

**Ex-Post Project Evaluation 2017
Package III-8 (Palestinian Authority)**

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JAPAN INTERNATIONAL COOPERATION AGENCY

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Palestine Authority

FY 2017 Ex-Post Evaluation of Japanese Grant Aid Project

“The Jericho Wastewater Collection, Treatment System and Reuse Project”

External Evaluator: Juichi Inada, Senshu University

0. Summary

The objective of the project is to construct wastewater treatment facilities and reuse the treated wastewater for Jericho Municipality and its surrounding area, which will extend wastewater treatment services and keep water resources, and thus improve sanitary conditions and contribute to the development in the district.

The project was consistent with the development policy and the development needs of Palestine and Japan’s ODA policy toward Palestine. However, at the time of project planning, there was a problem in the plan regarding the estimation of the amount of wastewater treatment and the examination of the feasibility of the components borne by the Palestinian side. Therefore, its Relevance is fair.

The project cost of the Japanese portion was the same as planned. Nevertheless, since the project period exceeded the planned period (106.5%), Efficiency of the project is fair.

The target year for generating the development effects was set for 2020. Yet, at the end of April 2018 (3 years and 10 months after the completion of the project), the achievement rates of the main indicators of effectiveness, such as the wastewater treatment amount and reuse water amount, were less than 50% of the planned target values for 2020 (written in Ex-ante Evaluation Report). Therefore, it is highly probable that the target values cannot be considered as achieved. However, it is difficult to estimate the exact target values at the time of evaluation in 2018, and to find clear evidence that the project effects were lower than the target. Therefore, the project Effectiveness is fair. The positive impacts of the project are mostly observed. Therefore, this project has achieved its objectives to some extent, and Effectiveness and Impacts of the project are fair.

As to the operation and management of the project, there are no major problems in terms of the organizational and technical aspects, but there are some problems regarding the financial aspect. Therefore, Sustainability of the project effects is fair.

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

1. Project Outline



Project Location



Constructed Waste Water Treatment Facility

1.1 Background

The Jericho-Jordan Valley District is located in the Great Rift Valley. Owing to its topographical characteristics, domestic sewage generated in urban areas had no place to discharge to other than river basins and was forced to remain within the district. Since there were no appropriate wastewater treatment facilities available in this area, serious contamination of the groundwater vein, which was the sole water resource for the water supply system of the Jericho Municipality, had been found in January 2010. In addition, from the viewpoint of effective use of a limited water resource, treated wastewater was expected to be considered as a new water resource. Agricultural activities had been prospected in this area and construction of an “Agro-Industrial Park” was planned as a core project in the “Corridor for Peace and Prosperity” that is being promoted by the Government of Japan. Wastewater generated in the park was also planned to be treated.

Based on these circumstances, the Palestinian Interim Self-Government Authority (hereafter referred to as the Palestinian Authority) requested the Government of Japan to construct the facilities for a wastewater collection and treatment system in Jericho Municipality located in the West Bank Area of the Jordan River under the Japanese Grant Aid Assistance in August 2008. The outline of the request was to construct a wastewater treatment plant, trunk line of waste water, and sewer pipelines for Jericho Municipality and its surrounding area (Nwaeima, Duyuk, Ain Sultan Refugee Camp, Aqbet Jaber Refugee Camp). In response to the request, the Government of Japan concluded the Grant Aid Agreement to construct wastewater treatment facilities and to reuse the treated wastewater in order to improve water and sanitary conditions in Jericho Municipality and its surrounding area in February 2011.

1.2 Project Outline

The project objective was written in the ex-ante evaluation as “to construct wastewater treatment facilities and to reuse the treated wastewater for Jericho Municipality and its surrounding area,

which will improve sanitary conditions and keep water resources, and thus contribute to the development in the district.”

Since “the amount of treated wastewater” and other measures were listed as “quantitative indicators” in the Ex-ante Evaluation, “to extend wastewater treatment services in the district” is added for outcome. On the other hand, “to improve sanitary conditions” was written as “a qualitative effect” in the Ex-ante Evaluation, but this should be regarded as an “impact” of the project. Therefore, the project objectives are revised as follows:

The objective of the project is to construct wastewater treatment facilities and to reuse the treated wastewater for Jericho Municipality and its surrounding area, through which to extend wastewater treatment services and keep water resources, thus to improve sanitary conditions and contribute to the development in the district.

Grant Limit /Actual Grant Amount	2,650 million yen / 2,650million yen
Exchange of Notes Date/Grant Agreement Date	February 2011 / February 2011
Executing Agency	Palestinian Water Authority (PWA)
Project Completion	June 2014
Main Contractor	Dai Nippon Construction, Co., Ltd.
Main Consultant	N. J. S. Consultants, Co. Ltd.
Preparatory Survey	October 2010~March 2011
Related Projects	Technical Assistance and Capacity Building Project for the Jericho Sanitation (December 2012-March 2018) UNRWA (supported by Japanese Grant Aid), Construction of Sewerage System in Aqbet Jaber Palestinian Refugees' Camp: Package No.1 (2017), Nos.2-4 (2018~) USAID、Jericho Collection System Expansion: Phase 1A (November 2014~November 2015), 1B (October 2017~March 2019)

2. Outline of the Evaluation Survey

2.1 External Evaluator

Juichi Inada, Senshu University

2.2 Duration of Evaluation Study

This evaluation study was conducted with the following schedule.

Duration of the Study: October, 2017 – January, 2019

Duration of the Field Study: January 28, 2018-February 6, and April 26, 2018-May 5, 2018

2.3 Constraints during the Evaluation Study

The target year of the effective indicators was 2020, 6 years after the completion of the project. The project was completed in June 2014 and the ex-post evaluation was conducted around the mid-term between the project completion and the target year. In the ex-post evaluation, the operation and effective indicators were checked in early 2018 and analyzed based on the actual situation of generating effects at the time of evaluation and the projective situation of generating effects for the target year of 2020.

3. Results of the Evaluation (Overall Rating: D¹)

3.1 Relevance (Rating: ②²)

3.1.1 Consistency with the Development Plan of Palestine

At the time of planning, improvement of the water environment, including water supply and wastewater treatment, to improve the living environment was raised as a prioritized agenda in the *Palestine Reconstruction and Development Plan 2008-2010* of the Palestine Authority. Therefore, the project was consistent with the national plan. Improvement of the water supply and wastewater treatment were also mentioned as a core policy agenda in *National Development Plan 2011-2013*.

Provision of public services, including water supply and wastewater treatment, was focused in *National Development Plan 2014-2016*,³ and the water supply and wastewater treatment are also prioritized in the new *National Development Plan 2017-2022*.⁴

Thus, the project is consistent with Palestinian development policy, both at the time of planning and at the time of ex-post evaluation.

3.1.2 Consistency with the Development Needs of Palestine

At the time of planning in January 2010, the contamination of the groundwater vein was found to be serious in Jericho Municipality, and the improvement of wastewater treatment was an urgent issue.⁵ The portion of the population who has the access to the public wastewater treatment service in the entire area of the West Bank of Palestine was limited to 52.1% in 2009 (based on the statistics of the Central Statistical Bureau of Palestine). Therefore, the Palestinian Water Authority (hereinafter referred to as PWA) formulated the *Strategy for the Water and Wastewater Sector (2011-2013)*, including four strategic goals: strengthening of governance and

¹ A: highly satisfactory; B: satisfactory; C: partially satisfactory; D: unsatisfactory

² ③ : high, ② : fair, ① : low

³ http://planipolis.iiep.unesco.org/sites/planipolis/files/ressources/palestine_ndp_state_final.pdf (2018.7.24)

⁴ <https://ims.undg.org/downloadFile/4e3c5a2af50af000cbfd> (2018.7.24)

⁵ Based on Ex-ante Evaluation Table.

the provision of legal institution; integrated management of the water sector to secure water resources; integrated management of wastewater; and efficient management of organizations in the water and wastewater sectors.

In particular, there was no wastewater treatment service in Jericho Municipality. Diffusion of the wastewater network and its efficient management in Jericho Municipality were mentioned in the *Strategy for the Water and Wastewater Sector (2011-2013)* as important issues, and continue to be raised as important issues in the new *National Water Policy for Palestine 2017-2032*. Thus, the project is consistent with development needs, both at the time of planning and at the time of ex-post evaluation.

Compared with other donors' similar assistance in the water sector in other areas, such as Germany's (KfW⁶ and GIZ⁷) support of wastewater treatment in Nablus and Al-Bireh since 2000, a distinguishing characteristic of this project in Jericho is an additional component of reuse of wastewater, which responds to the needs of agriculture because water is a limited resource in Jericho and its surrounding area.

The United States Agency for International Development (USAID) started its project (1A) of constructing branch sewer pipelines in Jericho Municipality in July 2014, and has continued with the second phase of its project (1B) since October 2017. USAID's (1A, 1B) projects of constructing branch sewer pipelines in Jericho have a complementary relationship with JICA's project of constructing a wastewater treatment plant and a main trunk sewer network in Jericho.

3.1.3 Consistency with Japan's ODA Policy

The Japanese government has been selectively providing several assistance projects (Technical Cooperation Projects, development study, and Grant Aid to Jericho Municipality), as a base of the "Corridor for Peace and Prosperity."⁸ The Japanese government advocated to strengthen the socio-economic infrastructure in Jordan Valley area within the initiative of the "Corridor for Peace and Prosperity" in July 2006. Jericho is a core target area of the initiative and the selection of the location of the project is consistent with the initiative.

At the "Japan-Palestine High Level Meeting" in July 2010, the water and wastewater sectors were core sectors among 7 prioritized sectors agreed upon for the 3 years subsequent to the meeting. The water sector was also mentioned in JICA's Rolling Plan as a "program for improvement of water supply and sanitation services," which is one of the prioritized areas of "improvement of living infrastructure." Thus, the project is consistent with Japan's ODA policy.

⁶ Kreditanstalt für Wiederaufbau ("Reconstruction Credit Institute").

⁷ Deutsche Gesellschaft für Internationale Zusammenarbeit ("German Corporation for International Cooperation").

⁸ "Corridor for Peace and Prosperity" is an initiative that was formulated in July 2006 when Prime Minister Koizumi (at that time) visited Palestine and is being promoted by the government of Japan. It advocates long-term efforts for promoting socio-economic development of Jordan Valley area and economic independence of Palestine by regional cooperation among Palestine, Israel, Jordan and Japan.

The Japanese government promoted the dissemination of Japanese advanced technologies in the environment and energy sectors to developing countries by using the supplemental budget of FY2010. This project was a part of the efforts toward promoting Japanese technology for the environment, and a part of assistance for responding to climate change that was announced by Japanese government in December 2009.

3.1.4 Appropriateness of the Project Plan and Approach

2020 was set as the target year because it was estimated to take about 6 years for the wastewater treatment facility to generate effects. It was a normal target and the same as other wastewater treatment projects.

On the other hand, at the time of planning, the target area of the project included the surrounding two local government units (LGUs), Nwaeima and Duyuk, and two refugee camps, Ain Sultan and Aqbet Jaber, in addition to the Jericho Municipality. There were plans to improve sewer networks in those areas at the time of planning of the project, however, all plans in those areas have not been implemented due to lack of budgetary appropriation during the project period (by June 2014). At the time of ex-post evaluation in April 2018, Aqbet Jaber Refugee Camp was the only area where construction of sewer pipelines was in progress.⁹

Therefore, in the calculation of the target value of the project, the estimate of the population in the target area, pollutant load of BOD (per day), and the wastewater generation rate were revised (downsized) in December 2017 as shown in the report of “The re-examination of the quantitative effect indicators based on the actual figures in 2017” written by the consultants of “Technical Assistance and Capacity Building Project for the Jericho Sanitation.” The above re-examination paper revised those values in December 2017 and estimated them as follows; the population in the target area for 41,541 persons, pollutant load of BOD per day for 2,486kg/day, and wastewater generation amount for 3,930m³/day, etc. Moreover, wastewater generation rate was revised to 50% from 70% in the ex-ante evaluation, based on the actual values at that time.

The Jericho Municipality did not have a *Strategic Management Plan* of wastewater services at the time of the project’s start, but it formulated the first draft of the *Strategic Management Plan* of wastewater service in 2014 as a result of the “Technical Assistance and Capacity Building Project for Jericho Sanitation” supplemented to this Grant Aid project. In parallel with the re-examination of the target values by the consultants, Jericho Municipality set its own more realistic target values of wastewater treatment amount in July 2017 in its *Strategic Business Plan 2014-2020 (for Managing Jericho Sewerage System)*. Table 1 shows the comparison between the projected figures at the time of planning in the Ex-ante Evaluation Report and the

⁹ Aqbet Jaber Refugee Camp is under the jurisdiction of UNRWA, but UNRWA did not have sufficient funds for construction of wastewater network in the camp. The Japanese government then provided grant aid to UNRWA for its project of improving wastewater pipelines, as mentioned in the section of “4.2. JICA’s Contribution and Role.”

values written in the *Strategic Business Plan 2014-2020* of Jericho Municipality. In the plan, the target figure of wastewater treatment amount in 2020 was 3,363m³/day, and the target figure of reuse water amount was 2,529m³/day.

Table 1. The Comparison between the Target Values in Ex-ante Evaluation Report and *Strategic Business Plan 2014-2020*

	2020 target values at the time of planning in Ex-ante Evaluation Report	2020 target values in <i>Strategic Business Plan 2014-2020</i> of the Jericho Municipality
Estimated Population of the Target Area	52,800	39,734 (Jericho Municipality 25,932 +Aqbet Jaber Refugee Camp 13,802)
Amount of Wastewater Treatment (m ³ /day)	6,540	3,363
Amount of Reuse Water (m ³ /day)	6,540	2,529

As shown in the report of re-examination in 2017, number of the population in the target area was overestimated at the time of planning. Table 2 shows several different statistics of population in the project's target area. The estimation of the population in the target area written in the Preparatory Survey Report of 2011 was based on the value proposed by the PWA in 2010. The report estimated that the population would increase 1% annually after 2008. However, the most realistic estimate of the population in the target area in 2020 is 34,782, which is a combined figure of 25,932 in the Jericho Municipality area, as written in the new Strategic Business Plan of the Jericho Municipality, and 8,850 in Aqbet Jaber Refugee Camp which was provided by the United Nations Relief and Works Agency (UNRWA). This value (34,782) is about 66% of 52,764, which was the original estimated population in the target area in 2020 at the time of planning.

Because the surrounding two LGUs of Nwaeima and Duyuk and Ain Sultan Refugee Camp are geologically close to Jericho Municipality and wastewater generated in those areas run into Jericho City by natural slope, there were plans to improve sewer networks in those areas at the time of planning of the project, and the project's target population and wastewater amount were calculated based on the assumption that the plans to improve sewer networks in those areas would be implemented by the Palestinian side. Although the PWA, counterpart of the project, still has the plans to improve sewer networks in those surrounding LGUs and refugee camps in the future, the substantial implementing agency of the project was limited to the Jericho Municipality during the project period. Considering the fact that both the Palestine Authority and the UNRWA were facing extremely tight budgetary situations at the time of planning, there were some problems at the time of planning in terms of the judgment of the feasibility of the plans to improve sewer networks in the surrounding LGUs and refugee camps.]

Table 2. Several Different Population Statistics & Estimates

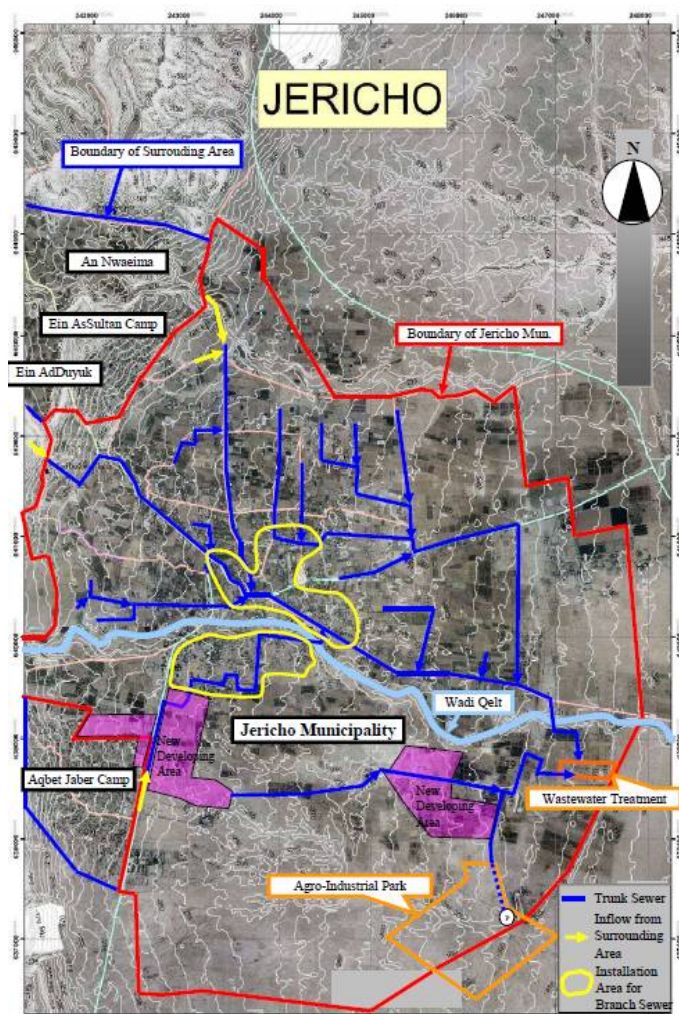
Population	2010	2017	2020
Preparatory Survey (2011)	39,983 (Jericho 25,895)	n.a.	52,764 (Jericho 32,042)
Re-examination in 2017 (*)	33,010 (Jericho 19,696)	41,541 (Jericho 25,420)	44,766 (Jericho 27,482)
Strategic Business Plan of Jericho Municipality	N.A.	37,672 (Jericho 23,870) (Refugee Camps 13,802)	39,734 (Jericho 25,932**) (Refugee Camps 13,802)
Population Statistics of PA Statistical Bureau	Jericho 19,696 Refugee Camps 11,096	Jericho 23,220 Refugee Camps 13,082 (statistics of 2016)	N.A.
Statistics of UNRWA (***)	N.A.	Aqbet Jaber 8,792 Ain Sultan 2,762	Aqbet Jaber 8,850 Ain Sultan N.A.

(Note)* Report written by the consultants of the “Technical Assistance and Capacity Building Project for the Jericho Sanitation” (December 2017). Target population in the report still included the population of 2 refugee camps and 2 LGUs of Nwaima and Duyuk.

**Calculation based on 3% annual increase. The figures of “Refugee Camps” include population of Aqbet Jaber and Ain Sultan.

***Statistics of UNRWA was directly received from UNRWA during the local survey.

Chart 1. Location Map of the Project



(Source) JICA document

< Check Points of Project Evaluation in Conflict-Affected Country/Area >

Palestine is under constant tension in its relationship with Israel, and has unstable factors in its political, societal, and security situations. On the other hand, the Palestinian Authority is in the process of constructing a state framework. Therefore, the following items were analyzed based on JICA's *Guidelines of Project Evaluation of Conflict-affected Country/Area*.

- ① Timing (Political and Policy Contribution): Prime Minister (at that time) Koizumi proposed the initiative "Corridor for Peace and Prosperity" to promote economic development of the Jordan Valley through collaboration among four actors, namely Japan, Israel, Palestine, and Jordan in July 2006. Subsequently, when President Mahmoud Abbas visited Japan in February 2010, the Japanese government pledged to provide long-term support for the building of Palestinian state. The project which targets Jericho in the center of Jordan Valley began at this time, and was consistent with Japanese diplomatic policy in the region.
- ② Activities (Selection of Beneficiary Area and Groups): In the Jericho-Jordan Valley District, domestic sewage generated in urban areas had no place to discharge other than river basins due to local topographical characteristics. Israel was also concerned about contamination of the soil and groundwater, which might affect the Israeli area. Therefore, proper treatment of wastewater was also regarded as an important agenda for Israel. Although assistance to Palestine requires prior consultation and acceptance with Israel, this project was able to be accepted by Israel as a project that benefits Israel as well as Palestine.
- ③ Implementation System: Since there were two refugee camps in the areas surrounding Jericho Municipality, the project was expected to benefit them by improving the living environment of the refugees. On the other hand, construction of a wastewater network in refugee camps is under the jurisdiction of UNRWA, and it was not always easy to coordinate the project with the Palestinian Authority and UNRWA.

This project has been highly consistent with the Palestine's development plan and development needs as well as Japan's ODA policy. However, some problems have been observed in terms of the project planning. Therefore, its Relevance is fair. (②)

3.2 Efficiency (Rating: ②)

3.2.1 Project Outputs

Details of the construction works and procured equipment of the project are as follows¹⁰:

- ① Wastewater treatment plant (WWTP) (Planned Capacity 9,800m³/day): Specifications of the facility are as follows: Waste Receiving Tank for Vacuum Trucks and Equipment, Grit

¹⁰ Based on the document provided by JICA.

Chamber and Equipment, Reactor (2 lines) and Equipment, 2 Final Clarifier and Equipment, Return-Sludge Pump House and Equipment, Disinfection Tank, Chlorine House and Equipment, Irrigation Water Tank, Sludge Thickener, Thickened-Sludge Pump House and Equipment, Sludge-Drying Bed, Electric Power Receiving Tower, Electric Lead-in Facilities, Blower, Electric Room, Electrical Equipment.

②Solar Power Panel (Output 100kW)

③Sewer Pipes (Trunk Sewer, Branch Sewer): Original Design: 25.4km×Dia. 200-700mm, Material: uPVC Pipe (under Dia. 400mm), Concrete Pipe (over Dia. 500mm)

④Water Quality Analysis Equipment

Construction works of the Japanese portion were implemented mostly as planned. Before the completion of the project in June 2014, additional sewer pipes for 4.3km (4.3km × Dia. 200-315mm, 899 Connection pit) were constructed in an area with high necessity, based on the change of scope.

Table 3. Plan and Actual Situations of the Japanese Portion

Facilities and Equipment		Plan	Actual
W W T P	Waste Receiving Tank for Vacuum Trucks		No major change
	Grit Chamber		No major change
	Reactor, Clarifier		No major change
	Chlorine Disinfection Tank		No major change
	Gravity Sludge Thickener		No major change
	Sludge-Drying Bed		No major change
	Electrical Equipment		No major change
Solar Panel			As planned
Sewer Pipes (Trunk Sewer, Branch Sewer)		25.4 km × Dia. 200-700mm	25.27 km: as planned * Additional Pipes : 4.39km × Dia. 200-315mm (29.66 km in total)
Water Quality Analysis Equipment			No major change

Table 4 shows the details of the Palestinian portion and the situations of implementation¹¹.

Among the Palestinian portion, facilities for Wastewater Treatment Plant were implemented as planned, with additional components and a building for security guards. On the other hand, construction works of branch sewer pipelines and connection pits to connect the pipes to houses were delayed and not implemented during the project period, mainly because of the lack of budget of the Palestinian Authority.

¹¹ Based on “Preparatory Survey Report”.

Table 4. Plan and Actual Situations of the Palestinian Portion

Facilities and Equipment		Plan	Actual
W W T P	Land Acquisition for WWTP	13ha	As planned
	Fences of WWTP	1,710m	2.2km
	Construction of Access Road	1,380m	1,5km (about a 1-year delay, completed in 2015)
	Electricity Transmission Line	About 800m	As planned
	Water Pipes	1km	1,5km
	Building for Security Guards		30 m ²
		(800 thousand US\$ in total, from PA Budget)	
Construction of Branch Sewer Pipes		About 16km	This has not been implemented during the project period.
Connection Pits		2300 houses	This has not been implemented during the project period.

3.2.2 Project Inputs

3.2.2.1 Project Cost

Project cost on the Japanese side was 2,650 million yen at the time of planning, and the final project cost was 2,650 million yen, which was the same as planned (100%).

At the time of planning, project cost for the Palestinian side was estimated at 272 million yen, including 43.2 million yen for the facilities of the wastewater treatment plant, 192.4 million yen for sewer pipes, 37 million yen for connection pits, and a bank commission charge, etc. Excepting the components of wastewater treatment plant, the construction works of the Palestinian side were not completed at the time of evaluation (in February 2018), and the total cost for the Palestinian side could not be clarified. After the completion of the construction works by the Japanese side in 2014, construction works of the Palestinian side are still in the process of implementation as a project of UNRWA in Aqbet Jaber Refugee Camp supported by Japanese Government Grant Aid, a USAID project in Jericho, and a project of Jericho Municipality using 110 million US\$ budget from the Ministry of Finance of Palestine.

Because the actual project cost for the Palestinian side cannot be examined, “efficiency” is evaluated based on the project cost for the Japanese side only.

3.2.2.2 Project Period

At the time of planning, the project period was 31 months, from September 2011 (start of the D/D) to March 2014, and based on the implementation schedule written in the Preparatory Survey Report. The actual project period was 33 months, from October 2011 (start of the D/D) to June 2014. (The starting point of the project is defined as start of the D/D instead of E/N or G/A because the D/D was the substantial start of the project. The completion was defined as the date of completion of construction and handover of facilities written in the Completion

Report.¹²⁾

According to the original plan, the construction works contract would be 8 months after the start of the project. However, the consulting service contract was concluded in October 2011 and the construction contract was concluded in April 2012. The duration was 6 months, which was faster than the plan. On the other hand, the completion of construction took 27 months and occurred in June 2014, 3 months longer than the original plan (24 months). The construction period of the wastewater treatment plant and main trunk sewer pipelines was extended, and the trial operation and handover of the facilities were delayed for 3 months in comparison with the original plan. Reportedly, the progress of the peace negotiations between Israel and Palestine generated a situation of serious labor shortage in Palestine and delayed the construction works.¹³ This is not an “external factor” such as a natural disaster, war and conflict, temporary evacuation resulted from security risks, etc.. Therefore, no specific considerations were taken in the judgment of efficiency.

Regarding the components of the Palestinian side, land acquisition for the wastewater treatment plant and the construction of fences, electricity transmission line, water lead-in pipes, and the building for security guards were implemented during the project period. However, construction of an access road to the plant was delayed one year and completed in 2015. Also, construction of a lead-in box for branch sewer pipelines and connections to houses has been seriously delayed and has not yet been completed.

Therefore, actual project period (for Japanese side) was 33 months, which exceeded the plan of 31 months (106.5%).

< Check Points of Project Evaluation in Conflict-Affected Country/Area >

Risk and Costs of Implementing Process of the Project

After the establishment of the cabinet led by Hamas in 2006, the relationship between Palestine and Israel deteriorated. Japanese assistance projects in Palestine were also affected and some projects were inevitably suspended at the time. However, the relationship between Palestine and Israel improved after 2010 and it was relatively stable during the project period. Direct negative impacts of the unstable political and security situations to the project could not be found.

¹² Because a starting point mentioned in the Ex-ante Evaluation Report was not clear, the project period was defined from the start of D/D (Detailed Design) to the date of completion of construction.

¹³ Based on JICA documents. It was reported that (1) Palestinian workers preferred to work in Israel where wages were higher under the relaxation of restrictions for work in Israel, and (2) USAID started a large scale project in Jericho and hired many workers for the project.

Although the project cost was same as the plan, the project period exceeded the plan. Therefore, Efficiency of the project is fair. (②)

3.3 Effectiveness and Impact¹⁴ (Rating: ②)

3.3.1 Effectiveness

3.3.1.1 Quantitative Effects (Operation and Effect Indicators)

Operation and effect indicators written in the ex-ante evaluation are shown in Table 5.

Table 5. Operation and Effect Indicators of the Ex-ante Evaluation

Indicators	Baseline (2010)	Target (2020)
Wastewater Treatment Amount (m ³ /day)	0	6,540
Pollutant Load of BOD (kg/day)	2,114	504
Concentration of BOD of Discharged Water (mg/l)	500	20
Reuse Water Amount (m ³ /day)	0	6,540

The project set its target year as 2020, based on the estimated population of 6 years after the completion of the project. The target value was calculated based on the assumption that “the situation which all the wastewater generated by 40 thousand residents was penetrating underground, would be improved to the situation which 68 % of wastewater generated by planned service population of 53 thousand would be collected and treated through the system in the target year of 2020.”¹⁵ The wastewater treatment plant was designed to have a maximum capacity of treating 9,800m³/day.

As already mentioned in the section of “Appropriateness of the Project Plan and Approach” under “Relevance,” the target values in 2020 were calculated based on the excessive assumption of the target population, amount of wastewater, load of BOD, etc., and the target values were revised to more realistic figures in December 2017 after the completion of the project. Since there was no revision of the target values during the project period between 2011 and 2014, the judgment of “Effectiveness” should be based on the comparison between the original target value at the time of planning (written in the Ex-ante Evaluation) and actual values. Table 6 shows the baseline data of 2010 at the time of planning, original target values for 2020 (written in the Ex-ante Evaluation), actual values for each year after the completion of the project in June 2014, and the latest actual values in April 2018.

¹⁴ Sub-rating for Effectiveness is to be put with consideration of Impacts.

¹⁵ Preparatory Survey Report, page V.

Table 6. Main Operation and Effect Indicators (Baseline, Target, and Actual Values)

Indicators	Baseline	Target	Actual				
	2010	2020 (6 years after completion)	June 2014	June 2015	June 2016	June 2017	April 2018
			Completion Year	1 year after completion	2 years after Completion	3years After Completion	3years & 10 months after Completion
Wastewater Treatment Amount (m ³ /day)	0	6,540	0	188	419	814	1,090
Pollutant Load of BOD (kg/day)	2,114	504	N.A.	N.A.	N.A.	N.A.	1,495
Concentration of BOD of Discharged Water (mg/l)	500	20	N.A.	N.A.	N.A.	N.A.	10
Reuse Water Amount (m ³ /day)	0	6,540	0	0	364	686	890

(note) Baseline and target values were based on the Ex-ante Evaluation. Actual values were based on the data from Jericho Municipality.

Ex-post evaluation was conducted in FY2017, which was almost in the mid-term between the year of the completion of the project (June 2014) and the target year of 2020. The achievement rates of the target values were calculated based on the latest data at the end of April 2018. As one plausible roadmap to reach target values, the evaluator set a straight line with the starting point as the time of completion of the wastewater treatment plant to target point in June 2020 (6 years [72 months] after the completion). If the expected mid-term target value at the time of evaluation is calculated base on the straight line, the value at the end of April 2018 (which is 46 months after the completion) should be 63.9% of the original target value in 2020 (46 months ÷ 72 months).

Table 7 shows the baseline values in 2010, the target values in June 2020 (6 years after completion) set at the time of planning, the expected mid-term target value for April 2018 (63.9% of the original target), the actual value at the time of ex-post evaluation in April 2018, and the achievement rates in terms of the 4 indicators.

Table 7. Main Operation and Effect Indicators

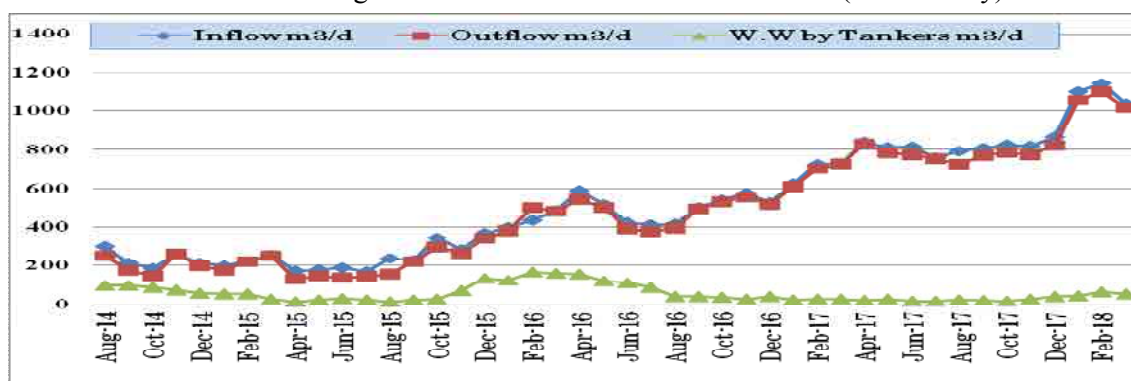
Indicators	Baseline (2010)	Target (2020)	Mid-term target at the time in April 2018 (63.9% of the target) (*note)	Actual at the time of evaluation (April 2018)	Achievement Rate (%)
Wastewater Treatment Amount (m ³ /day)	0	6,540	4,179	1,090	26.1
Pollutant Load of BOD (kg/day)	2,114	504	1,085	1,495	72.6
Concentration of BOD for Discharged Water (mg/l)	500	20	20	10	achieved
Reuse Water Amount (m ³ /day)	0	6,540	4,179	890	21.3

*(Note) 63.9% of original target values in the case of drawing a straight line from the starting point of 0 (zero) in 2010 to target point in June 2020, excluding the value of concentration of BOD (water quality).

As Table 7 shows, the actual value of wastewater treatment amount was 26.1% of the mid-term target value (16.7% of the original target of 2020), and the actual value of reused water amount was 21.3% of the mid-term target value (13.6% of original target of 2020). Therefore, the achievement rates of those indicators were less than 50%. The achievement rate of the pollutant load of BOD was 60.2% of the mid-term target value (38.4% of the original target), and the concentration of BOD (water quality) achieved, exceeding the target value.

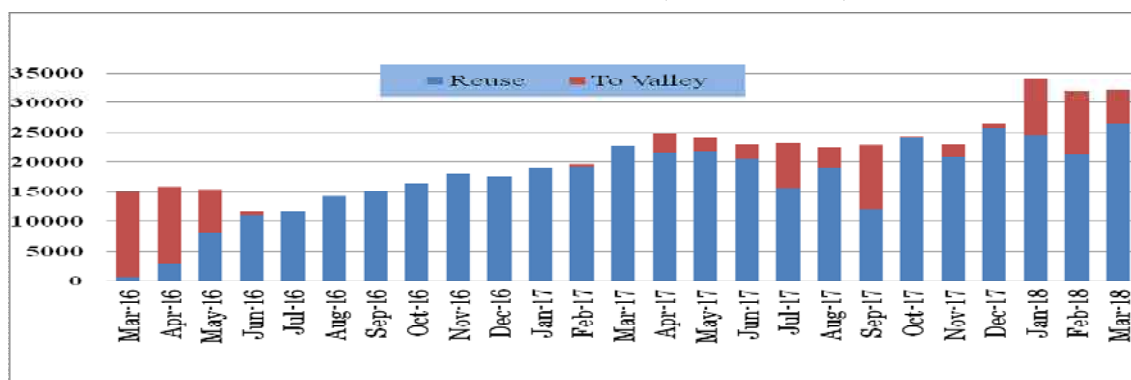
Chart 2 shows the changes in the average amount per day of wastewater treatment from 2014, the completion of the project, to February 2018. Chart 3 shows the changes of the reused water amount per month since March 2016, the time operation began. The amount of reused water was expected to be the same as the amount of wastewater treatment at the time of planning; however, the solids in wastewater would be reused for other purposes as solid waste, and the amount of reused water should be less than the amount of treated wastewater. (At the time of ex-post evaluation, solid waste had not yet been reused and is being kept at the wastewater treatment plant site because the legal framework for the regulation of water reuse has not yet been decided.)

Chart 2. Changes of Amount of Wastewater Treatment (unit: m³/day)



(Note) Based on the document of Jericho Municipality

Chart 3. Amount of Reuse Water (unit: m³/month)



(Note) Based on the document of Jericho Municipality

The amount of treated wastewater depends on the progress of the construction of the branch sewer network and connections to houses. Although those construction works are the components borne by the Palestinian side, the target value of treated wastewater amount may not be achieved without the completion of the construction of the branch sewer network and house connections. The judgment of the Effectiveness and Impacts of the project also depends on their progress. After the completion of the Japanese side's construction work in June 2014, several assistance programs have been implemented to support the progress of the components borne by the Palestinian side in addition to their own efforts. The programs are as follows:

(1) Construction of the house connections supported by and using the budget of the pilot projects of JICA's "Technical Assistance and Capacity Building Project for the Jericho Sanitation" (December 2012~March 2018): 246 house connections in pilot project 1 (PP1) by 2014 (Budget; US\$236,000), and 645 house connections in pilot project 2 (PP2) after 2014 (Budget; US\$741,000).

(2) Construction of the branch sewer network supported by USAID (Jericho Collection System Expansion Project): 13.1km for a population of 5,500 (about 25% of the population of Jericho Municipality) was supported by Phase 1A (November 2014-November 2015) (4.45 million US\$), and 23.5km for a population of 23,220 (about 45% of the population of Jericho Municipality) is now under construction in Phase 1B (2017- 2019 [plan]). This project covers almost 70% of the population of Jericho Municipality, and will be completed by 2019. This cover ratio was estimated by USAID based on the population in Jericho Municipality. It should be noted that population of refugee camp was excluded from this calculation because refugee camp is not a target of the USAID project.

(3) Jericho Municipality has improved 3.95km of branch sewer pipelines and 500 house connections through PP3 (248 thousand US\$), and plans to improve 650 house connections through PP4 (budget from the Ministry of Finance of the Palestinian Authority and the counterpart fund of non-project grant aid provided by the Japanese government).

(4) As a result of the progress of the projects mentioned above, the number of house connections (the numbers of connected households and connections to sewer pipelines) has been steadily increasing, as shown in Table 8. The number of connected houses has increased to 1,936, which was 38.3% of the target number of 2020 ($747 \div 1,952$). The number of connections to sewer pipelines was 747 at the end of 2017, which was 86.7% ($737 \div 850$) of the target number written in the *Strategic Business Plan 2014-2020* of Jericho Municipality. House connections have been progressing in recent years.

Table 8. The Increase of the Number of House Connections
(Actual number of each year and target number in 2020)

	Actual					Target
	End of 2014	End of 2015	End of 2016	End of 2017	End of March 2018	2020
Number of connected households	246	n.a.	891	1,836	1,936	n.a.
Number of connections to sewer pipelines	104	433	498	737	747	
Target value of each year in <i>Strategic Business Plan</i> of Jericho Municipality *	89	497	581	850	n.a.	1,952

(Note) Based on the interviews and documents provided by the Jericho Municipality

* Target value of *Strategic Business Plan* is based on the number of connections to sewer pipelines.

(5) Construction of the Sewerage System in Aqbet Jaber Refugee Camp was implemented by UNRWA in 2017, with grant aid in the supplementary budget (FY2017) from the Japanese government. Package No.1 of the construction (500 households, population of 3,451) was completed in 2017.¹⁶ Packages No.2-4 of the construction (1200 households, population of 8,850) are planned for 2018-2019, with the Japanese government's grant aid to international organizations (FY2018).

3.3.1.2 Qualitative Effects (Other Effects)

“Improvement of the living and sanitation environment of the residents”, “increase of agricultural production” and “Confidence building between Palestine and Israel,” mentioned as “qualitative effects” in the Preparatory Survey Report, should be regarded as “Impacts” of the project. Therefore, those items were moved to the section of “Intended Impacts” in this report. (Since those items should be regarded as “Impacts,” the objectives of the project were also revised in this ex-post evaluation, as mentioned in the section of “1-2. Outline of the Project.”)

3.3.2 Impacts

3.3.2.1 Intended Impacts

In the Ex-ante Evaluation and the Preparatory Survey Report at the time of planning, the following items were stipulated as “qualitative effects,” and but are now examined as “Impacts” of the project in this ex-post evaluation report.

As beneficiary interviews of the project, interviews were conducted of some beneficiaries, such as the residents, farmers, and other groups (major hotels, schools, shops, etc.) in Jericho

¹⁶ Construction of house connections for 500 households was completed, but 20-30 households could not use the wastewater pipelines because of the problem of the construction work. (Based on interviews with the People's Committee and local households.) It was reported that these problems have been improved by extending the fixing period by the contractor from 1 year to 3 years.

Municipality and its surrounding area as well as residents and peoples' committees in refugee camps. Precisely speaking, 4 farmers who buy reused water in Jericho Municipality, 6 households in the residential area (where house connections were already completed), management at 2 hotels in Jericho Municipality, 2 shops in the center of Jericho Municipality, and 2 schools were visited and interviewed.

In Aqbet Jaber Refugee Camp, our evaluation team visited 2 households to check the situations of wastewater facilities, and also conducted a group interview with the chairperson, 4-5 members of people's committee, and experts from the UNRWA. In addition, I conducted interviews about the situations and future plans of wastewater treatment with the Japan Agricultural Industrial Park (JAIP), a local office of "the Jericho Park" project, Ain Sultan Refugee Camp, and the joint council of Nwaeima and Duyuk, which were included in the target areas of the initial plan but were unable to realize construction of a wastewater network.

(1) Improvement of Living and Sanitary Situations of Residents

Based on the interviews of households, individuals perceived an improvement of sanitary situations, raising examples that there was no longer overflow of wastewater in roads and that trouble with the neighboring families had abated. They must have asked a vacuum car to collect wastewater periodically and paid for its cost, which was not small and more expensive than the fee for wastewater services. I received responses from 2 schools in Jericho Municipality indicating that they previously needed to hire vacuum cars periodically to collect wastewater because the bad smell and unsanitary conditions hindered students' studying. Sanitary conditions at schools became better after the connection lines had completed.

However, connections to households and schools have just begun, and the covering rate of wastewater treatment service is still low. Therefore, I cannot clarify the impacts of the project regarding changes in the sanitary situations and health conditions of the people in Jericho Municipality.

One of hotels answered that they had their own wastewater treatment facility, but they were able to increase the amount of treated wastewater from 100m³/day to 150 m³/day after the completion of the new wastewater treatment plant. They also mentioned that they recognized the benefits of decreasing odors. However, logic generating impacts on the increase or decrease of tourists in this area could not be identified.

The impact of the project on "cleaner streets in the city," which was mentioned at the time of planning, was difficult to identify objectively. Construction work was delayed in the center of Jericho Municipality where there are many shops, because construction work of wastewater pipelines will stop traffic and hinder their business for a period of time and some shops ask for compensation.

(2) Increase of Agricultural Production

An increase of agricultural production in Jericho Municipality and its surrounding area by using reused water was expected as an impact of the project. Private agriculture companies began to reuse the treated water, which was limited to use for cultivation of dates by farmers in the surrounding area of the wastewater treatment plant. At the time of ex-post evaluation, only 5 farmers were using the treated wastewater, so it was difficult to find the project's impact on the increase of agricultural production in the area as a whole. Those farmers using the treated water said, "Date trees can grow faster and yield better." (See the Column below.)

At the time of planning, it was expected that sludge subsidiarily generated from wastewater treatment would be dried and sold as soil for agriculture. For that purpose, it is necessary to formulate a legal framework and guidelines for selling the sludge as soil for agricultural use and to decide the selling price through negotiations between the Ministry of Agriculture and PWA. The negotiation is ongoing and has not yet been concluded. The sludge has accumulated at the site of the wastewater treatment plant, and is waiting for the time when it can be sold.

(3) Contribution to Reduction of CO2 Emission

At the time of planning, it was expected that "CO2 emission could be reduced to half of other existing wastewater treatment plants in other cities by introduction of energy-saving equipment and installation of solar panels."

In fact, the power required for the plant operation can be acquired from (1) solar panels installed at the site of the plant, and (2) purchase of electricity generated by solar panels of Jerusalem District Electricity Company (JDECO) located next to the plant.

Solar panels installed at the site of the plant can generate solar power up to 700kWh/day in a clear day and nearly 600kWh/day on average during summer months, which is almost 30% of the necessary power for the operation of the wastewater treatment plant. However, power generation by those solar battery panels is less on cloudy days during winter from November to January. On the other hand, the power from JDECO can be purchased at cheaper rate because the Jericho Municipality invested 40% of the capital fund to construct solar panels at JDECO in the area next to the plant. However, the power purchased from JDECO is not always generated by the solar panels, and the amount and price of the electricity are unknown.

Column: Utilization of Reuse Water

Agriculture is the main industry in Jericho Municipality and the surrounding areas because of their warm climates. However, it is difficult to develop new water resources due to the relationship with Israel, adjacent to the area. Therefore, reuse of treated wastewater is expected to be a new water resource for agriculture.

The treated wastewater began to be provided to farmers in the area surrounding the wastewater treatment plant in April 2016, and was supplied to 5 farmers in total at the time in April 2018. Those farmers installed connection pipes to their farms and distribution pumps at their own expense.

Table 9 shows the summary of interviews of 4 farmers (among the aforementioned 5 farmers) who utilize treated water from the plant. At the time in April 2018, one more farmer was in the process of making an official contract, and 3 more farmers were on the waiting list for receiving the treated water. The needs for reuse water are large, and the amount of reuse water which can be purchased by one farmer house is limited to 100m³/day in the contract. (The farmer who concluded the first contract to use the treated water is allowed exceptionally to use the reuse water of 150m³/day.)

All farmers answered that their production of dates has increased by using the reuse water, and would like to increase their production by extending the cultivation area if they could obtain access to more reuse water.

Table 9. Summary of Interviews of Farmers Who Buy and Use Treated Water

	Date of contract	Volume of reuse water (m ³ /day)	No. of date trees	Situations of utilization and benefits of reuse water
Farmer No.1 (A)	April 18, 2016	150	2000	Previously, he had a well only, and he still uses the well. There was no yield previously because of young trees, but now it is 120 tons/year. He is the first farmer using treated water. Other farmers were hesitant to use treated water, but he explained to other farmers that reuse water was beneficial.
Farmer No.2 (I)	August 1, 2016	50	4000	He farms a lot of land, uses well water, and purchases other water, too. He can save money for fertilizers by using reuse water. (The yield is almost the same.)
Farmer No.3 (S)	October 10, 2016	100	1500	Date trees grow faster when utilizing treated water. The yield per tree increased.
Farmer No.4 (N)	November 1, 2016	100	1400	Previously, he used a well (his trees were young), but now uses reuse water only because the well dried up. Yield has increased to 60 tons by utilizing treated water.
Farmer No.5 (A)	April 9, 2017	50	n.a.	No interview



An example of date farms using treated water

3.3.2.2 Other Positive and Negative Impacts

(1) Impact on the Natural Environment

In advance of construction, the Environmental Impact Assessment (EIA) was conducted in accordance with the environmental law by the Environment Quality Authority (EQA) and no major problem was observed. There are no residential houses in the surrounding area of the plant, no industrial wastewater, sludge generated by the wastewater treatment plant is treated and kept inside of the site of the plant, and treated water is reused for agriculture. The person in charge of EQA (director) visits the plant and checks the environmental impact regularly (approximately once a month) after the completion of the plant.¹⁷ There are no complaints from residents because there are no residential houses in the surrounding area of the plant.¹⁸

According to the “Smell Survey”¹⁹ conducted by the consultant of “Technical Assistance and Capacity Building Project for the Jericho Sanitation” in 2016, there was no problem in terms of smell of the treatment plant. However, there were some bad smells stemming from a waste landfill site and a large cow stockyard near the plant.

(2) Resettlement and Land Acquisition

The wastewater treatment plant is located in a remote area from the center of Jericho. It is on land which is owned by the Palestinian Authority with no residents. Therefore, there was no resettlement of residents.

Although there was a minor change of the location of the plant from the originally planned site, there was no acquisition of new land for the construction of the plant.

< Check Points of Project Evaluation in a Conflict-affected Country/Area >

① Effectiveness: Risks in the Process of Project Implementation

Palestine has been facing budgetary deficit continuously. International donors, such as European countries and the U.S., have been providing assistance, including budgetary support to Palestine, but a financial gap has still exists. Therefore, the project component of the Palestinian side was usually difficult or delayed in implementation due to lack of budgetary support. In this project, the components of the Palestinian side were delayed in implementation (such as the construction of branch sewer pipelines and house connections in Jericho Municipality) or there seems to be no prospect regarding when the project's

¹⁷ Based on the interview to EQA. The headquarter of EQA is located in Ramallah. Its branch office in Jericho was established in 2016, and thereafter inspections by the EQA began to be conducted regularly.

¹⁸ Based on the interviews of the director of the Jericho EQA Office and a manager of the wastewater treatment plant of Jericho Municipality.

¹⁹ The smell survey was conducted by local contractor, which measured 6 items (ammonia, hydrogen sulfide, volatile organic matter, temperature, humidity, and wind velocity) at 5 locations surrounding the WWTF.

budget will be secured (such as the plans of construction of the wastewater network in two surrounding LGUs (Local Government Units)). The financial constraints of the Palestinian side have made a large impact on the effectiveness of the project. It is uncertain whether the necessary risk hedge measures were considered for reducing the impact on the project.

② Impacts: Impact on Unstable Factors

It was mentioned in the Preparatory Survey Report, “The Palestinian efforts of preserving the environment and underground water would contribute to the confidence building between Palestine and Israel because it would benefit Israel who shares the same underground water resources.” This impact could not be verified because I could not conduct interviews of Israeli side.

< Summary of Effectiveness and Impacts >

Since the target values were set for 2020, the target value at the time of ex-post evaluation in 2018 is not clear. Given that the amount of inflow of wastewater is still limited, it is highly probable that the target values have not yet been achieved at the time of writing. On the other hand, since the target values at the time of ex-post evaluation are not clear and it is difficult to get accurate achievement rates of target values, Effectiveness of the project is regarded as fair.

The impacts of the project can be identified in the area where wastewater treatment service is provided and reuse water from the plant is utilized. However, its impacts are limited in the target area of the project as a whole because the amount of wastewater treatment is still limited.

Therefore, Effectiveness and Impacts of the project are fair. (②)

3.4 Sustainability (Rating: ②)

3.4.1 Institutional / Organizational Aspects of Operation and Maintenance

Although the executing agency of the project was the PWA, the actual body responsible for the operation and maintenance of the facilities is Jericho Municipality. The PWA is the competent authority of the project. Moreover, the staff of the section of wastewater service in Jericho Municipality is engaging in the operation and maintenance of the wastewater treatment plant and wastewater related facilities in the city and its surrounding area. The wastewater service section was newly established in 2014, when the wastewater treatment facilities were completed. At the time of the section’s establishment in 2014, the number of staff was 13 in total: 10 for the wastewater treatment plant, including a manager of the section, and 3 for wastewater pipelines, including house connections.

The number of staff in the wastewater service section was still 13 when the defect inspection was conducted in June 2015. The inspection report mentioned that the minimum number of necessary staff was hired but some were part-time. Therefore, the staff is also the minimum for

normal operation of the plant, and not enough for responses in cases of emergency.²⁰ The number of staff increased after the defect inspection with 15 permanent staff and 2 part-time staff employed at the end of 2017. (The increase of the number of permanent staff to 15 was a result indicator of the “Technical Assistance and Capacity Building Project for the Jericho Sanitation” and it was achieved.) After that, 2 part-time staff (for mechanical issues and water quality checks) became permanent staff (17 in total), and the situation had been improved at the time of ex-post evaluation in April 2018.

More precisely speaking, the wastewater treatment plant is operated by 3 staff members—a manager, engineer, and worker—in 4 shifts (every 6 hours, only one staff at night). The wastewater treatment plant has 2 lines, but only one line is in operation while another is suspended due to the lack of treated wastewater. The suspended line is sometimes put into operation for maintenance and is kept properly. Wastewater pipelines are maintained by one manager and 3 workers who have good skills, and no problem was found in terms of their ability for maintenance.

A challenge for the future is whether the current system is sufficient for the management and maintenance of the wastewater treatment facilities and pipelines in the case that the amount of wastewater increases. As to the wastewater treatment plant, it seems possible to maintain the plant with the current system. Regarding the wastewater pipelines, high pressure cleaners were already introduced and it seems possible to conduct regular maintenance with the current system for next 5 years. Yet, the system needs to be strengthened when the facilities and pipelines will deteriorate after 10 years and onward.

3.4.2 Technical Aspects of Operation and Maintenance

Among major municipalities in Palestine, Jericho Municipality was the only municipality where no wastewater network had been constructed, and it had no experience of implementing wastewater projects. Therefore, the Engineering Department of Jericho Municipality was in charge of the project until the completion of the construction of the facilities. In the technical maintenance section of the Service Department, there are only a few mechanical engineers engaging in the maintenance of an existing water pumping plant.²¹

Therefore, in parallel with this project, “Technical Assistance and Capacity Building Project for Jericho Sanitation” was implemented from December 2012 to March 2018. The project goal of the technical cooperation project was “to establish a system for operation and management of sewage works in Jericho municipality”, and the indicator of “output 2” of the technical cooperation project, which was “to develop capacity of Jericho municipality for appropriate

²⁰ A document provided from JICA.

²¹ Based on “Preparatory Survey Report” pp.2-3.

operation and maintenance of the sewage treatment”, was mostly achieved.²²

At the time of this ex-post evaluation, the number of staff of the wastewater service section of Jericho Municipality is relatively small. However, they are considered to have enough technical skills in terms of technology, management, and finance because no major problems could be found in the constructed wastewater treatment plant and pipelines and there were no major complaints from users of the wastewater service. The manuals of operation and maintenance were formulated, maintenance records were written properly, and minor repair works were conducted on a daily basis by the staff.

“Technical Assistance and Capacity Building Project for Jericho Sanitation” was implemented as planned, although the project period was extended half a year. The technical cooperation project was planned to complement the Grant Aid project of construction of the wastewater treatment facilities, and supported strengthening the capacity of management of wastewater treatment service of Jericho Municipality. In its pilot projects, the technical cooperation also implemented some of the construction works of house connections in Jericho Municipality to supplement the component that was supposed to be borne by the Palestinian side. There was no wastewater network and no wastewater treatment service section in Jericho Municipality at the start of the Grant Aid project in 2011. With regard to this fact, the technical cooperation project was a necessary project to develop the capacity of management of wastewater service in Jericho Municipality, and by working in combination with the Grant Aid project to construct wastewater facilities, two projects had complementary relationship each other.

In the Preparatory Survey Report, “technical accumulation will be available in Jericho Municipality staff and it will spread to nearby areas” was mentioned as a qualitative effect. In fact, the wastewater treatment plant of Jericho Municipality has received several visits of wastewater service staff from other municipalities, such as Al-Bireh, Nablus, Jenin, and Jericho Municipality hosted a seminar for waters suppliers union in 2016. However, there was no record of cases in which staff of Jericho Municipality visited to other municipalities to transfer their own experiences. In addition, staff of Jericho Municipality did not provide any technical advice to the wastewater project in the refugee camp because the area is under UNRWA jurisdiction.

3.4.3 Financial Aspect of Operation and Maintenance

The financial management of wastewater service was coupled with water service in Jericho Municipality. Water service has been financially supported by a water tariff paid by users, and

²² Based on “Terminal Evaluation Report” of the Technical Assistance and Capacity Building Project for Jericho Sanitation.

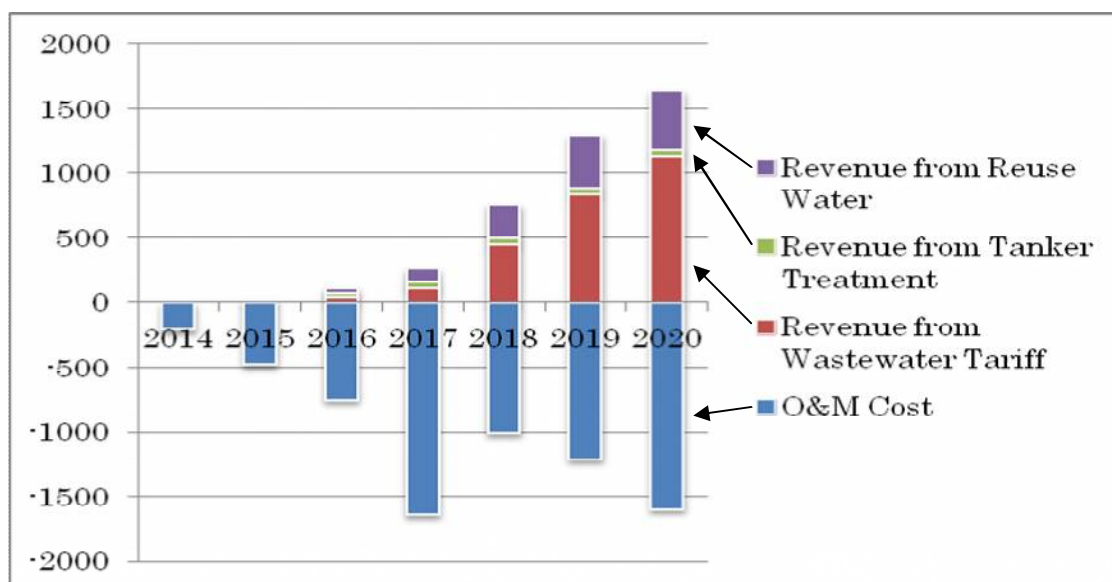
without any subsidies from the budget of Jericho Municipality. At the time of planning, the financial status of the water sector service was considered as healthy due to efforts such as revision of the water tariff system and improvement of the tariff collection rate.²³

After the completion of the wastewater treatment facilities in 2014 and development of wastewater treatment service, the financial status of wastewater service has been facing a deficit and the extent of the deficit has been increasing.

Because the wastewater treatment plant was completed in 2014 and the wastewater pipelines are still new, the maintenance cost of the wastewater treatment plant and pipelines has not yet become a large financial burden. On the other hand, construction of branch sewer pipelines and house connections must be finished to complete the wastewater network, and its budget is already insufficient. Although the number of house connections has been increasing, the low collection rate of the wastewater tariff is a major cause of financial deficit.²⁴

The collection rate of the wastewater tariff after the start of wastewater service was about 9% in 2015, and has been improved gradually after that. However, it is still limited to about 24% during the entire period between 2015 and 2017. There is data showing that the collection rate of the wastewater tariff in the area of PP1/PP2 is limited to about 17% for the newly installed part.²⁵ It has been reported that large governmental and security organizations have a tendency not to pay the tariff, and their share of unpaid tariff is about 30% of the total (monetary basis).

Chart 5. Estimates and Actual Financial Balance of Wastewater Service (unit: thousand sheqel)



(Note) Jericho Municipality, *Strategic Business Plan 2014-2020*.

Actual values are before 2017; estimate values are after 2018. Revenue: more than 0, Expenditure: less than 0.

²³ Based on "Preparatory Survey Report" pp.2-4.

²⁴ Detailed data of the financial status of water sector as a whole (including water service) could not be obtained.

²⁵ Based on interviews to the staff of Jericho Municipality.

To improve the tariff collection rate, some methods such as integrated collection of water tariff and wastewater tariff, introduction of prepaid meters, increase of staff for tariff collection (shift from another section), and measures to collect unpaid tariff from large users were proposed, and some have already been implemented. However, it is uncertain whether the collection rate has improved or not due to those efforts because large (governmental) users themselves are also facing serious financial situations.

As shown in Chart 5 (Estimates and Actual Financial Balance of Wastewater Service), Jericho Municipality forecasts that the financial deficit of wastewater service will be improved after 2018. However, there are some risks in their assumption.

Firstly, there are some challenges to increase revenues as follows:

- ① The amount of wastewater from JAIP is expected to increase in the plan. However, it has not increased as expected because industrial waste of some companies in JAIP is difficult to be received and this problem must be solved.
- ② The amount of wastewater from Aqbet Jaber Refugee Camp is expected to increase in accordance to the progress of construction of the wastewater network in the camp. However, collection of the wastewater tariff from users of wastewater service in the refugee camp is uncertain.
- ③ In accordance to the progress of construction of house connections in the projects of Phase 3 and Phase 4 of Jericho Municipality, it is expected that users will pay for the cost of house connection and collection rate of wastewater will be 100%. In reality, the cost of the house connection was not usually paid in previous cases, although the unpaid tariff is a credit in the financial account of Jericho Municipality. Jericho Municipality must make efforts to increase house connections and also collect the tariff from the beneficiaries. ²⁶

Secondly, there are some challenges in their estimates of expenditures as follows:

Since the wastewater treatment plant and pipelines are relatively new, it is expected that the maintenance cost will not be large for some years. This expectation is based on the assumption that large scale repair will not be necessary, although some spare parts will likely be required. However, the maintenance cost might increase due to malfunction and trouble with equipment as it deteriorates. In addition, the number of staff might need to be increased for maintenance, including staff for using a jet cleaner car, etc. There is a risk in keeping sufficient budget funds for increasing maintenance costs in the future.

Therefore, the forecast that the financial balance of wastewater service will be improved is not certain in terms of both revenue and expenditure. It is probable that the financial deficit will

²⁶ Jericho Municipality has made some efforts to improve financial sustainability, such as introduction of unified billing system, installing prepaid water meters, and issue of the Clearance license, which verifies citizen does not have any debts to the Municipality.

continue. To avoid such situations, it is important for Jericho Municipality to make urgent efforts to balance revenue from tariffs with expenditure for wastewater service.

3.4.4 Status of Operation and Maintenance

The staff of Jericho Municipality began operation of the wastewater treatment plant in August 2014. There is no major problem in the plant's operation of wastewater treatment and discharge.²⁷

After the completion of the facilities in 2014, there were three major troubles in parts of the plant in 2015 as follows:²⁸

- ① Vacuum Sludge Pump No.2: repair (October-November 2015)
- ② Thickened Sludge Pump No.1, 2, 3: repair (November 2015)
- ③ Return Sludge Pump No.2: exchange (November 2015)

All problems were solved properly either by repair or exchange of equipment by the contractors of the project at their own expense under defect liability warranty. There were no major damages and troubles after that. There were minor problems such as inflow of rainwater into the machine room, asphalt depressions on the road surface, and peeled painting on the sludge tank. However, those issues did not cause any problems for the operation of the plant. There was minor water leakage from pipes, which was fixed by the staff. No problems could be found in terms procured equipment such as water quality analysis equipment. Consumable supplies such as chemicals have been purchased by Jericho Municipality.

< Check Points of Project Evaluation in Conflict-Affected Country/Area >

Risks in the Process of Project Implementation

After the new administration of President Trump was established in January 2018 in the U.S., the U.S. government adopted the policies of moving the US Embassy in Israel from Tel Aviv to Jerusalem and reducing US aid to the Palestinian Authority and budgetary support for UNRWA. These US policies not only further deteriorated the relationship between Palestine and the U.S., but also worsened the financial situations of the Palestine Authority and UNRWA. It would make it more difficult for the Palestine Authority and UNRWA to implement their project components by using their own budgets, and their financial risks have been increasing. This increase of financial risk could not have been expected at the time of planning. As mentioned in the "section 3.3. Effectiveness", Phase 4 of the project of Jericho Municipality to increase house connections and Phase 2 of UNRWA's project of constructing a sewerage network in the refugee camp have been already supported by the budget provided

²⁷ A document provided by JICA.

²⁸ Interview of the staff of the Wastewater Treatment Plant.

by the Japanese government. However, the progress of the USAID project (1B) of constructing sewer networks and the financial situation of Jericho Municipality should be monitored.

Thus, no major problem could be found in terms of operation and maintenance of the wastewater treatment facilities and pipelines, the maintenance system, and the technical aspect even though the number of staff is still small. In terms of the financial aspect, the collection rate of wastewater tariff is still low. It is highly probable that the situation of deficit in the financial balance of wastewater sector will continue without the improvement of the tariff collection rate. Efforts to improve the tariff collection rate have already been made, but there are still uncertain factors regarding the improvement of the financial balance of the service.

Therefore, no major problems have been observed in the institutional and organizational aspect, technical aspect, and current status of the operation and maintenance system. However, some problems have been observed in terms of the financial aspect. Therefore, Sustainability of the project effects is fair. (②)

4. Conclusion, Lessons Learned, and Recommendations

4.1 Conclusion

The objective of the project is to construct wastewater treatment facilities and reuse the treated wastewater for Jericho Municipality and its surrounding area, which will extend wastewater treatment services and keep water resources, and thus improve sanitary conditions and contribute to the development in the district.

The project was consistent with the development policy and the development needs of Palestine and Japan's ODA policy toward Palestine. However, at the time of project planning, there was a problem in the plan regarding the estimation of the amount of wastewater treatment and the examination of the feasibility of the components borne by the Palestinian side. Therefore, its Relevance is fair. (②)

The project cost of the Japanese portion was the same as planned. Nevertheless, since the project period exceeded the planned period (106.5%), Efficiency of the project is fair. (②)

The target year for generating the development effects was set for 2020. Yet, at the end of April 2018 (3 years and 10 months after the completion of the project), the achievement rates of the main indicators of effectiveness, such as the wastewater treatment amount and reuse water amount, were less than 50% of the planned target values for 2020 (written in Ex-ante Evaluation Report). Therefore, it is highly probable that the target values cannot be considered as achieved. However, it is difficult to estimate the exact target values at the time of evaluation in 2018, and to find clear evidence that the project effects were lower than the target. Therefore, the project

Effectiveness is fair. The positive impacts of the project are mostly observed. Therefore, this project has achieved its objectives to some extent, and Effectiveness and Impacts of the project are fair. (②)

As to the operation and management of the project, there are no major problems in terms of the organizational and technical aspects, but there are some problems regarding the financial aspect. Therefore, Sustainability of the project effects is fair. (②)

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

4.2 JICA's Contribution and Role

To realize and enhance the effects of wastewater treatment facilities in Jericho Municipality and its surrounding area, several projects have been implemented with the support of JICA. These projects include, in addition to this Grant Aid project of Japan and technical cooperation project of JICA, construction of a sewerage system in Aqbet Jaber Refugee Camp by UNRWA, construction of branch sewer network in Jericho Municipality by USAID, project of house connections by Jericho Municipality,. The outline and the background of those related projects and JICA's contribution and role are summarized as follows:

(1) JICA's Technical Cooperation Project named "Technical Assistance and Capacity Building Project for the Jericho Sanitation." This technical cooperation project started in December 2012 and was completed in March 2018. It was formulated to complement the Grant Aid project for technical support at the start of the Grant Aid project in February 2011. By being put together with the (Grant Aid) project to construct facilities, this technical cooperation project aimed to enhance management capacity for the Palestinians, and the two projects had a complementary relationship with each other.

(2) USAID's "Jericho Collection System Expansion Project (Phase 1A/1B)". Phase 1A project to construct branch sewer pipelines was implemented from November 2014 to November 2015 for one year. Although the wastewater treatment plant and main trunk pipelines were constructed, it was essential for constructing a branch sewer network to make the wastewater treatment network effective. Under the circumstances, USAID decided to provide assistance to Jericho Municipality. Phase 1B project is being implemented from October 2017 to December 2018 (will extend to March 2019). JICA Palestine Office requested USAID to continue their project to extend the amount of treated wastewater in Jericho Municipality in close collaboration with JICA. The joint effort enabled the steady increase of house connections in the city area of Jericho.

(3) UNRWA's project to construct a sewerage system supported by the Ministry of Foreign Affairs of Japan (Representatives of Japan [RoJ] in Palestine). Although the Grant Aid project constructed the wastewater treatment plant based on the assumption that the plant would treat

the refugee camp's wastewater, there was no budget for UNRWA to construct a sewerage network in refugee camp, which was outside of the administrative boundary of Jericho Municipality. The Japanese government then decided to provide budgetary funds to UNRWA for constructing a wastewater network in the camp. Phase 1 was supported by the Grant Aid of Japanese government using the supplemental budget of FY2015, which was given to UNRWA in February 2016 and was implemented in 2017. Phases 2-4 were supported by using the aid scheme of "Grant Aid to an International Organization" in 2017, and will be implemented between 2018 and 2019.

(4) Project of Jericho Municipality using counterpart fund of Non-Project Grant Aid of the Japanese government.²⁹ To overcome situations in which construction of house connections in Jericho Municipality was not implemented due to budgetary constraints the Palestinian Authority agreed to use 1 million US\$ from the counterpart fund of Non-Project Grant Aid provided by the Japanese government to the Palestinian Authority (Ministry of Finance) for constructing the wastewater network in Jericho Municipality. The negotiation between the RoJ and the Palestinian Authority on this issue began in 2015, but it took time for negotiation, with both sides finally agreeing in late 2017. This component can be regarded as a typical collaboration project of using the counterpart fund of Non-Project Grant Aid provided by the RoJ and the JICA project.

Several efforts were made to provide technical assistance for capacity building of the Palestinian side by formulating several related projects in response to the delay of implementing the Palestinian side's components because of its budget shortage. These efforts can be regarded as a program-based approach to make projects more effective. On the other hand, the related projects (2, 3, 4 mentioned above) were implemented after the completion of the project in June 2014 as a response (as symptomatic therapy) to the delay of the implementation of the Palestinian components. It would have been better if these related projects could have been planned from the beginning and implemented during the project period to create synergetic effects among them.

4.3 Recommendations

4.3.1 Recommendations to the Executing Agency (PWA)

(1) The PWA should make efforts, such as getting its budget, to realize the plan of construction works of sewer network in the areas of the surrounding 2 LGUs of Nwaeima and Duyuk and Ain Sultan Refugee Camp, which were included in the target areas of the project but

²⁹ By using the fund provided by the Japanese government as non-project grant aid to improve the budgetary situations of the Palestinian Authority, the Palestinian Authority buys gasoline and diesel oil from a third country. The Palestinian Authority then sells the goods in Palestine, and uses the money (counterpart fund) for development purposes.

have not yet received any support for the improvement of sewer network.

4.3.2 Recommendations to the Implementing Agency (Jericho Municipality)

(1) The Jericho Municipality should continue to make efforts to increase house connections to branch sewer pipelines in order to increase the amount of wastewater towards the achievement of the target in 2020.

(2) The Jericho Municipality should make further efforts to improve the collection rate of the wastewater tariff, although some measures have already been taken, such as integrated collection of the water tariff and wastewater tariff, introduction of prepaid meters, and an increase of staff for tariff collection. In particular, thorough efforts to collect unpaid tariff from large users should be required.

4.3.3 Recommendations to JICA

(1) Considering the difficult financial situations and vulnerable institutions of the Palestinian side, JICA should continue monitoring several related projects, including a Grant Aid project of UNRWA, Jericho Municipality's project using a part of a Non-Project Grant Aid fund, and USAID's 2B project. Moreover, JICA should do follow-up and confirm that the construction of a wastewater network and house connections in the target areas will be implemented steadily.

(2) Increase of wastewater amount in Aqbet Jaber refugee camp is important to achieve the original target of wastewater treatment amount of the project. Since UNRWA has a plan to install equipment to measure the amount of wastewater of the refugee camp at the connection point to the main trunk, JICA should make its follow-up to verify steady implementation.

(3) JICA should make its follow-up to the Palestinian efforts to realize the plan of construction works of sewer network in the areas of the surrounding 2 LGUs of Nwaeima and Duyuk and Ain Sultan Refugee Camp, which were included in the target areas of the project but have not yet received any support for the improvement of sewer network.

4.4 Lessons Learned

(1) It is important to examine the feasibility and risks of implementation of the components borne by a counterpart at the time of planning.

Regarding the project of construction of a wastewater network, in the case that the project can be effective only when project components of both sides (Japanese side and counterpart side) are implemented as planned, it is important to examine the feasibility of construction and risks of delay of the counterpart's component, and to consider possible response measures in case of emerging the risks.

(2) A program-based approach, the combination of a main project and a related project which

have complementary and synergetic effects to the main project, can be effective to generate project effects. It is desirable to include collaboration with other aid schemes and/or other donors' projects at the time of planning.

In the end, this project has several related projects (such as technical assistance for capacity building of Jericho Municipality, UNRWA's project of construction of a sewerage network in a refugee camp, USAID's project of constructing a branch sewer network in the Jericho city area, and the house connection project of Jericho Municipality), and those projects can be regarded as a whole program. A program-based approach to combine related projects is useful to make a project effective, or to supplement the weak capacity of the counterpart, especially in a conflicted-affected country/area. It would be better if that kind of program-based approach could be planned from the beginning and implemented during the project period in order to achieve its objective by the target year.