Jordan

FY2020 Ex-Post Evaluation Report of
Technical Cooperation Project "Project for Formulating Water Supply Plan for the Host Communities of Syrian Refugees" and
Grant Aid Project "The Programme for Urgent Improvement of Water Sector for the Host Communities of Syrian Refugees in Northern Governorates"

External Evaluator: Tomoko Tamura, Kaihatsu Management Consulting, Inc.

0. Summary

In this ex-post evaluation, two projects that supported improvement of water supply and sewerage services in northern Jordan are evaluated in an integrated manner. These are: technical cooperation for development planning, "Project for Formulating Water Supply Plan for the Host Communities of Syrian Refugees" (hereinafter referred to as the "Technical Cooperation Project"), and a grant aid project, "The Programme for Urgent Improvement of Water Sector for the Host Communities of Syrian Refugees in Northern Governorate" (hereinafter referred to as the "Grant Aid Project").

Improving water supply and sewerage services was a priority for Jordan at the time of both the planning and ex-post evaluation of the projects, and the objectives of the projects were consistent with development policies and plans, and sector strategies. In particular, the northern part of the country was experiencing population growth due to the influx of Syrian refugees, and there was an urgent need to improve the services. The projects were consistent with Japan's aid policy at the time of planning and were formulated and initiated promptly considering the urgent need for assistance. They were implemented in coordination with other development cooperation agencies. The projects were well aligned with Jordan's development plan, development needs and Japan's ODA policy, and the project approach was appropriate; therefore, relevance of the projects is high.

In the Technical Cooperation Project, in addition to the planned outline design of the Grant Aid Project, development of the master plans for water supply and sewerage sectors, and implementation of technical transfer, the outline design of the “Programme for Urgent Improvement of Water Sector for the Host Communities of Syrian Refugees in Northern Governorates Phase II” (hereinafter referred to as the "Grant Aid Project Phase II"), and the design and cost estimation of the project proposed in one of the master plans, were carried out. In the Grant Aid Project, the construction of a new distribution main and distribution pipelines between the southern part of Irbid Governorate and Bait Ras area, and the rehabilitation and renewal of the distribution pipe network in Hawaarah area of the same Governorate, were implemented almost as planned. The cost of both projects was within plan, but the duration of the projects was longer than planned. Therefore, the efficiency of the projects is fair.

The objective of the Technical Cooperation Project was that the proposed and developed plans would be used. The proposed plans have been implemented as this Grant Aid Project and as that

of Phase II. In addition to these, two projects proposed in the water supply sector master plans are being implemented with the support of the EU, AFD (French Development Agency), KfW (German Development Bank), and USAID. Thus, the objective was achieved. The flow rate in the distribution main, which is the operation indicator of the Grant Aid Project, is lower than the target due to changes in the water transmission plan. There was a certain degree of improvement in water supply service in the target areas, and there was also an impact in terms of improving the living environment and reducing a disparity in conditions of water supply. Therefore, the effectiveness and impact of the projects are fair.

No major problems have been observed in the institutional/organizational, technical, financial aspects and current status of the operation and maintenance system. Therefore, sustainability of the project effects is high.

In light of the above, these projects are evaluated to be satisfactory.

1. Project Description

Project Location

The distribution main and a pressure reducing valve installed by the Grant Aid Project

1.1 Background

Jordan is one of the countries with the lowest water resources in the world. Ninety-two per cent of the country is desert, with an annual rainfall of only 200mm[1]. While the demand for water continued to increase due to population growth, the average per capita water supply in Jordan was around 61 liters per day[2], far below the government's target of 120 liters per day (2014).[3]

[1] The average rainfall in Japan is 1,718 mm (The average for the period from 1971 to 2000. Source: Website of the Ministry of Land, Infrastructure, Transport and Tourism of Japan.)

[2] P13, National Water Strategy of Jordan 2016-2025.

[3] The average per capita water supply in general households in Tokyo is 214 liters per day (FY2019. Source: Website of Tokyo Metropolitan Government Bureau of Waterworks).

Due to the outbreak of the Syrian crisis, there was an influx of Syrian refugees into Jordan since 2011. The four northern governorates of Jordan that were the target area of the two projects have seen a large influx of Syrian refugees because they are near the Syrian border. In particular, 23.3% of the refugees in Jordan lived in Irbid governorate - urban area, accounting for 10% of the governorate's population.[4] The areas where Syrian refugees settled in large numbers came to be known as host communities of Syrian refugees.

At the time of planning these projects, 97% of the population of the four northern governorates used water supply services - these were essential for the population. However, due to the limited allocation of water resources and inadequate capacity and deterioration of the water transmission and distribution facilities, they were unable to receive adequate water supply services. This situation was further worsened by the rapid increase in population due to the influx of refugees.

To address the problem faced by the host communities of Syrian refugees, and to support the improvement of water supply services, JICA launched a Technical Cooperation Project in December 2013 (blue part in Fig. 1). The project had three components: A) proposal of outline design of projects, B) formulation of plan of assistance, and C) technical transfer. The Grant Aid Project was implemented based on the outline design carried out under Component A (1) (Fig. 1, green part). In addition, Grant Aid Project Phase II[5] of JICA is being implemented based on the outline design developed in Component A (2) by the United Nations Office for Project Services (UNOPS), in collaboration with the United Nations.

The water supply master plan for Irbid city, which is one of the water supply master plans for the two cities developed under Component B (1), was selected for implementation with assistance from EU, AFD and KfW. JICA developed the basic and detailed designs, and reference materials for the preparation of bid document to facilitate this. This work was Component B (3).

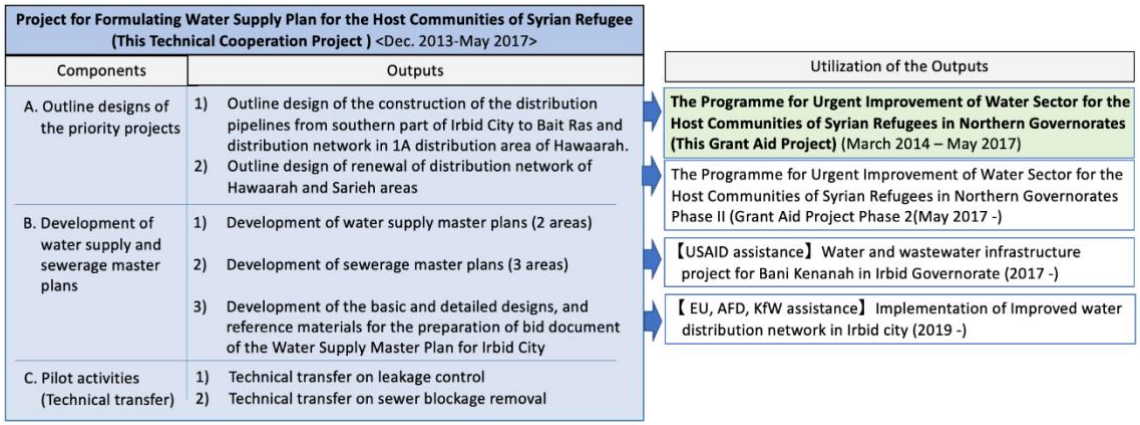

Figure 1Utilization of the Outputs of the Technical Cooperation Project and relationship between the Technical Cooperation Project and the Grant Aid Project

[4] Source: Jordan Response Plan 2015, Executive Summary, "Facts and Figures", and UNHCR statistics in September 2013. Population of Irbid Governorate in 2013 was 1,137,100 and there were 117,206 refugees.

[5] Works that were included in the draft plan of the Grant Aid Project but no longer fitted within its budgetary framework were included in the Phase II with the agreement of the executing agency.

1.2 Project Outline

Technical Cooperation Project: Project for Formulating Water Supply Plan for the Host Communities of Syrian Refugees

Overall Goal		Water supply and sewerage services in the host communities of Syrian refugees is improved.
Project Purpose		・ A grant aid project is implemented immediately according to the outline design for the prioritized projects. ・ The water supply and sewerage service development plans developed by this project are utilized by the WASH Task Force[6] functioning under the Host Community Support Platform, formulated by the Jordanian government and development partners as a tool for prioritizing and selecting projects, and are implemented.
Outputs	Component A	Formation of short-term priority projects Development of outline design of the priority projects that are to be implemented through Grant Aid assistance.
	Component B	Formulation of master plans necessary to maintain water supply and sewerage sector services for the host communities.
	Component C	Technology transfer through pilot activities such as leak detection and repair and cleaning of sewage pipes.
Total cost (Japanese side)		649 million yen
Project Period		December 2013 - May 2017 (Extension period: January 2017 - May 2017)
Target Area		Four northern governorates (Irbid, Ajlun, Jerash and Mafraq governorates)
Implementing Agency		Water Authority of Jordan (hereinafter referred to as "WAJ")
Other Relevant Agencies/ Organizations		Supervisory organization: Ministry of Water and Irrigation Organization for operation and maintenance: Yarmouk Water Company (hereinafter referred to as "YWC")
Consultant		TEC International Co., Ltd.
Related Projects		【Grant aid project】Programme for Urgent Improvement of Water Sector for the Host Communities of Syrian Refugees in Northern Governorates (March 2014 -)

[6] The WASH Task Force is an internationally coordinated working group formed by the Jordanian government and UN agencies to provide humanitarian assistance in the field of water, sanitation and hygiene against the backdrop of the influx of Syrian refugees into Jordan. “WASH” stands for Water, Sanitation and Hygiene.

	【Grant aid project】Programme for Urgent Improvement of Water Sector for the Host Communities of Syrian Refugees in Northern Governorates Phase 2 (May 2017 -) 【Project assisted by EU, AFD, KfW】Implementation of Improved Water Distribution Network in Irbid City 【Project assisted by USAID】Water and wastewater infrastructure project for Bani Kenanah in Irbid Governorate

Grant Aid Project: The Programme for Urgent Improvement of Water Sector for the Host Communities of Syrian Refugees in Northern Governorates

The objective of the Grant Aid Project was to improve water supply services to meet the increasing water demand by upgrading and renewing water supply facilities in Irbid City, Bait Ras and Hawaarah areas in Irbid governorate - thereby contributing to improvement in the living environment of the local community.

Grant Limit / Actual Grant Amount	2,510 million yen /2,501 million yen
Exchange of Notes Date /Grant Agreement Date	March 2014/ March 2014
Executing Agency	WAJ (Operation and Maintenance Agency is YWC)
Project Completion	May 2017
Target Area	Irbid city, Bait Ras and Hawaarah areas in the Irbid Governorate
Main Contractor	Dai Nippon Construction
Main Consultant	TEC International Co., Ltd.
Preparatory Survey	January 2014 - June 2014

Integrated Evaluation

In this integrated ex-post evaluation, the two projects were evaluated together for relevance and sustainability, and a sub-rating of the two projects were provided simultaneously for these criteria. This was because both projects had a common objective of improving water supply and sewerage services for the host communities of Syrian refugees, were implemented at the same time, and have the same executing, and operation and maintenance agencies. For the criteria of efficiency and effectiveness and impacts, the external evaluator studied results of each project separately first, since project period, project cost, outputs, and expected effects and impacts of these projects were independent from each other. Then, the external evaluator made an evaluation judgement and provided a joint sub-rating for each criterion, considering the levels of achievement of the two projects in a comprehensive manner. An overall evaluation and an overall rating were provided for the two projects as a whole, based on evaluation results of the five criteria.

2. Outline of the Evaluation Study

2.1 External Evaluator

Tomoko Tamura, Kaihatsu Management Consulting, Inc.

2.2 Duration of Evaluation Study

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

Duration of the Study: October 2020 - November 2021

Duration of the Field Study: January 13th, 2021 - September 7th, 2021

In this ex-post evaluation, the external evaluator did not travel to Jordan due to travel restrictions resulting from the Covid-19 pandemic; a Jordanian research assistant collected information in the country. The external evaluator provided guidance and control for the information collection, had online discussions with the executing and operation and maintenance agencies, and made analysis and evaluation based on information obtained.

3. Results of the Evaluation (Overall Rating: B[7])

3.1 Relevance (Rating: ③[8])

3.1.1 Consistency with the Development Plan of Jordan

Jordan's development plan was the National Agenda (2006-2015) at the time of project planning, and Jordan 2025 (2016-2025) at the time of the ex-post evaluation. The Water Strategy of Jordan, the sectoral strategy for the country, targets the provision of adequate and safe drinking water and sanitation facilities to the people, both at the time of planning and ex-post evaluation. Thus, the two projects, targeting the improvement of water supply and sewerage services, are consistent with the country's water supply and sewerage development plan throughout, from planning to ex-post evaluation.

3.1.2 Consistency with the Development Needs of Jordan

At the time of project planning, a rapid increase in the population of Jordan due to the influx of Syrian refugees was causing water shortages and inequalities in access to water. Therefore, the improvement of water supply services was an urgent and critical need. As mentioned in "1.1 Background," there was a high concentration of refugees in the northern part of the country and in the Irbid governorate – an urban area in the region; there was an urgent need to improve water supply services. At the time of the ex-post evaluation, water supply services continued to be essential for the population of the country and the northern region; there is a continuing need for facilities constructed by the two projects. The need for sewerage services is also high, both at the

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

[8] ③: High, ②: Fair, ①: Low

time of planning and at the time of the ex-post evaluation, due to the increase in the water supply service population and population density caused by urbanization.

Thus, the objectives of the two projects, to improve water supply and sewerage services, are consistent with the country's development needs, both at the time of planning and ex-post evaluation.

3.1.3 Consistency with Japan's ODA Policy

At the time of planning the projects, Jordan was contributing to peace and stability in the Middle East region by receiving a large number of Syrian refugees, and its active involvement in the peace process in the Middle East. Japan's policy was to continue to support this contribution. The two projects also corresponded to the specific measure "Program for Effective Utilization of Water Resources" of the development issue "Sustainable Management of Natural Resources and Environmental Conservation" of "Assisting Autonomous and Sustainable Economic Growth." This was a priority area of the Japanese Government's Country Assistance Policy for Jordan at that time. In this way, both projects were consistent with Japan's aid policy at the time of planning.

3.1.4 Appropriateness of the Project Plan and Approach

1) Prompt project formation and commencement based on the urgent need for support (Coordination and special measures taken by JICA)

Given the urgency of the need for assistance and an early impact, JICA quickly formulated and initiated both projects, mainly by making the following special arrangements:

The Technical Cooperation Project

In the Technical Cooperation Project, JICA decided on the general framework of the assistance, quickly formed the project by applying the fast-track system;[9] and promptly dispatched a contractor of the project comprising a team of consultants to Jordan. This was due to the urgency of implementing the assistance, and the fact that other donors were also considering rapidly implementing support to the water sector in the country.

The Grant Aid Project

An outline design, which is usually conducted in a preparatory study for a Grant Aid project, was carried out as one component of the Technical Cooperation Project. This enabled prompt formulation of the Grant Aid Project, reducing time being spent on selecting and signing a contract with a consultant team for a preparatory study.

[9] JICA identifies projects that require urgent action, such as disaster reconstruction assistance, as projects eligible for the fast-track system, to speed up the decision-making process for project planning and implementation, and to simplify the process of selecting and contracting experts necessary for project implementation.

2) Cooperation with other development cooperation agencies

Both projects were implemented in effective coordination with other development partners to urgently address Jordan's challenges in the water sector due to the influx of Syrian refugees.

Participation of the JICA project team in the WASH Task Force

The Technical Cooperation Project started promptly as mentioned above. Therefore, a team of Japanese consultants with extensive experience in working in the water sector in the country was able to participate early in discussions of the WASH Task Force, to review the request for assistance from WAJ from a technical perspective with consideration of the action being taken by other donors, and to identify a project of high priority for assistance.

Utilization of the master plans by an EU, AFD and KfW supported project

The JICA Project Team noted during discussions of the Task Force that the EU, AFD and KfW had recognized the importance of the project proposed in one of the master plans developed under the Technical Cooperation Project and were ready to provide funding for it. JICA prepared the basic and detailed designs and reference materials for the preparation of bid document as part of activities in the Technical Cooperation Project and facilitated implementation of this project.

[Interview with the AFD office in Jordan]

At the time of the ex-post evaluation, the evaluation team interviewed the staff of AFD office in Jordan and asked them about utilization of the output of the Technical Cooperation Project. They told the team that the master plan prepared in the Project was the starting point of the ongoing project "Implementation of Improved Water Distribution Network in Irbid City", which is one of the components of the "Improved access to water, water distribution performance and related sewerage disposal in Irbid Governorate for host communities and Syrian refugees." JICA developed the basic and detailed designs and reference materials for the preparation of bid document, which enabled the project preparation to start steadily and quickly. The component has completed the procurement of consultants and environmental and social studies, and, as of June 2021, tenders for construction contractors were underway. Construction would start in August 2021.

3) Project approach for the Grant Aid Project

As shown in "3.3.1.1 Quantitative Effects," the flow rate in the distribution main, which is an operation indicator of the Grant Aid Project, was lower than the target. This was mainly due to a reduction to the allocation of Disi groundwater[10] to the northern region of the country that was

[10] Disi groundwater is fossil groundwater pumped from the Disi aquifer in southern Jordan. At the time of planning in 2017, 10MCM (million cubic meters) of this groundwater was planned to be sent to the northern region. Later, this plan was changed due to the need to supply more water to the area around the capital Amman.

planned at the time of project planning. In the meantime, the Government continues to work to improve water supply services in the target areas by developing other water sources and implementing projects for improving water distribution to compensate for this. As mentioned above, the facilities constructed under the Grant Aid Project are essential for the provision of water supply services to people in the target areas and will also be used to distribute the increasing volume of water in the future. Therefore, although achievement of the operation indicator at the time of the ex-post evaluation is low, it is not considered that there was a problem in the planning and approach of the Grant Aid Project.

In summary, these projects have been highly relevant to Jordan's development plan and development needs, as well as Japan's ODA policy, and there was no problem with the project approach. Therefore, its relevance is high.

3.2 Efficiency (Rating: ②)

3.2.1 Project Outputs

As Table 1 shows, three components of the Technical Cooperation Project were implemented as planned: A. Outline design of the Grant Aid Project, B. Development of the water supply and sewerage sector master plans, and C. Technology Transfer for Leakage Control and Sewerage Blockage Removal. In addition to these three components, development of the outline design of the second Grant Aid Project, development of the basic and detailed designs and the reference materials for the preparation of bid document of the project proposed in one of the master plans were also carried out. Thus, the output of the project was more than planned.

Table 1 Planned and actual outputs of the Technical Cooperation Project

Plan	Actual	Plan vs. Actual
A Formation of short-term priority projects and outline design for implementing priority projects with grant aid	The outline design of the Grant Aid Project has been carried out. In addition, the outline design of the Grant Aid Project Phase II has been carried out.	More than planned
B Development of water supply and sewerage master plans	Master plans for the water supply and sewerage sectors were developed. In addition, the basic and detailed designs, and the reference materials for the preparation of bid document for international competitive bidding for a part of the water supply master plans, were developed.	More than planned
C Technical transfer to YWC staff through pilot activities such as leak detection and repair, and sewer cleaning	Pilot activities for leakage control and sewer blockage removal were carried out. The necessary skills were transferred to YWC staff, and the procured equipment was transferred.	As planned

The Grant Aid Project consisted of two components: (1) the construction of a new distribution pipeline between the southern part of Irbid City and Bait Ras area, and (2) the rehabilitation and renewal of the water distribution network in Zone 1A of Hawaarah area in the Irbid Governorate. These were implemented largely as planned (table 2 and Fig. 2). In component (1), the actual extension of the pipelines was slightly longer than planned, due to changes in some distribution pipe routes and construction methods.[11] These changes were made based on necessity and have not affected the use of the facilities or the expected benefits. In component (2), it was no longer possible to carry out all the envisaged construction items due to the rapid depreciation of the yen at that time. Therefore, it was decided and agreed with the executing agency to construct only the main pipelines and exclude the service lines from the work plan. This was a reasonable change in line with the implementation policy of the Project, which was to prioritize urgent works and implement them quickly and flexibly within the project budget.[12]

Table 2 Planned and actual outputs of the Grant Aid Project (Construction of the facility)

Components	Plan	Actual	Plan vs. Actual
(1) Construction of a new distribution pipeline between the southern part of Irbid city and the Bait Ras area	・ 18,610 m of distribution pipelines ・ 5 pressure reducing valves	・ Total of 19,206 m of distribution pipes ・ 5 pressure reducing valves	Slightly more than planned.
(2) Rehabilitation and renewal of the distribution network in Zone 1A distribution area of the Hawaraah Area in Irbid Governorate	・ 17,670 m of distribution pipelines ・ 350 m of service lines ・ 2 pressure reducing valves	・ 7,526 m of distribution pipelines in total ・ 2 pressure reducing valves	Less than planned, but changes are reasonable.

Source: Project Completion Report and project consultant's response to the questionnaire.

[11] The Ministry of Public Works proposed a plan to construct an underpass above the planned route of a distribution pipeline; and therefore, the change in design was needed in a way that the pipeline would go around the underpass. The geological features at two of the six sites, where a jacking method of construction was planned, were found to be very hard, and that it would take a long time to complete the construction. Therefore, the construction methodology was changed to open-cut method.

[12] The construction of the service lines excluded from the Project was included in the Grant Aid Project Phase II.

Pressure reducing valve

Distribution main

Manhole cover

Photos were taken at the time of the ex-post evauation

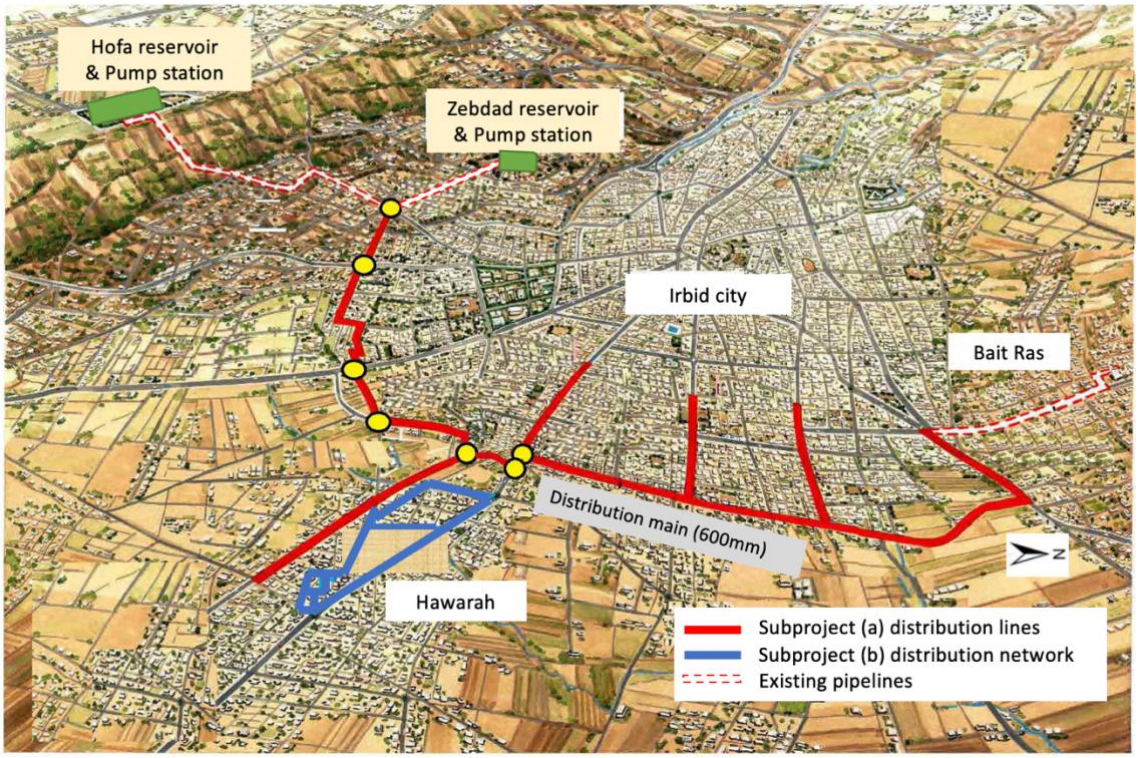

Figure 2 Layout of the distribution pipelines and network constructed by the Grant Aid Project

Source: Illustrated by the external evaluator using a picture in the Annex of the Project Completion Report.

The consulting services were carried out as planned. Apart from delays in the supply of water for testing and granting of construction permits by the Ministry of Public Works, the project was carried out without any problems.

As described above, the outputs of the Grant Aid Project were generally in line with the plan.

3.2.2 Project Inputs

3.2.2.1 Project Cost

The planned project cost of the Technical Cooperation Project was 660 million yen, and the actual cost was 649 million yen, which was within the plan (98%). The planned cost of the Grant Aid Project was 2,510 million yen from Japan and 3 million yen from Jordan, totaling 2,513 million yen. The actual cost of the Project for Japan was 2,501 million yen. Since no information was provided on the actual project cost from Jordan, an analysis of the difference in the project cost of the Grant Aid Project was carried out using only the project cost from Japan. As a result, it was concluded that the project cost was as planned (100%).

3.2.2.2 Project Period

The planned project period for the Technical Cooperation Project was 37 months and the actual period was 42 months, with the actual result exceeding the plan (114%). As mentioned above, the project carried out the following additional work: the outline design for the Grant Aid Project Phase II, the basic and detailed designs and preparation of reference materials for the preparation of bid document for one of the projects proposed in the master plans. This work was planned to be completed within the project period. However, it took more time than planned to consult and coordinate with the relevant authorities, review the implementation method, and review and update the report, and an extension to the period was required.

The planned project period for the Grant Aid Project was 30 months and the actual period was 39 months; the actual period exceeded the plan (130%). The main reasons for the delays were the time taken to tender for the selection of the construction contractor and to respond to design changes, and delay in the provision of water for testing by the Ministry of Public Works.

3.2.2.3 Input Elements (Technical Cooperation Project)

The planned and actual input elements of the Technical Cooperation Project were largely in line with the plan (Table 3). The number and man-months of JICA experts dispatched were increased to ensure the availability of expertise and time necessary for the additional work. Equipment was procured and provided as required, based on a review of the nature of the pilot activities. The Jordanian inputs, such as assignment of counterpart staff for technical transfer and the provision of the project office, were implemented as planned.

Table 3 Planned and actual input elements for the Technical Cooperation Project

Input element	Plan	Actual
JICA Experts	16 (137 man-months)	31 (162 man-months)
Equipment	Equipment for pilot activities (leak detectors, high-pressure sewer cleaning units, pipe materials for sewer connection, etc.), survey equipment	Materials and equipment for the implementation of pilot activities (welding machines for pipe jointing, high-pressure sewer cleaning units, TVs for sewer diagnosis, pipe materials for sewer connections, etc.)

Although the project cost was within the plan, the project period exceeded the plan. Therefore, efficiency of the projects is fair.

3.3 Effectiveness and Impacts[13] (Rating: ②)

3.3.1 Effectiveness

3.3.1.1 Quantitative Effects

1) Technical Cooperation Project

In the Technical Cooperation Project, the following two targets and indicators for the use of the developed and proposed plans were set to measure the effectiveness of the Project.[14] Both targets have been well achieved; and the effect of the Project has been produced as planned.

Target 1: The Grant Aid Project is implemented promptly based on the outline design for the priority projects.

Progress in utilization of the plans	Progress in implementing priority projects through Grant Aid
Indicators of the targets to be achieved through the utilization of the plans	Use of the facilities constructed by the Grant Aid Project
Status of achievement (Results)	This Grant Aid Project has been promptly started and completed; the facilities constructed are in use. The Grant Aid Project Phase II is also being implemented.

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

[14] Overall goal and PDM were not formulated for this technical cooperation project, because this was a development plan study type of technical cooperation project.

Target 2: The water supply and sewerage master plans to be developed by the project will be utilized by the WASH Task Force for selecting priority projects, and these projects start to be implemented.

Progress in use of the plans	The status of the water supply and sewerage master plans to be developed being referred to in other plans and shared with relevant institutions.
Indicators of the targets to be achieved through use of the plans	Number of projects implemented, their progress, among those proposed in the water supply and sewerage master plans.
Status of achievement (Results)	・ A seminar on the formulated master plans was held in February 2015, attended by 70 stakeholders. ・ The WAJ recognizes the master plans as the medium-term plan for the region. ・ The following two projects proposed in the master plans are currently being implemented: – EU-, AFD- and KfW-supported "Implementation of Improved Water Distribution Network in Irbid City" – USAID-supported "Water and Wastewater Infrastructure Project"

The method of removing blocked sewer pipes using the high-power vacuum tracks, which was taught in the Technical Cooperation Project, has been useful for efficient removal of blocked sewer pipes, and the equipment provided has been used. It was not possible to identify any specific examples of the use of methods to repair leaks.

2) Grant Aid Project

(1) Operation Indicators

The flow rate of the distribution main from the southern part of Irbid City to the Bait Ras area (see Fig. 2), which is one of the facilities constructed under this Grant Aid Project, was set as an operation indicator. This pipeline is the main facility constructed under the project, and the flow rate indicates the operational status of the pipe, so this is an appropriate indicator to measure the operational status of the project.

Since completion of the project, the distribution main has been used to distribute water to the eastern part of Irbid, Bait Ras and Hawaraah areas as planned. In the target year,[15] the total annual

[15] At the time of planning, the target year to produce the planned effect was set at the year following the completion of the project. Therefore, the target year is 2018.

flow volume of the distribution main was 4.06 MCM,[16] which was less than the target of 11.00 MCM (Table 4; achievement rate of 37%). There has been no significant change since the target year. The distribution main is not used as effectively as planned.

Table 4 Target and actual values of the operation indicator "Flow rate of the distribution main" of the Grant Aid Project

Flow rate of the distribution main	At the time of planning In 2014	Target value (One year after project completion)	Actual values			
			Target year: 2018	2019	2020	2021*
Daily average (m^3/day)	0	30,000	11,125	11,601	10,924	10,754
Annual total (MCM/year)	0	11.00	4.06	4.23	3.99	3.93
Target achieved (%)			37	39	36	36

Source: Planned and target values are from the preparatory survey for the Grant Aid Project (P.4-3), actual values are the responses from the WAJ to the questionnaire.

Note: The flow rate at the time of planning was zero because this distribution main was newly constructed by the Project.
The daily averages and annual total of the figure for 2021 were calculated from data for the period from January to May 2021.

As mentioned in "3.1.4 (3) Project Approach of the Grant Aid Project," the flow rate of the distribution main was less than the target value mainly due to a change in the transmission plan of Disi groundwater to the northern region. As Fig. 3 shows, the volume of Disi groundwater transmitted to the area was only 2.4 MCM in 2018, although it was planned to be 10.0 MCM. As a result, the amount of water in the Hofa reservoir was less than planned. Therefore, it was decided to supply water to the distribution main from the Zebdad reservoir, which had a relatively large amount of water. However, the volume of water supplied to the distribution main has been around 4 MCM in recent years, because the Zebdad reservoir supplies water not only to the beneficiary area of the Grant Aid Project, but also to West, and Central and Upper Irbid.

[16] MCM is million cubic meters.

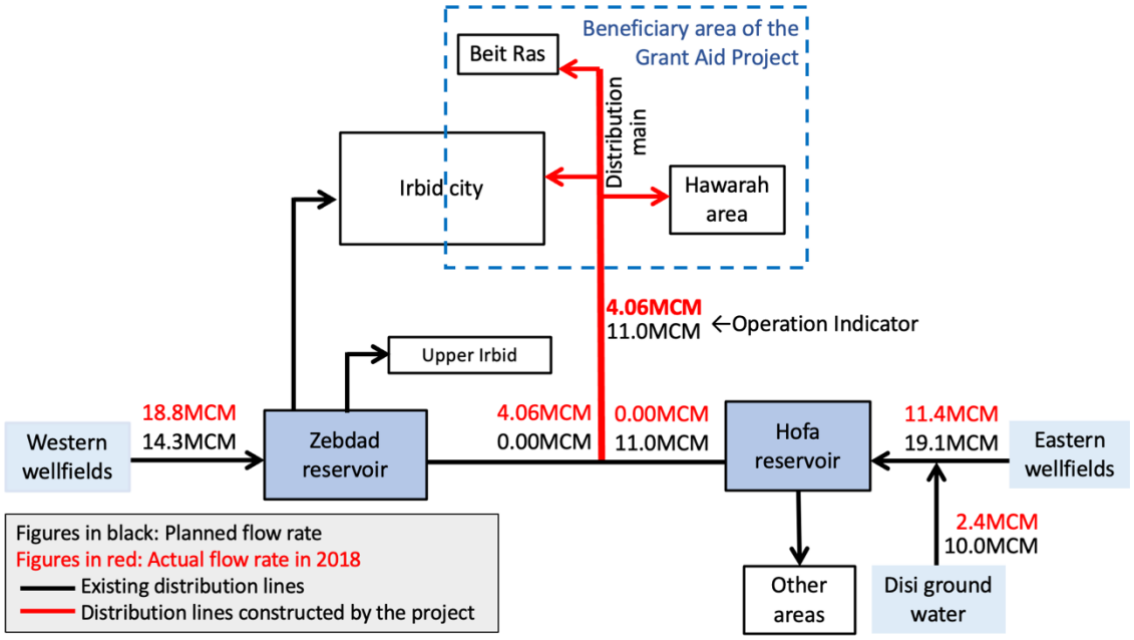

Figure 3 Planned and actual flow rates to the beneficiary area of the Grant Aid Project (2018)

Source: Prepared by the external evaluator. The source of the planned flow volume is the Detailed Planning Study Report, and that of the actual flow rate is the document provided by WAJ data.

(2) Effect Indicators

At the time of planning, water was supplied once a week to the beneficiary area of the project, namely the eastern part of Irbid City, Hawaraah and Bait Ras areas, by valve operation. However, because these areas were located at the end of the distribution main that existed at that time, water supply pressure to the houses was low, and it was difficult for water to reach these houses. Sometimes, water was not supplied to some areas, especially to places located at higher altitude and equipped with old distribution pipes. Residents stored the supplied water in tanks in the houses and used it little by little. However, they had to buy water from water lorries when they were not able to store enough water to meet their needs.

Therefore, it was expected that water supply services in the beneficiary area would be improved by implementation of this project. To find out whether this has been realized, the changes in amount and frequency of water supply, and amount of water consumption, were studied in the ex-post evaluation. The results of the study were as follows (Table 5).[17]

[17] The leakage rate and number of complaints were also studied to see if there were any changes before and after the Project. However, a comparison could not be made because reliable data - both before and after the project - was not available.

Amount of water supply: Increased to a certain extent

The data on amount of water supply, both at the time of planning and ex-post evaluation, was not available since the beneficiary area of the Project has not been isolated as a distribution area. Therefore, changes in the amount of water supplied to the area from the Zebdad reservoir, including the beneficiary area, were studied. This is the total amount of water supply to Irbid city, Bait Ras and Hawaraah areas (mentioned as "target area" in the Table 5). It was found that the amount of water supply at the time of the ex-post evaluation (2020) had increased to 1.9 times the amount at the planning and reached the planned target amount although it had taken longer than planned. The main reason for this increase was an increase in supply from the Western wellfield to the Zebdad reservoir and commencement of transmission from the second Wadi Arab water treatment plant to Zebdad reservoir in the second half of 2020. Therefore, the amount of water supply must have been increased to a certain extent compared to that at the time of planning in the beneficiary area, as well.

Frequency of water supply: Some improvements have been made

Water is distributed to the beneficiary area once a week. The twice-weekly water distribution has not been realized, and there has been no change in the frequency of water supply. However, a questionnaire survey of beneficiaries[18] conducted with 40 households in the beneficiary area showed that households that received little or no water when the project was planned, had started to receive water every week after the project was completed. It can be said that there has been some improvement in the frequency of water supply at the beneficiary area.

Water consumption: Reached the target value for households surveyed in the questionnaire survey

The average daily water consumption per person at the time of the above-mentioned questionnaire survey was found to be 85 liters per person per day, according to water bills of the 40 households surveyed. The water consumption of these households has increased since the time that the project was planned and met the target amount. However, due to the small sample size this result cannot be generalized and should be taken as a reference value.

[18] A questionnaire survey of beneficiaries was carried out to study the opinions of residents in the beneficiary area regarding the improvement of water supply services and their living environment by the two projects, and to find any specific examples of these improvements. It was conducted as a reference in evaluating effectiveness and impact of the projects. A face-to-face interview survey was carried out using a questionnaire, visiting 40 households and 6 institutions and business entities. The survey was conducted in February and March 2021. It was conducted in the eastern part of Irbid city, Bait Ras and Hawaraah areas, which are served by the distribution main, and the distribution pipelines constructed by the Grant Aid Project. The sample households were selected using the quota sampling method. There were 10 female and 30 male respondents. For the institutions and business entities, six places were selected, including schools and clinics, that were considered to have relatively high water consumption. Due to the significant sampling and the limited sample size compared to the population (water supply service population), the results of this survey cannot be generalized.

Table 5 Target and actual values for effect indicators for improving water services

Effect indicators	At the time of planning in 2014	Target values 1 year after project completion	Actual values	
			At the target year in 2018	At the ex-post evaluation in 2020
Amount of water supply in the target area (MCM)	12MCM	23MCM	19MCM	23MCM
Frequency of water distribution to the beneficiary area (times/week)	Once a week	Twice a week	Once a week	Once a week
Amount of water consumption (liters/person/day)	54	85	Unknown	85 (Reference value)

Source: Source of the figures at the time of planning and target values are the preparatory survey report of the Grant Aid Project (P4-3); the source of frequency of water distribution and amount of water consumption are the result of the questionnaire survey of beneficiaries; that of the amount of water supply volume is the total of Irbid City, Bait Ras and Hawala areas that were calculated from data provided by the WAJ.

Note: The water supply volumes shown by the above table are the amount of water distributed to the beneficiary area through the distribution main of the Grant Aid Project and those distributed to other areas, such as Western Irbid, through other pipelines. As mentioned earlier, the flow rate of the distribution main of the Grant Aid Project did not increase from 2018 to 2020, but the above table shows an increase during this period. It is because this amount includes the water supply in other areas.

To understand changes in the demand for water supply services in the beneficiary area, we have also examined changes in the water supply service population of the Grant Aid Project. The service population has increased compared to the estimates at the time of planning.

Table 6 Changes in service population in the beneficiary area of the Grant Aid Project

Item	At the time of planning in 2012	2017		At the ex-post evaluation in 2020
		Estimated at time of planning	Actual	
Water supply service population* (persons)	344,724	473,344	598,558	622,126

*Note: Sum of the population of Irbid city, Bait Ras and Hawala areas. As the water supply coverage in the beneficiary area is 97%, the population of the area was considered as the service population.

Source: Sources of the planning and estimated population at the time of planning are the Preparatory Survey Report for the Grant Aid Project (P3-20); population of 2017 and 2020 are from Directorate of Family and Population Surveys, Department of Population and Social Statistics, Jordan.

In addition to confirming the data presented in Table 5 and Table 6 we examined whether there were any examples of improved water supply services since the completion of the Grant Aid Project in the above-mentioned questionnaire survey. As shown in the figure 4 below, 21 out of 40 households (52%) reported an increase in water pressure or quantity. The frequency and duration of water supply increased (Fig 5: 14 households, 35%), and the number of water-outages

decreased (Fig. 6: 18 households, 45%). It was also observed that households that previously had little, or no water supply received water every week after the completion of the project (see the case study on next page). This is probably due to improved pressure and volume of water supplied to the households because of the new distribution main and pipelines constructed by the Project. On the other hand, some households reported no change in the situation with their water supply.

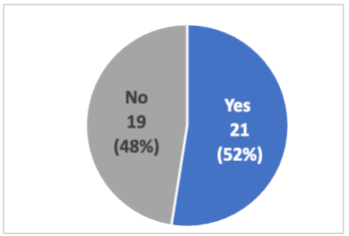

Figure 4 water pressure or volume improved?

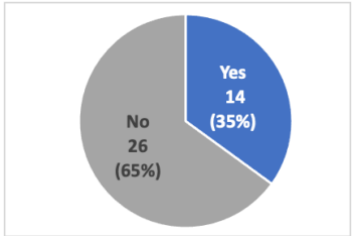

Figure 5 frequency and duration of water supply increased?

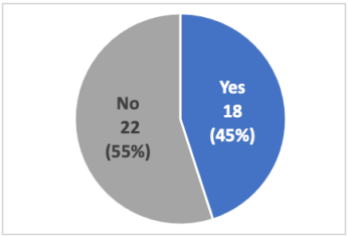

Figure 6 water-outages decreased?

Source: Questionnaire survey of beneficiaries conducted at the time of the ex-post evaluation (n=40)

Facilities and business establishments in the beneficiary area of the Grant Aid Project were also visited and interviewed in the same way. Three out of the six places stated that the frequency, duration, and pressure of the water supply had improved and that they used to buy water from water lorries but had not done so in the last two years.

From the above, it can be said that there are certain examples of improved water supply services in the beneficiary area.

3.3.1.2 Qualitative Effects (Other Effects)

YWC has been distributing water to the beneficiary area once a week by opening and closing gate valves installed in the distribution pipelines. YWC staff explained that the Grant Aid Project has improved the water volume and pressure, allowing them to distribute more water in a shorter time, which has made water distribution work more efficient. The Grant Aid Project was also expected to reduce the electricity costs of pumps in the reservoir and the leakage rate in the beneficiary area. However, there was no measurement conducted for these items, and therefore it cannot be confirmed whether there was any effect on them.

3.3.2 Impacts

3.3.2.1 Intended Impacts

The results of the above-mentioned questionnaire survey indicate that the projects have had an impact on improving living conditions and reducing disparities in water supply, and that the projects have benefited both Jordanians and Syrian refugees indiscriminately, contributed to the improvement and reduction of disparities in water supply conditions and supported the host communities' acceptance of Syrian refugees. The findings of the survey are summarized below.

Improvement of living environment

The evaluation team asked the 27 households that reported improvements in water supply services in the above-mentioned questionnaire survey if there were any examples of improvements in their living conditions as a result of the Project. They all replied there was a reduction in expenses. They used to buy water from water lorries when they did not have sufficient water supply. However, as a result of the projects, the frequency and volume of water supply increased, reducing the need to buy water and thus reducing expenses. Some households mentioned improved hygiene, and a reduction in psychological stress from running out of water, as an impact of the Projects.

They no longer have a shortage of water for washing hands as amount of water supply was increased by the Grant Aid Project
(A primary school in Irbid city)

[The implementation of the projects reduced psychological stress from running out of water]

Interview with an eight-member family in the Bait Ras area

They use water supply for everything except drinking - including cooking, washing, and bathing. In the past, there was little water supply, and even when there was the water pressure was very low. In the past two years, they always received water supply once a week; the duration and pressure of the water supply are sufficient to meet their need for water. The improved water supply service has reduced the psychological stress of worrying about running out of water.

They used to have to buy water from water lorries of private companies because there was very little supply. But they no longer need to buy water in this way since the service has improved. They are happy that they no longer pay for buying water from water lorries. The price of water from water lorries fluctuates, but in summer, when demand is high, it can be eight times higher than their water tariff. This expense for buying water was a big burden for them.

Reducing disparities in water supply conditions

Eighteen of the twenty-seven households (67%) who indicated that there had been an improvement in water supply services stated that they thought the project had contributed to reducing disparities in water supply conditions. The reason for this response is that previously this area did not receive water, but since completion of the project, it has received water, the same

as other areas. Nine households (33%) answered "don't know" because they were not aware of the water supply conditions in other areas.

3.3.2.2 Other Positive and Negative Impacts

Impacts on Natural and Social Environment

An initial environmental examination was conducted for the Grant Aid Project. According to the results of the IEE, mitigation measures were implemented, such as sprinkling water, checking for oil leaks from construction equipment and vehicles, deployment of security personnel, and installation of safety fences and guideways. In response to requests from residents, employment of residents in the beneficiary area, implementation of construction work after business hours in the city center, and simple maintenance of roads near the construction area, were also carried out. During the construction there were no environmental impact issues or complaints from the residents. There was no resettlement or land acquisition.

The executing agency visited the construction site and confirmed that the air quality, noise, and vibration caused by the construction had not been a problem, but no measurement of these items was taken. Stakeholder meetings with the residents were not held as a result of consideration based on JICA's Guidelines for Environmental and Social Considerations.[19] On the other hand, it is assumed that the residents were able to inform the contractor of any problems regarding environmental impacts from the fact that they had made various requests to the contractor as mentioned above.

[Measures needed in the future for improved environmental and social considerations]

As mentioned above, no environmental impact problems occurred during construction of the Grant Aid Project, and no complaints were filed by residents. However, from the perspective of environmental and social considerations, the following points need to be kept in mind in the future.

- The executing agency to measure dust, noise, and vibration according to the monitoring plan and quantitatively monitor the environmental impacts. The consultant/contractor and JICA country office to advise the agency on the need for these measurements.
- To ensure environmental factors are monitored, the measurement work should be included in the contract with the construction contractor.
- The executing agency to hold a stakeholder meeting with residents prior to construction to explain details of the construction, the expected environmental and social impacts and mitigation measures, and how to file complaints.

Impact on Gender Equality

[19] The Guideline states that a discussion with local stakeholders should be held for Category B projects if necessary.

No direct relationship was found between the improvement of water supply services through the Grant Aid Project and the promotion of gender equality, empowerment and strengthening of women's leadership. This may be because men are responsible for storing water in tanks at home and buying water from water lorries in the beneficiary area.

Impact on Conflict Prevention and Peace Building

The two projects have benefited both Jordanians and Syrian refugees in the beneficiary area without discrimination, contributed to an improvement in water supply services, reduced disparities in water supply conditions, and supported the host communities' acceptance of Syrian refugees. The neutrality and public nature of the executing agency, WAJ, and the operation and maintenance agency, YWC, is also high. The two projects have not had any negative impact on relations with neighboring countries and have not caused instability in the country.

As mentioned above, the plans developed and proposed in the Technical Cooperation Project are being utilized as expected. The flow rate of the distribution main, the operation indicator of the Grant Aid Project, is lower than the target, and the pipeline has not been used as effectively as expected. On the other hand, water supply services in the beneficiary area have improved to a certain extent due to the construction of the new distribution facilities under the Grant Aid Project. The impact of the projects has been to improve the living environment and reduce disparities in water supply conditions. In this manner, this project has achieved its objectives to some extent. However, there were several problems in the status of the effects of the projects. Therefore, effectiveness and impacts of the project are fair.

3.4 Sustainability (Rating: ③)

3.4.1 Institutional/Organizational Aspect of Operation and Maintenance

As at the time of the project planning, WAJ is responsible for the execution of water supply and sewerage service policies, and its responsibilities remain unchanged. YWC, a wholly owned subsidiary of WAJ, is responsible for the operation and maintenance of water supply and sewerage services in the four northern Governorates, as at the time of project planning.

The Operating Area 1, Operation and Maintenance Division of the Irbid Governorate Water Administration of YWC, is in charge of the maintenance of the facilities constructed by the Grant Aid Project. A total of 130 staff members have been assigned under the purview of the director to handle water distribution, pipe laying, tariff collection, billing, data entry, and general affairs. WAJ and YWC are under-staffed overall due to the suspension of recruiting new civil servants due to the Covid-19 pandemic, and they could not replace staff who retired. However, there are no vacancies in key positions, and the necessary personnel are in place to maintain the facilities

constructed by the Grant Aid Project. As such, there are no institutional or organizational issues that would hinder sustainability of the projects.

3.4.2 Technical Aspect of Operation and Maintenance

The operation and maintenance of the facilities constructed by the Grant Aid Project consists of regular inspections of the distribution pipelines and pressure reducing valves. This is a task that has been carried out routinely by YWC staff for some time; they did not have any technical problems. There are no equipment or facilities constructed by the Project that are not in use or are used infrequently due to technical problems. Thus, there are no technical issues that hinder the sustainability of the two projects.

3.4.3 Financial Aspect of Operation and Maintenance

All that is required for operation and maintenance of the facilities constructed by the Grant Aid Project is opening and closing of gate valves, and periodic inspections and repair. These tasks involved personnel costs that can be covered by those normally budgeted; they do not require significant investment. Currently, the budget for the necessary personnel costs has been allocated. The financial situation of WAJ and YWC is deteriorating due to accumulated operating losses, and they depend on government subsidies. This needs to be improved in terms of sustainable water supply management. On the other hand, the Jordanian government has been giving priority to financial subsidies to WAJ and YWC under the policy of operating water supply and sewerage services as public utilities from the aspect of stability of people's lives; this is expected to continue in the future.

A YWC staff member distributing water by operating a gate valve in a manhole

Thus, although WAJ and YWC are financially dependent on government subsidies, it has not hindered the sustainability of the Project's effect; it is expected to remain the same in the future. It should be noted that WAJ is working to improve its finances with the support of the International Monetary Fund (IMF), and its financial situation may improve in the future.

3.4.4 Status of Operation and Maintenance

There are no unused, broken, or damaged facilities constructed by the Grant Aid Project or in the equipment provided in the Technical Cooperation Project. The regular inspection of pressure reducing valves and distribution pipelines proposed in the defect liability inspection are carried out every six months.

WAJ and YWC are working on the "Implementation of Improved Water Distribution Network in Irbid City", in accordance with one of the master plans prepared by the Technical Cooperation Project, to formulate water distribution zones for optimal water distribution. The distribution main constructed by the Grant Aid Project will be an important part of this network. Tertiary distribution lines and house connections in Hawaraah and adjacent Sarieh areas are being constructed in Grant Aid Project Phase II, and they will be connected to the distribution pipelines constructed by the Grant Aid Project. Then, it is expected that the quantity and pressure of water supply in those areas will improve. Water transmission from the Wadi Arab Phase II water treatment plant to the Zebdad reservoir started in 2020. It is planned to increase the amount of transmission in the future.

As mentioned above, the operation and maintenance of the facilities provided by the Grant Aid Project are in good condition, and measures to improve water supply services in the beneficiary area have been implemented and planned; there are no particular issues related to sustainability.

No major problems have been observed in the institutional/organizational, technical, financial aspects and current status of the operation and maintenance system. Therefore, sustainability of the project effects is high.

4. Conclusions, Lessons Learned and Recommendations

4.1 Conclusion

In this ex-post evaluation, two projects that supported improvement of water supply and sewerage services in northern Jordan are evaluated in an integrated manner. These are: technical cooperation for development planning, "Project for Formulating Water Supply Plan for the Host Communities of Syrian Refugees", and a grant aid project, "The Programme for Urgent Improvement of Water Sector for the Host Communities of Syrian Refugees in Northern Governorate".

Improving water supply and sewerage services was a priority for Jordan at the time of both the planning and ex-post evaluation of the projects, and the objectives of the projects were consistent with development policies and plans, and sector strategies. In particular, the northern part of the country was experiencing population growth due to the influx of Syrian refugees, and there was an urgent need to improve the services. The projects were consistent with Japan's aid policy at the time of planning and were formulated and initiated promptly considering the urgent need for assistance. They were implemented in coordination with other development cooperation agencies. The projects were well aligned with Jordan's development plan, development needs and Japan's ODA policy, and the project approach was appropriate; therefore, relevance of the projects is high.

In the Technical Cooperation Project, in addition to the planned outline design of the Grant Aid Project, development of the master plans for water supply and sewerage sectors, and implementation of technical transfer, the outline design of the Grant Aid Project Phase II, and the

design and cost estimation of the project proposed in one of the master plans, were carried out. In the Grant Aid Project, the construction of a new distribution main and distribution pipelines between the southern part of Irbid Governorate and Bait Ras area, and the rehabilitation and renewal of the distribution pipe network in Hawaarah area of the same Governorate, were implemented almost as planned. The cost of both projects was within plan, but the duration of the projects was longer than planned. Therefore, the efficiency of the projects is fair.

The objective of the Technical Cooperation Project was that the proposed and developed plans would be used. The proposed plans have been implemented as this Grant Aid Project and as that of Phase II. In addition to these, two projects proposed in the water supply sector master plans are being implemented with the support of the EU, AFD, KfW, and USAID. Thus, the objective was achieved. The flow rate in the distribution main, which is the operation indicator of the Grant Aid Project, is lower than the target due to changes in the water transmission plan. There was a certain degree of improvement in water supply service in the target areas, and there was also an impact in terms of improving the living environment and reducing a disparity in conditions of water supply. Therefore, the effectiveness and impact of the projects are fair.

No major problems have been observed in the institutional/organizational, technical, financial aspects and current status of the operation and maintenance system. Therefore, sustainability of the project effects is high.

In light of the above, these projects are evaluated to be satisfactory.

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

(1) Implement measures to improve water supply services, including the Grant Aid Project Phase II, without delay and make further effective use of the facilities constructed by this Grant Aid Project

Due to a change in the allocation plan of Disi groundwater, the flow rate of the distribution main, which is the operation indicator of the Grant Aid Project, was below target, and the distribution main has not been used as effectively as planned. It is recommended that the WAJ to implement the ongoing projects, such as the Grant Aid Project Phase II, Implementation of Improved Water Distribution Network in Irbid City and the increase of water transmission from the second Wadi Arab II water treatment plant, without delay, and make effective use of the facilities constructed by the Project, and further improve the water supply services in the project area.

4.2.2 Recommendation to JICA

(1) Monitoring the progress of related projects and ensuring effective use of the facilities constructed by the Grant Aid Project

As the water distribution main of the Grant Aid Project have not been used as effectively as planned, it is recommended that JICA continue to monitor the progress of related projects in the project area to confirm the effective use of the facilities of the Grant Aid Project, and improvement of water supply services in the target area. For example, JICA can find out the combined effect of the two grant aid projects, such as increase in amount of water and pressure in Hawaraah area, once the pipelines constructed by this Grant Aid Project would be connected with the pipelines being constructed under that of Phase II.

4.3 Lessons Learned

(1) Appropriate application of cooperation schemes responding to urgent need of assistance, and flexible management of the project according to the needs, had facilitated prompt delivery of effective assistance

In view of the urgency of the need for assistance, JICA launched the Technical Cooperation Project under the fast-track system as early as possible, conducted the outline design of the Grant Aid Project in one of the components of the Technical Cooperation Project, and formulated the Grant Aid Project promptly.

JICA started the Grant Aid Project by concluding a comprehensive Exchange Note and Grant Agreement with the Jordanian government. This encompassed several sub-projects identified under the Technical Cooperation Project. Then, they finalized the selection and detail of contents of sub-projects in the detailed survey. This approach led to prompt implementation of the Grant Aid Project. This can be referred to as a good example of emergency assistance.

(2) Providing effective support in coordination with other development partners

In the course of participating in discussions of the WASH Task Force, it became clear that the EU, AFD and KfW would provide assistance to one of the master plans prepared under the Technical Cooperation Project. Therefore, the basic and detailed designs and the reference materials for preparation of bid document were developed to facilitate the implementation of this assistance. This is currently being implemented under the project "Implementation of Improved Water Distribution Network in Irbid City," supported by the EU, AFD and KfW. Interviews with staff in the AFD office in Jordan conducted during the ex-post evaluation confirmed that the preparation of the basic and detailed designs and reference materials for preparation of bid document developed by JICA facilitated the steady and prompt preparation of the project.

As mentioned above, the prompt start of the Technical Cooperation Project, and the early and continuous participation of a team of Japanese consultants, who had experience working in the

water sector in Jordan, in the discussions of the WASH Task Force, may also have contributed to the development of this collaboration. This can be referred to as an example of JICA coordinating with other development partners to provide effective emergency assistance.