Solomon Islands

FY2017 Ex-Post Evaluation of Japanese Grant Aid Project

The Project for Improvement of Water Supply System in Honiara and Auki

External Evaluator: Miyuki Sato, Japan Economic Research Institute Inc.

0. Summary

This project was planned to build water supply facilities in Honiara and Auki cities for improving water supply conditions, such as increasing and stabilizing the water supply and improving the quality of water supplied, thereby contributing to the realization of a hygienic environment for living. Since this project was confirmed to be consistent with the development plan and development needs of the Solomon Islands at the time of both planning and ex-post evaluation, and with the Japanese ODA policy at the time of planning, the relevance of this project was high. Regarding the implementation of this project, although the project cost was within the plan, the efficiency of the project can be said to have been fair because some facilities to be installed were not constructed, and the project period greatly exceeded the plan because of prolonged discussion on land acquisition. As for the effectiveness of the project, the water supply volume and the stability of the water supply in Auki City improved as the water supply volume increased after project completion, and the total hours of water supply served per day in the area was achieved at 24 hours. In Honiara City, although the yield from the new water source was below the estimation, a certain water supply volume was secured through construction of the facility, and the water quality during normal operation was so improved as to clear the standard of Honiara City for water quality monitoring. In contrast, the water turbidity problem was not resolved as a turbidity reduction facility was not installed at Kongulai Spring which affected the stability of the water supply by causing water turbidity and temporary shutdowns of the water source during heavy rain. As for the project impacts, sanitation of households and businesses improved on past conditions before the project, as the water supply reached a stable condition through the improvement of water supply facilities. As a result, the reliability of the Solomon Islands Water Authority (hereinafter referred to as “SIWA”), which provides water supply services, increased. Therefore, the effectiveness and impacts of this project were fair. Regarding sustainability, there was no problem with institutional or technical aspects of operation and maintenance and the financial aspects were sound. However, the sustainability can be said to be fair as there were some problems observed; these problems were minor ones in that some facilities were not used because the facilities were not user-friendly enough for the staff to operate. Therefore, the sustainability after project completion is judged to be fair.

In light of the above, this project is evaluated to be partially satisfactory.

1. Project Description

Project Locations

Water Transmission Pump Installed through the Project

1.1 Background

At the time of planning, Honiara City, the capital of Solomon Islands, depended on water resources of which 59% was spring water and 41% was groundwater. Kongulai Spring, which accounted for more than 40% of all water resources, had seen water source shutdowns due to the frequent blockages at raw water inlets ("sinkholes") during times of heavy rain and flooding. Furthermore, residents had no choice but to use a supply of water which did not satisfy water quality standards because spring water from Kongulai Spring and Kombito Spring became unsuitable for domestic and commercial use because of the high turbidity of water after heavy rains. Also, there were some other issues, such as an unstable water supply due to the insufficient water distribution system, difficulties in supplying water at peak use times, or insufficient water capacity volume at the distribution reservoir in times of emergency, and so forth.

In Auki City, the second largest city in the Solomon Islands, water resource development was needed, as the total water volume only from Kwaibara Spring, the existing water resource, was not adequate. Since it was impossible to secure enough water from the low volume of water resources, the average daily water consumption per capita in Auki City was 75 liters, about 40% of that in the other cities, and people were forced to undergo water rationing of 4 hours per day.

1.2 Project Outline

The objective of this project was to improve water supply conditions, such as by increasing and stabilizing the water supply, improving the quality of water supplied, and accomplishing fair water distribution to meet the demand, through the rehabilitating and constructing of water supply facilities in Honiara and Auki cities, thereby contributing to the realization of a hygienic environment for living.

Grant Limit / Actual Grant Amount	2,090 million yen / 2,090 million yen
Exchange of Notes Date /Grant Agreement Date	June 2009 / June 2009
Executing Agency	Solomon Islands Water Authority (SIWA)
Project Completion	October 2014
Main Contractor	Kitano Construction Corporation
Main Consultant	Yachiyo Engineering Co., Ltd.
Basic Design	March 2008 – January 2009
Related Projects	<Grant Aid> - The project for the improvement of water supply system in Honiara in Solomon Islands (1996 – 1998) - The Study for Rehabilitation and Improvement of Solomon Islands Water Authority's Water Supply and Sewerage Systems [Development Study] (2005 – 2006) - Follow-up Cooperation on the project for the improvement of water supply system in Honiara in Solomon Islands (2005 – 2006) <Technical Cooperation> The Project for Improvement of Non-Revenue Water Reduction Capacity for Solomon Islands Water Authority (2012 – 2015) <Other International Organization and Donor Agencies etc.> GEF, UNDP, UNEP, SOPAC: Honiara City Water Resources Management (2007 – 2012)

2. Outline of the Evaluation Study

2.1 External Evaluator

Miyuki Sato, Japan Economic Research Institute Inc.

2.2 Duration of Evaluation Study

This ex-post evaluation study was conducted with the following schedule.

Duration of the Study: October, 2017 – November, 2018

Duration of the Field Study: January 21 – February 6, 2018, and April 19 – 27, 2018

3. Results of the Evaluation (Overall Rating: C[1])

3.1 Relevance (Rating: ③[2])

3.1.1 Consistency with the Development Plan of Solomon Islands

At the time of planning, the *Medium-Term Development Strategy 2008 to 2010* developed by the Government of the Solomon Islands stated that promoting a "reliable, safe, and sustainable water supply in urban areas" and "water resource development in Auki City" were priority areas. At the time of ex-post evaluation, the *Medium-Term Development Plan 2016 to 2020* also indicated that the "improvement of water and wastewater facilities" was a priority task and that it was important as a policy to continuously provide an effective and efficient water supply, which included the organizational reform of the SIWA. Furthermore, the *National Development Strategy 2016 to 2035*, the master plan of the development plan and long-term plan above, mentioned that improving water accessibility was one of the highest priority actions to be taken and the improvement of the water supply and sanitation, particularly in urban areas such as Honiara and others, was an urgent need.

Thus, this project can be said to be consistent with the Solomon Islands' policy direction as the improvement of accessibility to the water supply and of water quality in urban areas like Honiara were mentioned in *Mid-Term Development Strategy* and *National Development Strategy* both at the time of planning and ex-post evaluation.

3.1.2 Consistency with the Development Needs of Solomon Islands

At the time of planning, the situation in Honiara and Auki cities were extremely bad as water did not sufficiently reach the end users in some areas and incidents of water quality issues, that is, turbid water, frequently occurred. Therefore, the urgent need of implementing this project was thought to be high at that time. According to the SIWA, water leakage could be seen even at the time of ex-post evaluation because of aging of water pipelines (both transmission and distribution pipelines) as many of the pipelines in Honiara had been in place for more than 60

[1] A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

[2] ③: High, ②: Fair, ①: Low

years since their installment. Also, according to the Ministry of Mines, Energy and Rural Electrification, about 40% of non-revenue water (hereinafter referred to as "NRW") came from leakages of pipelines due to dilapidation. Thus, the need for facility improvement still seemed high.

Additionally, at the time of ex-post evaluation, connections to the water supply in both Honiara and Auki cities could not keep pace with the rapid population growth. In Honiara City, as the residential population had increased about 40% over 10 years, the rate of increase in water supply services to that population was less; thus, the service coverage ratio in 2017 dropped to 55% from that of 73% in 2007. Moreover, the service coverage ratio of the water supply in Auki City in 2017 remained at about half of the residential population receiving service. Furthermore, the water supply demand and the volume in both cities exceeded the actual water supply even at the time of ex-post evaluation, and particularly in Auki, the actual water supply volume was less than half of water demand volume. As mentioned in "3.3 Effectiveness and Impact", although water supply volume increased as a result of this project, the water supply needs remained high even after project completion.

Table 1. Population and Water Supply Service Coverage Ratio in 2007 and 2017

City	Honiara City		Auki City	
Year	2007	2017	2007	2017
Residential Population (person) *1	76,232	105,453	5,095	6,220
Serviceable Population (person) *2	55,656	57,999 (71,487)	3,208	3,110 (3,834)
Service Ratio (% of population)	73%	55% (68%)	63%	50% (62%)

Source: Documents provided by JICA and the executing agency

*1 The SIWA's water supply service area

*2 Serviceable populations are calculated by the number of contracted households multiplied by the average number of customers per household. The average number of customers per household in 2007 was calculated at 9 persons while that in 2017 was calculated at approximately 7.3. (Bracketed figures are a reference rate as calculated by the average number persons in year 2007.)

Table 2. Water Supply Volume and Demand as of 2017 in Honiara City and Auki City (at Average and Peak Times)

(Unit: million liter)

City	Average daily water supply volume	Water supply demand (average times)	Water supply demand (peak times)
Honiara	32.5	40.7	44.7
Auki	0.4	1.17	1.31

Source: Documents provided by the executing agency

Notes: Average daily water supply volume was quoted from the actual water supply data as of 2016, and average and peak times of water supply demand were calculated by the SIWA referring to the "Benchmark Database" of the PWWA (Pacific Water and Wastewater Association).

Therefore, the needs to improve water facilities can be said to be continuously high.

3.1.3 Consistency with Japan's ODA Policy

In the 4th Pacific Islands Leaders Meeting held in 2006, the Government of Japan announced to the Pacific Islands, which participated in the meeting, that necessary actions for "water and sanitation" would be taken on as one of the high priority support areas as the "sustainable development". Also, as to the priority areas announced at the meeting, the Government of Japan offered its cooperation to the Government of the Solomon Islands according to their development and strategy. The Government of Japan formulated the infrastructure development program in the project implementation plan to rectify disparities through economic development.

Therefore, this project was said to be consistent with Japan's ODA policy at the time of planning.

In light of the above, this project has been highly relevant to the development plan and development needs of Solomon Islands, as well as Japan's ODA policy. Therefore, its relevance is high.

3.2 Efficiency (Rating: ②)

3.2.1 Project Outputs

The project outputs between the plan and the actual are shown in Table 3, and most of the facilities were constructed according to the plan.

Table 3. Planned and Actual Outputs of the Project

Category	Facility Name	Components	Plan (2007)	Actual (2014)
Honiara City				
Water source facility	Borehole facility (4 boreholes) 1) Tasahe 2) Titinge 3) Skyline 4) Borderline	- Construction of boreholes (development of new water source and boreholes) - Use of submersible pumps	Number of boreholes: 16 (4 boreholes x 4 borefields)	As planned
			Number of pumps: 20 (4 units x 4 borefields, 1 unit for stand-by x 4 borefields)	As planned
	Conveyance pipeline	Installment of conveyance pipeline	5.4km long	As planned
	Turbidity reduction facility	Instalment of settling basin, chlorine dosing equipment	Kongulai Spring and Kombito Spring	Kombito Spring only
	Power receiving equipment	Instalment of power receiving equipment (low voltage)	2 sets (1 each for Kongulai Spring and Kombito Spring)	Kombito Spring only (1 set)
	Improvement of spring intake facility	Instalment of screen (water treatment facility)	1 set for Rove Spring	As planned

Category	Facility Name	Components	Plan (2007)	Actual (2014)
Water transmission facility	Water transmission pump station	Instalment of water transmission pump	4 stations (1 station per borefield) 2 pumps for regular use and 1 pump for stand-by	As planned
		Construction of water transmission pump house	4 houses (RC-made, 2-story)	As planned
		Construction of chlorine disinfection facility	4 units (installed at each water transmission facility)	As planned
	Power receiving equipment (high voltage)	Installment of power receiving equipment (high voltage) and transformer	4 sets (installed at each water transmission facility)	As planned
	Emergency generator	Installment of diesel engine generator	4 sets (installed at each water transmission facility)	As planned
	Water transmission main	Installed from water transmission pump station to distribution reservoir	4.1km long	As planned
Water distribution facility	Distribution reservoir	Expansion of distribution reservoir	Tasahe, Titinge, Lower West Kolaa, Skyline, and Panatina	As planned
	Water distribution main	Installment of water distribution main	22.9km long	As planned
Auki City				
Water source facility	Borehole facility	- Construction of boreholes - Use of submersible pumps	Number of boreholes: 2	Number of boreholes: 3
			Number of pumps: 3 (1 for stand-by)	Number of pumps: 4 (1 for stand-by)
	Conveyance pipeline	Installment of conveyance pipeline	0.4km long	As planned
	Emergency generator	Installment of diesel engine generator	1 set	As planned
	Power receiving equipment	Installment of power receiving equipment (low voltage)	1 set	As planned
	Civil and construction works	Construction of electrical house	1 house (RC-made, 1-story)	As planned

Source: Documents provided by JICA and the executing agency

As a part of the change in this project, in Honiara City, a turbidity reduction facility and power receiving equipment were installed at only one site, Kombito Spring, though it was planned to be installed at two sites: Kongulai Spring and Kombito Spring. There were negotiations about land acquisition between the Government of the Solomon Islands and the ethnic group who owned the land around Kongulai Spring; however, the negotiation did not end in an agreement and the land was not acquired for building the facility. In Auki City, the

number of boreholes changed to 3 from 2 in order to secure water volume, and the number of pumps grew to 4 from 3 (1 for stand-by use) under the change.

Also, the Government of the Solomon Islands was to put up fences around the reservoirs and borehole facilities as the obligation of the Solomon Islands side, but at the time of ex-post evaluation, there were no fences surrounding Tasahe reservoir (Honiara City) or the boreholes in Auki City. According to the SIWA's explanation, the fence at Tasahe reservoir was to be erected within the year 2018 and as for the boreholes in Auki City, the whole area including the borehole facilities were being planned to be fenced. At the time of ex-post evaluation, Tasahe reservoir and the borehole facilities were located at the old reservoir site, which was surrounded by an old fence. Additionally, the boreholes in Auki City were chained and locked for the purpose of avoiding water pilfering. The unfenced sites currently do not seem to pose imminent security problems.

Fence built through the project (Borderline Pump Station)

Old fence surrounding the Tasahe pump station where the old reservoir is located

3.2.2 Project Inputs

3.2.2.1 Project Cost

In this project, the project cost was planned at 2,282 million yen including 2,090 million yen in cooperation from the Japanese side. As shown in the table below, the actual cost including both the Japanese and the Solomon Islander sides was 1,983 million Japanese yen, 87% of the planned cost, which was within the plan. Even if the turbidity reduction facility and power receiving equipment, whose installations were abandoned, had been installed as planned, the actual project cost of the Japanese side would have been confirmed at 1,899 million yen, including the would-be 75 million yen for the installations, according to an interview with the project consultant. Also, if the fences, which had not been built by the Solomon Islands, had been erected as planned, the cost from the Solomon Islands would have been 163 million yen, an increase of 4 million yen;

thus, the cost was still within the plan.

Table 4. Project Cost

(Unit: million yen)

Item	Plan	Actual
Japanese side	2,090	1,824
Solomon Islander side	192	159*
Total Project Cost (Japan + Solomon Islands)	2,282	1,983 (87% of planned cost)

Source: documents provided by JICA and the executing agency
Note: Rounded down to the nearest 1 million
* Fencing cost is not included in the actual cost

3.2.2.2 Project Period

The actual project period greatly exceeded the plan, as shown in the table below: 31 months as planned with an actual of 64 months (206% of the planned period). The reasons for which the project period was longer than the plan are as follows: Although the time allotted for discussion on land acquisition had been expected to be prolonged before the project, the negotiation between the ethnic group who had rights over land and the Government of Solomon Islands continued longer than expected, which brought about the delay in bidding for construction (about a 21-month delay); There had been damages to water facilities due to landslides near the construction site caused by heavy rains, and the construction materials were stolen, which brought about a re-procurement of the materials; And, it took time for discussions to hand over the facility after its construction (a 12-month delay during and after its construction). For the reasons stated above, this project was delayed, approximately 33 months longer that the plan.

Table 5. Project Period

Plan	Actual	Comparison
31 months (July 2009 – December 2011)	64 months (July 2009 – October 2014)	206%

Note: Project completion is defined as the time of the completion of the soft component (training for the SIWA staff)): October 2014, which was carried out after both the completion of the construction and the handing over of the facility to the executing agency by the Japanese side.

In light of the above, although the project cost was within the plan, the project period exceeded the plan. Therefore, efficiency of the project is fair.

3.3 Effectiveness and Impacts[3] (Rating: ②)

3.3.1 Effectiveness

[3] Sub-rating for Effectiveness is to be put with consideration of Impacts.

3.3.1.1 Quantitative Effects (Operation and Effect Indicators)

At the time of project planning, as an operation effect generated by the project, it was expected that an increasing and stabilized water supply would be achieved, improving the quality of water supplied and accomplishing fair water distribution that met the demand.

As confirmation of the increase and stabilization of the water supplied, Table 6 shows the actual values of operation indicators after project completion.

Water volume, as a whole, in each of the three years after project completion exceeded the target value for daily maximum water supply in both Honiara and Auki cities. It is considered that a certain volume of water can be secured by the facility constructed through this project, decreasing water leakage through installation of the replacement of water pipes, increasing the capacity of the distribution reservoir by expanding the reservoirs, and so forth. On the other hand, in terms of new water sources in Honiara City, yield from 16 boreholes at 4 borefields, which were newly developed, was lower than the target value in each of the three years after project completion.

Table 6. Operation Indicators

		Baseline	Target	Actual			
		2007	2018	2014	2015	2016	2017
		Year at the Time of Planning	4 Years after Completion	Completion Year	1 Year after Completion	2 Years after Completion	3 Years after Completion
To increase and stabilize water supply volume	Honiara City						
	Daily maximum water supply (Water supply from 4 new boreholes*1)	25,685m^3 /day (0m^3/day)	30,509m^3 /day (12,800m^3/day)	35,000m^3/day (16,182 m^3/day)	34,000m^3/day (8,034m^3/day)	31,200m^3/day (5,769 m^3/day)	31,960 m^3/day (6,370m^3/day)
	Capacity of distribution reservoir*2	7,280 m^3	14,630m^3	12,360 m^3	12,630m^3	12,630m^3	12,810 m^3
	Auki City						
	Daily maximum water supply	540 m^3/day	1,106 m^3/day	1,700 m^3/day	1,703 m^3/day	1,176 m^3/day	1,889 m^3/day

Source: documents provided by JICA and the executing agency

Note: At the time of planning, the target value after project completion was to be set as a value 4 years after project completion. With a project completion date of 2014, the actual value was to be set as that in 2018. However, since it was difficult to get the actual value for 2018 according to the survey schedule, the target value was set as that in 2017, 3 years after project completion.

*1 The total yield of each borehole: Tasahe, Titinge, Skyline, and Borderline

*2 The capacity of the distribution reservoir is the total volume of reservoirs at all the facilities in Honiara City, including those which were constructed through this project. The reservoir in East Kolaa is planned to be constructed in 2018 and the total capacity of the distribution reservoir after the construction will be 16,280 m^3.

According to the explanation from the SIWA, the operation of some boreholes at Titinge, Borderline, and Skyline had been stopped from 2015 to July 2017 because of inadequate water volume from each borehole, and to avoid the risk of a water hammer problem[4] caused by the frequent switching of the large pump and because of poor yields from boreholes and the high cost of electricity for pumping[5]. Because of poor yield from 4 borefields, the SIWA hired an Australian consultant after project completion who reviewed the project in order to confirm whether the borehole design was appropriate. According to the review report written by the Australian consultant, it might have been necessary to conduct more in-depth tests to gain more accurate results, that is, although it is said that a 24-hour pump test for new water sources is generally appropriate[6], the pump test which had been conducted 24 hours after the construction of the boreholes should have been carried out longer (72 hours at least) in order to place more stress on the aquifer. Also, the report stated that since water level in surrounding boreholes in the same borefield had not been recorded during the pump test, it would have been more effective if monitoring of surrounding bores as a part of pump tests had been conducted in order to help to understand and manage any potential issues related to borehole performance or interference from other pumping boreholes.

Furthermore, the review report mentioned that since the existing pump size was too big for yields at present, a borehole had affected another borehole located next to it, lowering the water level when the pump was in operation. Since it affected the yield of another borehole next to it, the report suggested replacing the pump with a slower and smaller one. In response to the comments above, the project consultants commented that there were no problems with the design because precipitation had affected the boreholes, as the boreholes themselves were shallow, and the yields were adequate for the required volume at the time of pump testing during the construction period. Although an adequate volume of water could have been secured in 2014, at the time of handing over the facility, there was a reality that the facilities had not been utilized fully because of the reasons above after 2015. These facilities were constructed according to the plan and there was no defect in the construction. However, it is considered that it was necessary for each, the SIWA, which gave the order for construction of the facilities, consultants who received the construction order, and JICA, which provided funds, to discuss what to do for making full use of the capacity of the facilities. Also, for better

[4] The problem is that of a hammering-like sound coming up from a pipeline and vibrating, which is propagated by a wave of water pressure caused by a sudden change in water pressure through frequent switching of a pump. If there is no treatment taken for the problem, it may cause serious accidents such as damaging or explosion of the valve and water pipe. According to the document provided by JICA, pipeline damages which seemed to have been caused by water hammer actually occurred 6 times at the Skyline pump station from August 2015 to April 2016 . (The damages were all repaired.)

[5] All boreholes at Borderline and Skyline restarted operation in July 2017. Boreholes operating at Titinge (4 boreholes) were the only sites which had not been stopped at the time of ex-post evaluation.

[6] A 24-hour duration of pump testing is also observed under Japanese standards for borehole digging, and it is generally appropriate.

output from future projects when implemented similarly at similar geographical locations, it would be desirable if the comments from the review report were to be referred to as in this event, as an example.

As for increasing the water supply volume, although the new water sources did not secure enough water, the total volume increased. Construction of the facility contributed to securing the water volume to some extent.

Other than the increase in water volume and stability of water supply, Table 7 (Honiara City) and Table 8 (Auki City) show effect indicators which were set to quantitatively identify improvement in water quality and fair distribution.

This project had aimed at a stable water supply by using multiple water sources and newly developed boreholes to reduce the dependency on Kongulai Spring, but as mentioned before, since the yield of the boreholes which were constructed through the project was not adequate, the dependency on Kongulai Spring was still high. Also, since the turbidity reduction facility was not installed at Kongulai Spring, water turbidity caused by heavy rains still occurred, which partially affected the quality of the water supplied. In the case of turbid water, a temporary stoppage of water intake from the spring and a water supply shutdown may have occurred, which may have affected the stability of the water supply to some extent. In fact, according to the data provided by the SIWA, the average water usage volume at the time of the shutdown of Kongulai Spring was less than half of that during normal operation. In light of the situation above, the SIWA made a plan to install a filter in the distribution pipeline at Kongulai Spring for filtering turbidity to reduce the frequency of shutdowns caused by water turbidity. The water turbidity at Kombito Spring, where a turbidity reduction facility was installed, continued to occur because the facility had not been used when the water turbidity occurred; the reason is mentioned later in "3.4 Sustainability".

Additionally, the water supply service ratio in Honiara City was 55%, lower than the target (83%) and below the baseline as of 2007 (73%). The service ratio seemed to have declined but it did not suggest that the number of users was decreasing. The service ratio is calculated by serviceable population[7] divided by resident population in the SIWA's service area. According to the SIWA, and as shown in Table 1, the resident population in the service area in Honiara City grew approximately 1.4 times over 10 years, from 2007 to 2017, while the number for serviceable population grew smaller, which resulted in an outcome below baseline. Although the data for the rate of low-pressure areas could not be obtained, the situation is seen to have been improving according to the qualitative research (water service user interview) mentioned later; the rate of total respondents in Honiara City who said the water pressure had become higher after project completion in 2014 reached 90%, as compared with the time before project.

[7] Serviceable population is a calculated number composed of contracted households multiplied by the average number of people per household. In 2007, the average number per household was calculated to be 9 but it is calculated to be 7.3 per household in 2017.

Additionally, the SIWA explained that they were underway in reviewing the water supply network design with an aim at reducing low pressure areas.

Table 7. Effect Indicators (Honiara City)

		Baseline	Target	Actual	
		2007	2018	2014	2017
		Year at the Time of Planning	4 Years after Completion	Completion Year	3 Years after Completion
To increase and stabilize water supply volume	Water consumption from Kongulai Spring (dependency on the spring)	11,100 m^3/day (43%)	4.100 m^3/day (13%)	11,797m^3/day (26%)	10,425m^3/day (33%)
	Daily average water consumption for domestic (general home) use (reference value: daily average water consumption volume at the time of shutdown of Kongulai Spring) *1	110LCD	170LCD*	174LCD (66LCD)	170LCD (70LCD)
	Low pressure areas (% of serviceable population)	25%	0%	--	--
To stabilize water supply volume and improve quality of water supplied	Frequency of turbid water incidents 1) Kongulai Spring 2) Kombito Spring	1) 18 times 2) 28 times	0 in each spring	18 times/each in 1) and 2)	21 times/each in 1) and 2)
Fair distribution	Water supply service coverage ratio	73%	83%	--	55% (68%) *2

Source: Documents provided by JICA and the executing agency

*1 Even during the shutdowns of Kongulai Spring, ordinary water supply volume should be secured.

*2 Bracketed figures are reference rates as recalculated by the average number per household based on year 2007.

Table 8. Effect Indicators (Auki City)

		Baseline	Target	Actual	
		2007	2018	2014	2007
		Year at the Time of Planning	4 Years after Completion	Completion Year	Year at the Time of Planning
To increase and stabilize water supply volume	Daily average water consumption for domestic (general home) use	75LCD	170LCD	58LCD	150LCD
	Hours of Water supply served	4 hours	24 hours	--	24 hours*

Source: Documents provided by JICA and the executing agency
* 14 hours in some of the commercial areas

In Auki City, the hours of water supply served have greatly increased as service operated 24 hours a day mainly in residential areas at the time of ex-post evaluation, up from 4 hours per day at the time of planning. And, daily average water consumption was a little lower than the target value but greatly improved to twice that of the baseline year. It could be seen that increases of both volume and stabilization of water supply were achieved.

3.3.1.2 Qualitative Effects (Other Effects)

In terms of the qualitative effects of this project, this project was aimed at acquiring comprehension of water systems, facility operation, recording, management, utilization of water volume data, and so on by conducting the soft component (training programs for operation capacity building) attached to this project. As for the soft component of this project, all operation and maintenance staff members (including those among provincial office staff) attended and participated in both the lecture and practice. As a detail to be mentioned in "3.4 Sustainability", it was confirmed that SIWA staff members had acquired the most basic skills which were necessary for daily facility operation, including operations of the water source facility, pump station, and distribution facility. Also, operations after the completion of facility construction were confirmed to have been conducted without any problem at the time of ex-post evaluation.

3.3.2 Impacts

3.3.2.1 Intended Impacts

As a project impact, by establishing a safe and stable water supply system, it was expected that the reliability of the SIWA for the residents would become higher, and the number of customers would thereby increase while the delays in payment would decrease.

To account for the change in the reliability of the SIWA through the improvement of the

water supply service after the project, interviews[8] were conducted with customers in Honiara City and Auki City to garner qualitative research data. According to the interview, 80% and more of respondents answered that they were satisfied with the water supply service that the SIWA had provided until then. Especially, satisfaction with the water volume and stability of the water supply were high, and most of the residents and business owners in both cities answered that the water supply served after the project improved as well as both the living and business environments could be seen as better, such as in areas of better sanitation, business operation, and so on, by the stabilization of the water supply. In Honiara City specifically, according to a resident, water could be basically used for daily housework such as washing clothes and floor cleaning, thus the sanitation of homes improved. A great deal of the same comments could be seen in Auki City, and in some business areas which had not yet achieved a 24-hour water supply, interviewees even replied that their service provision became stable as the number of hours of water supply service was almost stable every day, which made it easier for business owners to make operating plans.

As for the water quality, qualitative research showed that more than half of the respondents answered that the change in water quality could not be seen before or after the project. The respondents could not identify the change in water quality as the number of household respondents who had drunk tap water both before and after the project were few, 10% or less in the qualitative research, and as the tap water sometimes had become turbid after heavy rains. However, the water monitoring team from the Honiara City Council who were in charge of checking water quality said that the water quality had been very bad, as was reported in the local newspaper in 2014, but that the water quality had greatly improved at the time of interviewing. The water monitoring team explained that the team had conducted water quality monitoring on Tuesdays, through which the residual chlorine had been measured at a level within the city standard (0.21mg per liter), and that almost no coliform had been detected. After project completion, the users could not realize the change, but the water monitoring staff in Honiara City could, as the periodic monitoring conducted by Honiara City had passed inspection; therefore, the water quality in Honiara City can be thought to have improved.

Table 9 summarizes both the number of customers of the SIWA and the collection rate on water billing in order to see the changes above in both Honiara and Auki cities before and after the project.

[8] Outline of the qualitative research conducted: <Target> Residents and business owners selected from the customer list provided by the SIWA who use the water supplied from the facilities constructed by the project. <Number of targets> [Residents] 20 in Honiara City (11 male and 9 female) and 10 in Auki City (7 male and 3 female), [Business owners] 10 in Honiara City and 6 in Auki City <Research method> In depth interviews (individual interviews conducted using questionnaires in meetings)

Table 9. Changes in Number of Customers and Water Bill Collection Rate (2009 – 2017)

	2009	2010	2011	2012	2013	2014	2015	2016	2017
Honiara	6,901	6,916	6,926	6,931	6,979	7,199	6,184	6,352	7,943
City	57%	56%	79%	72%	80%	71%	92%	84%	95%
Auki	382	397	407	412	425	424	361	400	423
City	5%	5%	5%	5%	5%	5%	5%	6%	5%

Source: Information provided by the executing agency

Note: The upper row is the number of customers (number of households) and the lower row is the water bill collection rate. Bill collection rate includes the collections on arrears of billings from the previous year. The number of customers in 2015 declined because the SIWA conducted a large-scale disconnection of services because of non-payments on water bills and because of other reasons. After the disconnection, a certain number of customers did not reconnect as reconnection after disconnection was chargeable.

The number of customers gradually increased, and that in 2017 included nearly 8,000 households. The water bill collection rate in Honiara had remained to be sound since 2015, after project completion, and the rate in 2017 was more than 90%. In Honiara City, the SIWA established a service disconnection system which was conducted after three warnings of non-payment on water billings for customers in delinquency, and reconnection was chargeable; the system had been working very well. However, this system was only valid in Honiara City, while other cities, such as Auki City, had not implemented the system then because of a lack of staff members at the provincial office. Thus, water bill collection rates in Auki City, which had no penalty for non-payments by customers, was extremely low, at only 5%. The SIWA was planning to dispatch a staff member that would be used exclusively for bill collecting to certain provinces in order to strengthen bill collecting.

3.3.2.2 Other Positive and Negative Impacts

1) Impacts on the Natural Environment

Regarding impacts on the natural environment from a period of project implementation, as confirmed with the Environmental Conservation Department (hereinafter referred to as “ECD”), there were no relevant documents to obtain, but the ECD said that there were no events which affected the environment negatively nor were there complaints about destruction of natural environment from the local residents after project completion. As for the environmental impacts after the project, according to the interviews with the Ministry of Mines, Energy and Rural Electrification which is in charge of water resources management and SIWA, the executing agency and water supply operator, neither of them mentioned that there had been any negative impacts on natural environment from the water supply operation after the project. Therefore, it can be said that no specific impact occurred to the natural environment.

2) Resettlement and Land Acquisition

During the project period, there were three cases of resettlement at project sites. No documents could be confirmed but in the interview with the SIWA, it could be confirmed that there were no specific troubles nor negative impacts for residents after the resettlement, as the relocation distance is short as only about 10m from the original location, and the SIWA incurred the resettlement fees according to appropriate legal procedure.

In terms of land acquisition, to acquire land at the project-sites-to-be at Kongulai Spring and Titinge distribution reservoir, the Government of the Solomon Islands (Ministry of Lands, Housing and Survey, hereinafter referred to as "Ministry of Lands") negotiated with the ethnic group who owned the lands but did not reach an agreement, therefore the land acquisition was abandoned. As a result, installment of a turbidity reduction facility at Kongulai Spring was cancelled and the construction of the Titinge distribution reservoir had been concluded by changing the shape of the reservoir and constructing it within the land owned by the SIWA. Since a result of land acquisition had not been achieved, there were no specific negative impacts seen on this matter.

3) Other Impacts

At the time of planning, Kongulai Spring was located on land that an ethnic group owned and the SIWA had been paying water charges to the owner of the group whenever taking water from the spring. The SIWA was planning to cooperate with the Ministry of Lands to propose the group change to a new contract stipulating fixed land-leasing fees from water charges by constant rate which correlated to the actual sales volume of water. Since this change was pointed out to have affected the ethnic group in terms of their living expenses, it was confirmed in the ex-post evaluation whether this affected their income.

Regarding the confirmation as to whether the SIWA and/or the Ministry of Lands gave an explanation to the ethnic group on the matter above during the project, the SIWA and the Ministry of Lands answered that both had explained it to the landowner of the ethnic group during project execution. However, as for the result of discussion on the payment of water charges and change of contract, both parties had not paid water charges or land leasing fees to the landowner as of then. According to the high court decision made in 2015, the water charge was illegal because the spring was a public asset, thus there was no need to pay the water charge to the ethnic group. Also, after abolishing water charges, the SIWA and Ministry of Lands were planning to sign a land leasing contract with the landowner, but the landowner and the representative of the ethnic group (whom the group members called a "trustee") had refused the negotiation because they insisted on receiving water charge fees which they had not received from the SIWA as of then. The negotiation had been halted even at the time of ex-post evaluation.

In terms of the impact for the ethnic group's income after cancelling of the payment, the would-be beneficiaries were few in the ethnic group and none of them were in the village after that

because of deaths of beneficiaries or having moved to other places. Therefore, no specific context can be confirmed.

In light of the above, this project has achieved its objectives to some extent. Therefore, effectiveness and impacts of the project are fair.

3.4 Sustainability (Rating: ②)

3.4.1 Institutional / Organizational Aspect of Operation and Maintenance

The SIWA has four sections: operation, strategic, finance and administration, and human resources. Under the operation section, which oversees operation and maintenance (O&M), there are three divisions: network maintenance, network operations and provincial coordination, and NRW and customer connection coordination; and, 67 members, including provincial office staff members, work there. The SIWA's organization chart of the O&M section is shown in figure 1.

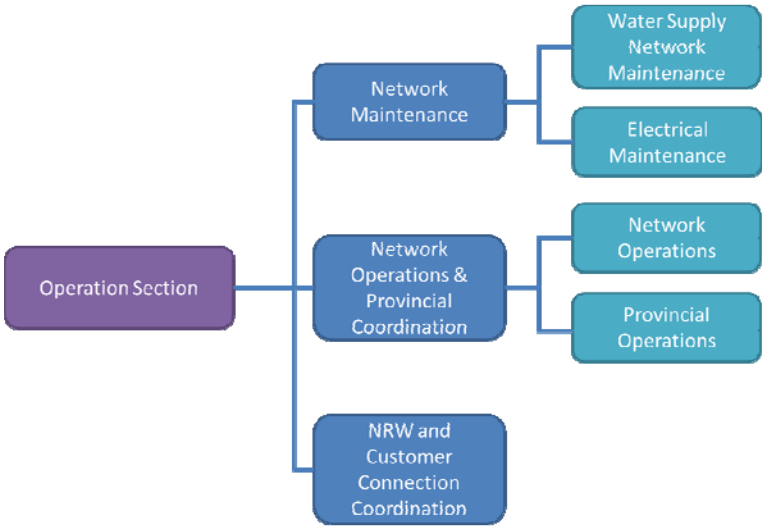

Figure 1. The SIWA's O&M Structure

There are two teams which oversee O&M works: water supply network maintenance and electrical maintenance (25 members in total). According to the SIWA, since many of the team members had adequate O&M maintenance experience and there were relatively few occurrences of staff transfer, it seemed adequate to operate works under the present structure and with the number of staff members at the time.

Technical staff members in each provincial office, who are in the provincial operations team under the network operations and provincial coordination division, are in charge of O&M for water facilities in provinces. In the SIWA Auki Office located in Auki City, there are three staff members in total: two technical staff in charge of facility maintenance and one customer care

and administration staff member. According to a technical staff member in Auki Office, only one technical staff member was tasked with operating the entire O&M works in Auki City since another technical staff member had resigned in 2015. As a result, it took most of the day to do the daily maintenance work, and it was difficult for only one technical staff member to visit non-paying customers to disconnect the water supply. Also, during the billing period, billing to customers was also the member's work, as well as daily maintenance work, but it took a long time for even two staff members, including administration staff, to visit all customers for billing. As some respondents of the qualitative research requested the SIWA staff to visit and read the meter regularly in order to avoid fluctuations in the billing amount, meter reading for billing was not thought to have been periodic. To reduce the workload for the technical staff, a new technical staff member had been assigned as of January 2018, but it potentially required a certain period of time to eliminate the effects of staff shortages until the new member became adept in performing the operation.

Regarding institutional aspects of operation and maintenance, there were no problems at the Honiara City location and it can be seen that the problem had been being addressed in Auki City by adding another staff member.

3.4.2 Technical Aspect of Operation and Maintenance

In terms of facility operation and O&M method, the project consultants held two sets of training programs (lecture and practice) as a soft component attached to this project, and all staff members in charge of O&M attended the programs to acquire necessary skills for performing the daily operation. Also, in this component, the consultants created operation manuals and submitted them to the SIWA. As for knowledge transfer, since the SIWA did not experience transferring of staff between sections and since the changing of members was not very frequent, there was no specific protocol for handing over responsibilities or knowledge transfer among staff. However, when a new staff member joined a section, the skill was certainly transferred without problems through OJT which was conducted by working with experienced staff to acquire the new skill. Therefore, there was no problem with the technical aspect of operation and maintenance at the time. Also, there was no utilization of operation manuals for daily O&M works as mentioned above, but there was no need for referring to the manuals to conduct operations because the operation works know-how had been disseminated among staff. Thus, skill transfer through the manuals was thought to have been achieved. Therefore, the technical aspect of operation and maintenance did not seem to have problems to date.

On the other hand, there were no specific opportunities for present staff to regularly undergo capacity development although SIWA secure the training budget every year. Some staff members had been dispatched to one-time-only international conferences and training courses,

but such opportunities were confined to a certain number of staff members.

3.4.3 Financial Aspect of Operation and Maintenance

The SIWA's recent income and expenditure is shown in Table 10.

Table 10. Breakdown of the SIWA's Major Sources of Income and Expenditures (2014 – 2017)

(Unit: million Solomon Dollars)

		2007	2014	2015	2016	2017
Income	Sales revenue (water bill)	33.7	81.1	84.3	91.9	88.8
	Non-sales revenue	0.6	6.0	16.7	13.6	11.7
	Subsidy from the Solomon Islands government (Community Service Obligation: CSO)	3.2*	3.1	0	4.6	0
	Aid from foreign government(s)		3.0	0.1	2.3	0
	Total	37.5	93.2	101.1	112.4	100.6
Expenditures	Staff salary and benefits	3.9	21.6	22.4	20.1	23.0
	Maintenance cost (operation and repairs and maintenance)	15.5	40.9	40.2	38.6	38.9
	Other expenditures (administration costs, amortization, etc.)	7.9	24.6	31.4	28.4	31.3
	Total	27.4	87.1	94.0	87.1	93.2
Balance		10.2	6.1	7.2	25.3	7.3

Source: Information provided by the executing agency

Notes: Some parts of the breakdown and total may not match because of rounding.

*Mentioned as "Aid from the Solomon Island government and foreign governments" in 2007

The SIWA's recent income greatly increased compared to that in 2007, a base year. The SIWA's main income is sales revenue, collection on water billing, which is 80% of its total annual income. The SIWA is a state-owned enterprise but there is no operational budget allocated from the government; their operation is mainly financed on the sales income collected on water billing. Since 2014, after project completion, sales revenue has multiplied 2.5 times higher than that in 2007 because of an increase in the number of customers, a decrease in that of non-paying customers, an increase of water tariff, and so on. Also, the Government of the Solomon Islands expected to provide a so-called CSO (Community Service Obligation) every year from 2012 for improving water facilities in provinces. However, the subsidy had not been allocated every year, as shown in Table 11; the government refused to allocate the fund in 2015 because, as they explained, the SIWA had not reported its fund usage clearly; and, the government conveyed that they would not allocate the fund in 2017 because of a financial issue of the government. Thus, it is hard to say whether the government subsidy has been a stable funding source.

Table 11. Government Subsidy (CSO) Allocation History

(Unit: million Solomon Island Dollars)

2012	2013	2014	2015	2016	2017	2018
3.0	3.0	3.1	0	4.6	0	3.0

Source: Questionnaire answered by the executing agency

With regard to the actual income and expenditures in the 4 years after the project, as shown in Table 10, although the figures vary to some extent, the SIWA has made a profit for 4 consecutive years and the profit in 2016 significantly increased compared to past fiscal years. The reason was that the sales revenue increased, and furthermore, the subsidy (CSO) from the Solomon Islands government was allocated while aid from foreign governments also increased. Regarding expenditures, the SIWA saved staff cost, and the cost for disposal of equity held in 2014 and 2015 was not incurred in 2016 as they had been completed. During the situation in 2017 in which there had been no aid from foreign governments and the income from water billing had declined, the SIWA secured a certain amount of profit in spite of the cost increase due to software updating and training. Therefore, it can be said that the financial aspect is in good condition. However, the SIWA recognized that the profit was not adequate as there were a lot of areas which required an infusion of funds, such as large-scale facility upgrades, capacity development for staff members, and so on.

Therefore, the financial aspect of operation and maintenance was stable and sound at the time of ex-post evaluation. However, since the funding needs were still high, such as those for NRW, increasing yields, and so on, a situation in which more funds are needed remained.

3.4.4 Status of Operation and Maintenance

In Honiara City, engineers went on daily rounds of the facilities to check operation conditions and cleanliness around the facility, and when they found damages, they made repairs depending on the degree of the damage. Also, they cleaned the inside of the pump once a year. Engineers contacted asset management staff on the network maintenance team to ask for grass cutting around the facility and for cleaning of the inside to be done depending on conditions. In facilities in Auki City, technical staff at Auki Office monitored the conditions of boreholes and electric facilities daily. Also, the staff hired a worker to cut grass once a month and reported the condition of facilities to provincial operations teams weekly. According to the procedures taken above, the facilities in both Honiara and Auki cities as a whole were in good condition and there were no problems in terms of operations.

In addition to the above, in the field survey at the time of ex-post evaluation, some unused facilities and damages to facilities were confirmed, all of which were in Honiara City, as shown in Table 12.

Table 12. Unused facilities and damages (Honiara City)

Item	Facility	Location	Detail (Reasons of unused, damages)	To do next
Unused Facilities	Chlorine dosing equipment at pump station	Tasahe Titinge Borderline	- Burden of staff who hand-carries chlorine for delivery every day. - Stairs to the chlorine facility are too narrow to carry chemicals and there is a danger of staff falling off or from the stairway. - Chlorine feeding pipes are often blocked up.	Install a dosing pump instead of dripping chlorine by force of gravity
	Boreholes and pump station	Titinge	- Yields are poor. - Electricity costs for pumping are too high and produce small yields. - Capacity of transmission pipeline, which is to send water after yielding, is too small.	In progress of Constructing new water transmission pipeline; Water transmission will be re-started after its construction.
	Turbidity reduction facility	Kombito Spring	Pressure to distribute water to end-users through the turbidity reduction facility is too low to distribute because of the increased number of connections at present (Water distributes to the end-user directly from the spring so far not through the facility.)	Not decided yet
Facility breakdown or damage	Breakdown of fans at pump station	Skyline Borderline	Not working when turned on	Replace parts when receiving
	Damages of fence at distribution reservoir	Skyline	Fence was partially buried by the landslide in 2017	To be repaired in 2018

Source: Site visit result and responses of the executing agency

As for unused facilities, since the facilities were constructed according to the plan which had been agreed at the time of basic design study, the reason was neither design and construction failure nor facility breakdown. This was because there had been a difference between the specifications of the facilities and actual operation procedures when using the facilities; some facilities were not user-friendly for SIWA staff and they felt that the operation cost was higher than their expectation. The recognition gap should have been filled in through the project between the project consultants who had designed the facilities and the SIWA which had been the executing agency of the project at the time of basic design study, but regarding the detail of the design, one project member from the SIWA commented that the SIWA could only receive the report from the project consultants because the SIWA did not have enough expertise or experience to evaluate the specifications and give requests at that time. Because of unused

facilities such as the unused turbidity reduction facility and chlorine facilities, some indicators on effectiveness have been affected (e.g., water supply volume from new water sources and frequency of turbidity). Additionally, for the turbidity reduction facility, it was not used in 2015 at the time of inspection. The project consultant advised the SIWA to examine methods on how to provide the water supply effectively and stably and to consider utilizing the facility at Kombito Spring[9]. As for the unused chlorine facility, the SIWA uses some previously used chlorine facilities which had existed before project implementation for water treatment use and thus, there was no impact on effectiveness observed. At the time of basic design study, chlorine facilities were to be installed for supplying chlorine to receiving tanks which stored water from boreholes and transmitted water from the tank, but according to the SIWA, chlorination was actually done at a distribution reservoir or water tanks when water was supplied from receiving tanks. In regard to the water quality, the water quality monitoring team from the Honiara City Council said that the residual chlorine concentration usually met the criteria and there was no problem with the water quality. Yet since facility aging was on-going in some facilities, the SIWA was planning to utilize the unused chlorine facilities by changing the chlorination dosing method.

Unused chlorine facility
(Tasahe Pump Station)

Stairs for chlorine facility
(Tasahe Pump Station)

All dilapidated facilities were planned to be repaired in 2018. According to the SIWA, the spare parts which had been ordered were not difficult to obtain and rapid repair was expected. Therefore, regarding the current status of operation and maintenance, the facilities in operation were in good condition and there was no problem with the current maintenance status.

[9] It was not certain how long the facility had not been utilized after the project completion in 2014 as it could not be confirmed with the executing agency, but since the facility was not being used at the time of ex-post evaluation, it could be possible that the facility had not been used for 3 years, from the inspection in 2015 until the time of ex-post evaluation.

However, some facilities had not been fully utilized, and the current status of operation therefore had some problems. Thus, a few problems had been observed in terms of the current status of operation and maintenance.

In light of the above, some minor problems have been observed in terms of the current status and sustainability of the project effects is fair.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project was planned to build water supply facilities in Honiara and Auki cities for improving water supply conditions, such as increasing and stabilizing the water supply, improving the quality of water supplied, thereby contributing to the realization of a hygienic environment for living. Since this project was confirmed to be consistent with the development plan and development needs of the Solomon Islands at the time of both planning and ex-post evaluation, and with the Japanese ODA policy at the time of planning, the relevance of this project was high. Regarding the implementation of this project, although the project cost was within the plan, the efficiency of the project can be said to have been fair because some facilities to be installed were not constructed, and the project period greatly exceeded the plan because of prolonged discussion on land acquisition. As for the effectiveness of the project, the water supply volume and the stability of the water supply in Auki City improved as the water supply volume increased after project completion, and the total hours of water supply served per day in the area was achieved at 24 hours. In Honiara City, although the yield from the new water source was below the estimation, a certain water supply volume was secured through construction of the facility, and the water quality during normal operation was so improved as to clear the standard of Honiara City for water quality monitoring. In contrast, the water turbidity problem was not resolved as a turbidity reduction facility was not installed at Kongulai Spring which affected the stability of the water supply by causing water turbidity and temporary shutdowns of the water source during heavy rain. As for the project impacts, sanitation of households and businesses improved on past conditions before the project, as the water supply reached a stable condition through the improvement of water supply facilities. As a result, the reliability of the Solomon Islands Water Authority (hereinafter referred to as “SIWA”), which provides water supply services, increased. Therefore, the effectiveness and impacts of this project were fair. Regarding sustainability, there was no problem with institutional or technical aspects of operation and maintenance and the financial aspects were sound. However, the sustainability can be said to be fair as there were some problems observed; these problems were minor ones in that some facilities were not used because the facilities were not user-friendly enough for the staff to operate. Therefore, the sustainability after project completion is judged to

be fair.

In light of the above, this project is evaluated to be partially satisfactory.

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

(1) The turbidity reduction facility had been installed at Kombito Spring through this project, but the reduction of the turbidity had not been achieved as the facility had not been used because there was not enough water pressure to deliver the water to the end user through the facility, which in turn had been caused by the increase in water service connections. As the project consultants pointed out at the time of inspection, in the facility rehabilitation plan such as the "5-year plan (action plan)" that the SIWA provided, it would be desirable to plan the designing of a water supply system which can be transmitted and distributed through a turbidity reduction facility without any negative impacts on the water pressure in order to achieve a stable water supply and an improvement of water quality.

(2) In this project, thanks to implementing the soft component of the project and utilizing manuals, there was no problem with the staff skills related to maintenance work, but as there was no specific opportunity for continuously maintaining or brushing up their skills within the organization, there may be some concern about future opportunities to maintain or enhance their skills. In order to maintain good facility condition, for instance, several years later when the large-scale replacement of the facilities is completed, it is desirable to secure training opportunities internally.

4.2.2 Recommendations to JICA

The boreholes constructed through this project were installed to secure a sufficient water volume so as to decrease the dependency on Kongulai Spring. However, since 2015, as the situation in which the yields from each borehole had been poor was ongoing, both the electricity cost and the risk of an exploding transmission pipeline from the water hammer problem had become high when pumps operated at low water volume, and consequently, some boreholes and pump stations had been stopped. Although all these facilities were the outputs according to the plan and the handover process had been completed, there may be a need for some actions to be taken for utilizing facilities. To solve the problems above and to return the facilities to operating capacity, as was the original purpose, it can be desirable for JICA to seek possibilities for offering continuous advice and cooperation to the SIWA, such as replacing pumps, as suggested in the review report and so forth, aiming at effective utilization of borehole facilities.

4.3 Lessons Learned

Adequate explanation and facilitating understanding of the plan to the executing agency

In terms of the basic design study before project implementation, there was an observation from a project staff member from the executing agency, who stated, the “SIWA did not have enough skill and expertise to evaluate at the time of the basic design”. As a result, a problem had occurred in which some facilities had not actually been used for a reason other than a breakdown, although the facilities were constructed according to the plan. For better facilities for users to be constructed, it is necessary for the executing agency to become actively involved from the basic design study phase and to have close communication with the project consultants. To achieve the above, it is also important for the project consultants to give well-explained instruction to facilitate understanding of the plan for the executing agency. When a similar project is implemented, more opportunities for discussions and collaborative efforts are desirable for the executing agency and project consultants to improve the capacity of the executing agency. Also, if possible, it may be effective for the project consultants to provide opportunities for having a “mini seminar” or workshop for the staff members of the executing agency in order to confirm the necessary expertise, such as those on holistic comprehension of water supply systems and facilities, designs to improve water supply services in the basic design study. It is desirable to build a system for the executing agency in which they have active involvement in the project and fill in the gap as much as possible between the facility constructed and its actual operation.

Setting the negotiation period and providing an option in order to prevent the delay of the project when the negotiation is not settled

The project was completed 7 years after implementing the basic design study, 3 years later than the planned year of project completion. The delay of negotiations on land acquisition, the main reason of the delay of the project, had been expected at the time of the basic design study, but the negotiation between the government and the ethnic group was delayed more than the expectation, and the land acquisition was ultimately not achieved. If a similar project is implemented in an area which includes land acquisition, like the Solomon Islands, and if it is expected to be difficult to negotiate such acquisition, it is desirable to set a deadline for the end of negotiations and discuss and agree with the executing agency during the basic design study period whether they would change its project scope or adopt an optional plan etc., in case the negotiation is not settled by the due date. It is the most desirable to achieve the land acquisition and construct the facilities as planned, but sometimes it is more desirable to build the facilities quickly rather than extending the project period for negotiations. To provide a facility at the optimal hand-over timing, if the project is centered around its completion within the project period, the project may be more effective and efficient if the optional plan, which is expected to

give comparable effects of the original project design, is separately discussed during the basic design study or the negotiation for the land acquisition.

(End)