendix

Snapshot of detailed feasibility

Overall annual energy consumption of the seven pump stations was 2.78 million units of electricity. Total water pumped by these pump stations was 11 thousand cubic meter per day. This was corresponding to a specific energy consumption of 0.692 kWh per cubic meter of water pumped.

Detailed technical and financial feasibility of shortlisted recommendation led to identified saving potential of 0.47 million units of electricity, which is 16.8% of the total annually energy consumption. The new specific energy consumption after implementation of proposed recommendations is estimated 0.563 kWh per cubic meter of water pumped.

The energy saving corresponds to a monetary savings of about 2.6 million Solomon dollars. The investment required for this is 1.8 million Solomon dollars with a simple payback of 9 months.

The overall GHG emission reduction potential by all the energy efficiency recommendations is 308 tonnes of carbon dioxide equivalent per year.

The cumulative solar rooftop PV potential identified for seven pump station is 185 kWp. Solar PV option for the pump station is technically feasible. But, the financially feasibility is dependent on future SIEA tariff structure. With present tariff structure and regulatory elements, the solar PV is not feasible. Solomon Water took a strategic call to not invest in solar PV at present. They want to wait for favourable regulatory regime.

A snapshot of cover page of detailed feasibility report is shown in figure.