Jordan

FY2023 Ex-Post Evaluation Report of Japanese Grant Aid Project
"The Project for Improvement of Waste Management Equipment
in Northern Region Hosting Syrian Refugees"

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

0. Summary

This project was carried out to improve waste management in the northern region of the country, which is hosting Syrian refugees. The project procured the necessary equipment for transfer stations (hereafter referred to as 'TSs') and final disposal sites (hereafter referred to as 'DSs'), thereby helping to improve the sanitation and living conditions in the region.

The project was in line with the development policy and needs of Jordan, consistent with Japan's ODA policy at the time of planning, and there were no problems with the plan and approach of the project. There was no plan for collaboration with other JICA projects. As planned, coordination with the United Nations Development Program (UNDP) enabled a rapid response to urgent needs. Accordingly, the relevance and coherence of the project are high.

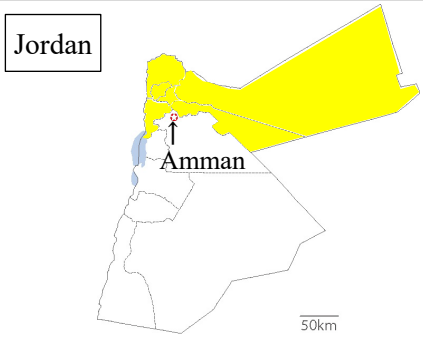
Equipment was procured as planned, including the compactors and semi-trailers required for the TSs to compact and transfer waste, and the excavators and bulldozers required at the DSs for final disposal. The project period exceeded the plan, but the project costs were within the plan. As a result, the efficiency of the project is high.

As operation and effect indicators, the project was expected to increase the amount of waste transferred by the TSs, and the amount handled for final disposal by the DSs. At the time of the ex-post evaluation these amounts had not reached the targets. A slowdown in economic activity and target values being too high are considered the main reasons for not achieving the targets. The expected qualitative effects, such as improving the environment around the TSs and hygienic landfill in the DSs, have generally been achieved. The project contributed to the improvement of sanitation and living conditions in the northern region to a certain extent, which was expected as an impact. It was not possible to identify any examples that the project directly helped improving the living conditions of refugees. This project has only achieved its objectives to a certain extent. Therefore, the effectiveness and impacts of the project are moderately low.

There are some minor problems in the operation and maintenance of the facilities of the project in terms of environmental and social considerations, but the prospects for improvement and resolution are high. Therefore, sustainability of the project effects is high.

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

1. Project Description



Project Location

Equipment Procured by the Project
(Rabiet Al-Kura TS)

Map provided by JICA; photo taken by the evaluator.

1.1 Background

The Syrian crisis started in 2011 and led to a large influx of Syrian refugees into Jordan. In response, many international organizations and donors provided emergency assistance to Jordan to support the reception of refugees. JICA recognized that the problem of waste management was becoming more serious due to the increase in population caused by the influx of refugees. JICA identified needs through information gathering and verification surveys and confirmed how other organizations were providing support to improve waste management. As other agencies were planning to support the construction of TSs and DSs, JICA decided to procure the equipment required for efficient operation of these facilities, and to strengthen their capacity. This assistance could be implemented quickly under the scheme of grant assistance.

1.2 Project Outline

The objective of this project is to improve waste management in the northern region of the country, which is hosting Syrian refugees, by procuring the equipment needed for TSs and DSs, thereby contributing to improve the sanitation and living conditions in the region.

Grant Limit/Actual Grant Amount	1,631 million yen/1,183 million yen
Exchange of Notes Date/Grant Agreement Date	May 2018/May 2018
Executing Agency	Ministry of Local Authority
Project Completion	February 2021
Target Area	Northern region of Jordan (Irbid, Mafraq, Ajloun, Zarqa and Balqa governorates)
Main Contractor	Toyota Tsusho Corporation
Main Consultant	Kokusai Kogyo Co., Ltd.
Preparatory Survey	October 2017
Related Projects	None

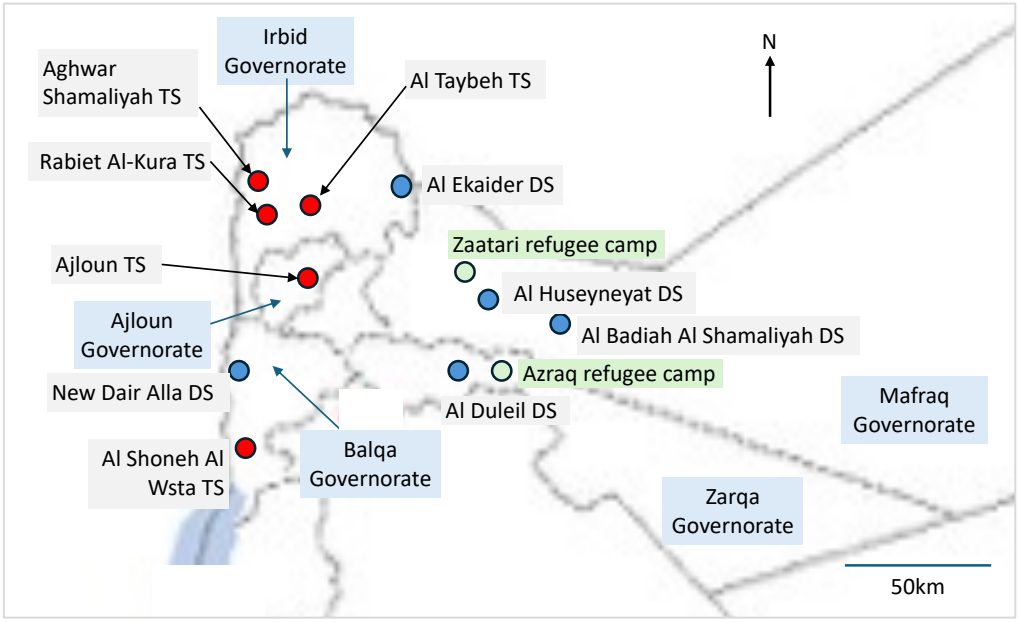


Figure 1: Location of TSs and DSs Assisted by the Project

Source: Illustrated by the evaluator.

<Waste Management Flow in Jordan>

To facilitate understanding of this report, the basic flow of management of municipal waste (hereafter abbreviated as 'waste' where appropriate) in Jordan is shown in the figure below.

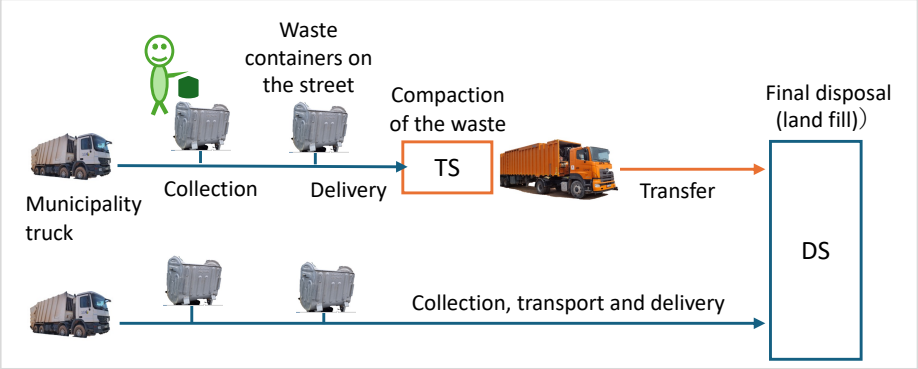


Figure 2: Waste Management Flow in Jordan

Source: Illustrated by the evaluator.

- Citizens put their waste into waste containers on the street.
- The municipality collects waste in the containers by truck and delivers it to the TS or DS.
- The TS compresses the waste that comes in with a compactor and transfers it to a DS.
- The DS puts the waste brought in by the TS or municipality into landfills for final disposal.

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 study was conducted with the following schedule.

Duration of the Study: October 2023 - January 2025

Duration of the Field Study: February 3, 2024 - February 16, 2024,
July 6, 2024 - July 12, 2024

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

3.1 Relevance/Coherence (Rating: ③[2])

3.1.1. Relevance (Rating: ③)

3.1.1.1 Consistency with the Development Plan of Jordan

Both at the time of planning and ex-post evaluation of the project, the country's development policy is *Jordan 2025* (2016 - 2025). The policy emphasizes the environmental sector, with targets such as reducing the rate of solid waste disposal to landfills and increasing the rate of management and re-use of solid waste. The country's sectoral plan for both time periods, the *National Municipal Solid Waste Management Strategy* (2015-2034) (hereafter referred to as the 'National Strategy'), intends to establish a modern and comprehensive urban waste management system, improve municipal waste management, and urgently address the waste problem caused by the refugee influx. The project, which aims to improve waste management and help solve the waste problem caused by the influx of Syrian refugees, is consistent with the country's development policies and plans at the time of planning and ex-post evaluation.

3.1.1.2 Consistency with the Development Needs of Jordan

At the time of planning most of the equipment in Jordanian TSs was obsolete and could either not be used or broke down frequently, which hindered its operation. The DSs were not able to properly dispose of waste in landfills due to lack of equipment and inadequate landfill planning. The inadequate treatment capacity of the TSs and DSs was exacerbated by the increase in population due to the influx of Syrian refugees. The treatment of waste could not keep up, which led to a situation where the city was littered with waste. Immediate assistance was needed to prevent the host community from becoming dissatisfied with the decline in waste management services due to the influx of refugees.

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

[2] ④: Very High, ③: High, ②: Moderately Low, ①: Low.

Although the growth in the Syrian refugee population has been reduced, waste management is still an essential service for civilian life at the time of the ex-post evaluation. In addition, the TSs and DSs developed under the project are important waste management facilities in the northern region, and the need for these facilities continues.

3.1.1.3 Appropriateness of the Project Plan and Approach

As waste management is a public service, and host communities and refugees benefit equally, the project was appropriate as support in a conflict-affected country, and from an equity perspective.

At the time of planning the location of the new TS was changed from Jerash to Al Taybeh, following opposition from residents. In Al Taybeh there were no houses nearby, and there was no opposition to the new construction. There was no impact on the effectiveness of the project due to the change; and therefore, the change was appropriate. Lessons learned from similar projects in the past were applied in this project, and equipment was procured to enable the supply of spare parts and after-sales service.

The approach taken by the project was appropriate, and no problems were observed.

3.1.2 Coherence (Rating: ③)

3.1.2.1 Consistency with Japan's ODA Policy

This project corresponds to the key objective of the *Development Cooperation Policy for the Hashemite Kingdom of Jordan* (July 2017) of the Ministry of Foreign Affairs, "Stabilization of the region," and the specific measure "Contribute to reducing the burden on Jordanian society in the field of social services such as education, healthcare, water and sanitation, which are under heavy burden due to the reception of refugees from Syria and other countries." The project was consistent with Japan's aid policy at the time of planning.

Active contribution of the Japanese Government in the promotion of the Middle East peace process, and its support for Jordan, which is receiving many refugees from Syria and other neighboring countries, was highly significant in terms of contributing to peace and stability in the Middle East region and ensuring energy security of Japan.

3.1.2.2 Internal Coherence

Synergy and complementarity with other JICA projects were not planned and not realized. General Grant Assistance of the Ministry of Foreign Affairs 'Economic and Social Development Project (FY2015)' has also procured equipment for waste management in the country. Some equipment was procured by the program for New Dair Alla DS and Al Duleil DS, which were assisted by this project. There is no problem of duplication with the equipment of this project; both are being utilized.

3.1.2.3 External Coherence

At the time of planning the reception of Syrian refugees was an international challenge, and it was important to coordinate between donor agencies. Coordination with UNDP was planned and achieved in this project. In Al Taybeh TS, UNDP constructed the building, and the project procured and installed the indoor compaction equipment. In Al Ekaider DS, the project procured some equipment for the sanitary landfill that UNDP was constructing with Canadian government funds. Coordination between the two organizations for the construction of the new Al Taybeh TS was particularly important for a rapid response to the urgent need for comprehensive support to improve the efficiency of waste management in the northern region.

The project was highly consistent with development policy and development needs of Jordan, and there were no problems with the project plan or approach. The project was consistent with Japan's ODA policy at the time of planning. There was no plan for collaboration with other JICA projects. As planned, there was collaboration with the UNDP, and the expected outcome was created. Therefore, its relevance and coherence are high.

3.2 Efficiency (Rating: ③)

3.2.1 Project Outputs

(1) Procurement of Equipment

In the project equipment, including compactors, semi-trailers and others for compaction and transfer of waste, were procured for the TSs (Table 1), and excavators, bulldozers and others for final disposal were procured for the DSs (Table 2), with the aim of improving waste treatment capacity and efficiency. Equipment was procured in line with the plan, both in terms of type and number.

Table 1: Equipment Procured for the TSs (All as Planned) (Unit: Number of units)

Name of the equipment \ TS	Aghwar Shamaliyah	Rabiet Al-Kura	Ajloun	Al Shoneh Al Wsta	Al Taybeh	Total
Outdoor-type hopper and compactor	0	1	1	1	0	3
Tractor-head	5	5	5	3	0	18
Semitrailer (50㎥)	5	6	5	3	0	19
Indoor-type hopper and compactor	0	0	0	0	1	1
Arm roll truck	0	0	0	0	6	6
Container (35㎥)	0	0	0	0	7	7
Tractor	1	1	1	1	0	4
Sprayer	1	1	1	1	0	4
Skid steer loader (0.6㎥)	1	1	1	1	0	4
Snow removal blade	0	1	1	0	0	2
Wastewater collection truck (8,000 liters)	0	0	1	0	1	2
Water tanker (8,000 liters)	1	1	1	1	0	4
Air compressor (30 liters)	1	1	1	1	0	4
High pressure car washing machine (15 litres/minute)	1	1	1	1	0	4

Source: Documents provided by JICA and the executing agency, field survey.
Note: Items with capacity specifications are indicated in brackets in the equipment name.

Table 2: Equipment Procured for DSs (All as Planned) (Unit: Number of units)

Name of the equipment \ DS	Al Ekaider	Al Huseyneyat	Al Badiah Al Shamaliyah	Al Duleil	New Dair Alla	Total
Bulldozer (28t)	4	1	0	0	1	6
Excavator (0.7㎥)	2	0	0	0	0	2
Excavator (0.5㎥)	0	1	1	0	1	3
Tipper truck (10㎥)	2	0	1	0	1	4
Tractor	0	1	1	1	1	4
Sprayer	0	1	1	1	1	4
Skid steer loader (0.6㎥)	1	1	0	0	0	2
Snow removal blade	1	1	0	0	0	2
Water tanker (8,000 liters)	1	1	1	1	1	5
Air compressor (30 liters)	1	1	1	1	1	5
High pressure car washing machine (15 litres/minute)	1	1	1	1	1	5

Source: Documents provided by JICA and the executing agency, field survey.
Note: Items with capacity specifications are indicated in brackets in the equipment name.

Tractor Head and Semi-trailer

Waste Compactor

Skid Steer Loader

High Pressure Car Washing Machine and Air Compressor

Bulldozer

Excavator

Photos: Taken by the evaluator.

The following problems occurred after the equipment was procured, and equipment parts were replaced or repaired.

- Due to Covid-19 the attendance of government employees was suspended, which delayed measures for duty exemption and customs clearance. Equipment was stored in bonded warehouses for about a year. During this period, the batteries in the dump trucks and water trucks ran down, and the cab-tilt cylinders in the tractor heads developed a fault; therefore, these parts were replaced.
- After the TSs started using the tractor heads, the gears on the shafts of 8 of the 18 vehicles were repaired because they were damaged. It was because excessive strain put on the tractor head coupling when vehicles are moving as the roads in Jordan are very uneven. It was found that the damage could be avoided by loading less waste than the maximum loading weight. Accordingly, the load for the vehicles had been restricted up to 18.7 tons, although the maximum capacity of them was 23 tons.
- Parts placed at the joint between the tractor head and semi-trailer, such as tire covers and step plates, were repaired because they were damaged. This was because the height of the coupling for these pieces of equipment did not match. Subsequently some improvements

were made by TS staff, such as increasing the height and thickness of the tractor head connecting plate and increasing the size of the driving shaft.

At the time of the ex-post evaluation, all the equipment was utilized without any problem.

(2) Consultancy Services

The consultancy services included detailed design, tender support and procurement management, all of which were carried out as planned. Under the training component, training was provided on the operation and maintenance of equipment, and the operation of the TSs and the DSs. As entry into Jordan from abroad was prohibited due to Covid-19, guidance was provided by local consultants under the direction of a Japanese consultant. In addition, the training schedule was shortened and the number of locations and participants reduced to prevent the spread of infection. Despite these changes, the expected results were achieved through sufficient prior consultation and the recruitment of highly competent local consultants.

For matters borne by the Jordanian Government, Covid-19 caused delays in arranging tax exemption, customs clearance and domestic transfer of the equipment, but there were no changes or problems in other matters.

From the above, the project outputs were considered largely in line with the plan.

3.2.2 Project Inputs

3.2.2.1 Project Cost

The planned project cost was 1,631 million yen from Japan and 6 million yen from Jordan, totaling 1,637 million yen. The actual project cost was 1,183 million yen from Japan and 9 million yen from Jordan, totaling 1,192 million yen. The project cost was within the plan (73% of the plan). The actual project cost of Japan was less than planned, due to a reduction in equipment procurement costs resulting from competitive bidding. The increase in project costs for Jordan compared to the plan was due to additional storage and insurance costs incurred due to the equipment being stored in a bonded warehouse for approximately one year.

3.2.2.2 Project Period

The planned project period was 21 months, from May 2018 to January 2020. The actual project period was 33 months, from May 2018 to January 2021. The main reasons for delay in the project were a delay in the start of bidding due to needing to wait for completion of the environmental impact assessment for Al Taybeh TS, the time taken by the Ministry of Local Administration (MOLA) to confirm with the Ministry of Finance whether the project equipment was eligible for tax exemption, and the impact of Covid-19, which delayed tax exemption measures, customs clearance and domestic transport of the equipment.

In this evaluation, of these factors the 81 days (approximately 3 months) from March 17, 2020 to June 6, 2020 when inter-governorate travel was prohibited to prevent the spread of Covid-19, and when tax exemption, customs clearance and domestic transfers were not possible at all, were deemed an unavoidable delay. The project period was deemed to be 30 months - 33 months minus 3 months. As a result, it was evaluated that the project period exceeded the plan (143%).

Therefore, efficiency of the projects is high.

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

3.3.1 Effectiveness

3.3.1.1 Quantitative Effects (Operation and Effect Indicators)

The performance of the operation and effect indicators of the project is shown in Table 3. They are below the target.

Table 3: Actual Values of Operation and Effect Indicators and Status of Target Achievement

Indicators	Baseline value in 2017	Planned target value (3 years after completion)	Revised target value	**Actual value in 2023** (3 years after completion)	Status of achievement of the revised target
(1) Amount of waste transferred by TSs (ton/day)	374	1,052	967	**486**	50%
(2) Amount of waste handled by the DSs for final disposal (ton/day)	2,625	3,977	4,172	**2,324**	56%

Source: Sources of the baseline and planned target values are the Preliminary Evaluation Report. Revised targets were calculated by the evaluator. Sources for actual values are provided by the executing agency.
Note: The baseline value for indicator (1) is the sum of the amount of waste delivered to the four existing TSs, excluding the newly constructed Al Taybeh TS. The baseline value for indicator (2) is the total quantity of waste delivered to Al Ekaider DS and Al Huseyneyat DS, where disposal was being implemented hygienically.

Definition of indicators: Indicators at the time of planning were defined as follows.

- Indicator (1): Average daily quantity of waste delivered to TSs.
- Indicator (2): Average daily quantity of the waste delivered to DSs and disposed of hygienically. Hygienic disposal is defined as leveling, compacting and covering the waste with soil.

[3] When providing the sub-rating, Effectiveness and Impacts are to be considered together.

Baseline values: Estimated from results of the questionnaire survey conducted for each facility in the Preparatory Survey at the time of planning.

Target values: At the time of planning the target values were calculated by multiplying '(a) the population of the municipality' that will use each facility in the target year by '(b) per capita waste generation rate' (the amount of waste produced per capita per day). For '(a) population,' the population statistics of municipalities that were planned to use the project's facilities in the target year in the national strategy were applied. For '(b) per capita waste generation rate,' the rates in 2022 defined in the national strategy were applied - 1.16 kg/person/day for urban areas, and 0.94 kg/person/day for rural areas.

Revised target values: The evaluator studied the municipalities using each facility at the time of the ex-post evaluation and found these to be partially different to assumptions made at the time of planning.[4] These differences were made by considering the efficiency of transportation. In this evaluation, revised target values were set in accordance with this difference in the user population of the facilities. Specifically, to calculate the revised target values in Tables 4 and 5, the names of municipalities using the TSs and DSs of the project at the time of the ex-post evaluation in February 2024 were studied. The population of these municipalities in 2023 was confirmed by the statistics and multiplied by the per capita waste generation rate in 2023 stated in the national strategy (1.19 kg/person/day in urban areas, and 0.95 kg/person/day in rural areas).

[4] For example, the national plan was to use the nearest TS, but the plan was changed to use a different TS because the road from the municipalities to the TS was a steep uphill slope, so the speed of transportation was slow, and the tires of the vehicles wore out excessively.

Table 4: Calculation of the Revised Target Values for the TSs

Name of TS	(a) Municipalities using the TS as of 2023	(b) Population in 2023	(c) Ratio of urban population (%)	(d) Ratio of rural population (%)	Revised target figures in 2023 (ton/day)
Aghwar Shamaliyah	Mo'az Bin Jabal	48,677	92	8	57
	Tabaket Fahil	50,061	92	8	59
	Khalid Bin Al Walid	35,914	92	8	42
	Wastyyeh	51,350	92	8	60
	Sub total	**186,002**			**218**
Rabiet Al-Kura	Burqush	71,982	92	8	84
	Deir Abi Saheed	95,268	92	8	112
	Rabiet Aru Kura	27,580	92	8	32
	Sub total	**194,830**			**228**
Ajloun	Greater Ajloun	71,362	84	16	82
	Al Junaid	38,512	84	16	44
	Kafrangeh	64,170	84	16	74
	Oyoon	26,240	84	16	30
	Al Shafa	30,216	84	16	35
	Sub total	**230,500**			**265**
Al Shoneh Al Wsta	Al Shoneh Al Wsta	58,737	82	18	67
	Swaimah	4,853	82	18	6
	Sub total	**63,590**			**73**
Al Taybeh	Al Taybeh	62,130	92	8	73
	West Irbid	94,069	92	8	110
	Sub total	**156,199**			**183**
Grand Total		**831,121**			**967**

Sources: (a) Documents provided by executing agency, (b) Department of Statistics, Jordan, (c) and (d) Preparatory Survey Report.

Note: Method of calculation of the revised target values: (((b) x (c)/100 x 1.19) + ((b) x (d)/100 x 0.95))/1,000.

Table 5: Calculation of the Revised Target Values for the DSs

Name of DS	(a) Municipalities using the DS as of 2023	(b) Population in 2023	(c) Ratio of urban population (%)	(d) Ratio of rural population (%)	Revised target figures in 2023 (ton/day)
Al Ekaider	Great Irbid	1,013,942	92	8	1,187
	Al-Merad	44,557	77	23	51
	Burma	14,929	77	23	17
	Hosha	33,230	70	30	37
	Al-Sarhan	34,820	70	30	39
	Al-Basalyia	8,248	70	30	9
	Al-Saro	27,713	92	8	32
	Ramtha	200,861	92	8	235
	Sahl Al-Houran	86,849	92	8	102
	Al Mazar	94,610	92	8	111
	Yarmouk	29,622	92	8	35
	Sho'leh	18,542	92	8	22
	Bab Amman	20,390	92	8	24
	Jerash	119,364	77	23	135
	Al-Naseem	27,330	77	23	31
	Manshyiate Bani Hassan	16,210	70	30	18
	Al-Kafrat	47,199	77	23	54
	Ajloun TS	230,500	84	16	265
	Sub total	**2,068,916**			**2,404**
Al Huseyneyat	Umm Al Jimaal	37,190	70	30	42
	Sabha Wa Dafyaneh	22,470	70	30	25
	Balama	47,120	70	30	53
	Erehaab	31,600	70	30	35
	Greater Mafraq	166,505	70	30	186
	Khaldeieh	52,150	70	30	58
	Prince Hussain Bin Abudulla	22,707	70	30	25
	Za-atariwa Al Manshieh	24,340	70	30	27
	Manshiet Bani Hasan	16,210	70	30	18
	Za'atari Camp	85,220	70	30	95
	Sub total	**505,512**			**565**
Al Badiah Al Shamaliyah	Bani Hashim	8,867	70	30	10
	Dair Al Kahlf	14,450	70	30	16
	Salhleh Wa Nayfeh	27,429	70	30	31
	Umm Al Gtain Wa Al Mkaifteh	17,570	70	30	20
	Sub total	**68,316**			**76**
Al Duleil	Bereen	29,963	96	4	35
	Al Duleil	61,448	96	4	73
	Al Hallabat	16,304	96	4	19
	New Hashmeyeh	97,187	96	4	115
	Azraq	20,571	96	4	24
	Sub total	**225,473**			**266**
New Dair Alla	Sharhabil Bin Hasna	48,832	92	8	57
	Ma'adi	27,055	82	18	31
	Dair Alla	61,585	82	18	71
	Al Shona Al Wsta TS	63,590	82	18	73
	Al Taybe TS	156,199	92	8	183
	Rabiet Al Kura TS	194,830	92	8	228
	Agwar Shamaliyah TS	186,002	92	8	218
	Sub total	**738,093**			**861**
Grand total		**1,537,394**			**4,172**

Sources: (a) Documents provided by executing agency, (b) Department of Statistics, Jordan, (c) and (d) Preparatory Survey Report.

Note: Method of calculation of the revised target values: (((b) x (c) /100 x 1.19) + ((b) x (d) /100 x 0.95))/1,000.

Actual values in 2023

Information provided by MOLA about the amount of waste transferred by TSs was taken as the actual values. The evaluator observed operation of the facilities and interviewed facility managers to confirm the reliability of the information. At the time of the ex-post evaluation the weighing bridges for Al Shoneh Al Wsta TS, Al Taybeh TS, Al Ekaider DS, Al Huseyneyat DS and New Dair Alla DS were functioning; the amounts weighed were provided to the evaluator. However, for the other five facilities, although the weighing bridges were in place, they were not in use as they were not working properly or awaiting inspection, and the amount of waste transferred was not measured. Therefore, transfer values provided by MOLA for these facilities were estimates, made by multiplying the number of municipal delivery trucks by the capacity of these trucks.

The main reasons why the actual value of the indicators at the time of the ex-post evaluation were less than the target values are as follows:

(1) Amount transferred by the TSs

Achievement of the actual amount transferred for each TS against the revised target ranges from 38% to 79% (Table 6).

Table 6: Details of the Amount of Waste Transferred by TSs

Name of the TSs	Revised Target Value in 2023 (ton/day)	Actual Values (ton/day)					Ratio of the revised target achieved
		2020	2021	2022	2023 (Target year)	2024	
Aghwar Shamaliyah	218	117	117	117	117	90	54%
Rabiet Al-Kura	228	117	117	117	117	81	51%
Ajloun	265	107	109	111	124	99	47%
Al Shoneh Al Wsta	73	32	48	58	58	45	79%
Al Taybeh	183	70	70	70	70	81	38%
Total	967	442	460	473	486	394	50%

Sources: Revised targets were calculated by the evaluator; actual values were provided by executing agency.
Note: Values for 2024 are the average for six months from January to June. These were less than those in 2023, apart from Al Taybeh TS. MOLA states that this is due to seasonal factors and that the total transfer amount in 2024 over the year is expected to be the same or slightly higher than in 2023.

At the time of the ex-post evaluation the TSs are accepting waste from all municipalities that want to deliver it. All waste delivered to the TSs is compacted and transported to the DSs. In this way, the TSs are operating without any problems. Therefore, the reduced transport volume of TSs

compared to the revised targets can be attributed to the surrounding environment of the TSs as follows:

(a) Slowdown in economic activity: Economic activity in Jordan has slowed since Covid-19. This may have weakened the purchasing power of citizens and reduced the amount of waste generated.[5]

(b) Targets set too high: It is possible that the per capita waste generation rates in the national strategy used to set targets at the time of planning were too high. MOLA explained that when the national strategy was developed there was no data on waste generation in Jordan, so the rates were set based on examples from European countries. However, as they were very likely to have been too high, MOLA was reviewing the rates at the time of the ex-post evaluation.[6]

(c) Waste collection rate is not 100%: MOLA explained that sometimes waste is not collected in some areas of the municipality, due to lack of supervision by the staff in charge in the municipalities.

(2) Amount of waste handled by the DSs for final disposal

The amount of waste handled by the five DSs for final disposal is shown in Table 7. While Al Duleil DS has achieved its target the other DSs have not achieved the revised targets, with achievement ranging from 37% to 83%.

[5] Jordan's GDP growth rate was as high as 8% in 2005 - 2007, but gradually declined to 2% - 3% from 2010 onwards; in 2020 it was -1.1%, due to Covid-19. The recovery of economic activity has been slow since then, with GDP growth remaining stagnant around 2% - 3% from 2021 to 2024. The unemployment rate also increased year on year. It was 11.9% in 2014, and 22.9% in 2022 (source: International Monetary Fund website). From late 2023 tourism has also declined due to the situation in Palestine and Israel.

[6] The revised per capita waste generation rates were not available. For reference, examples of the rates are 900 g/person/day in Japan (2021), and an average of 1.4 kg/person/day in OECD member countries in Europe (2020).(https://www.union.tokyo23-seisou.lg.jp/kikaku/kikaku/iken/ikenkokan/documents/gomigentani.pdf https://stats.oecd.org/index.aspx?DataSetCode=MUNW#)

Table 7: Details of the Amount of Waste Handled by the DSs for Final Disposal

Name of the DSs	Revised Target Value in 2023 (ton/day)	Actual Values (ton/day)					Achievement ratio of the revised target
		2020	2021	2022	2023 (Target year)	2024	
Al Ekaider	2,404	1,297	1,306	1,319	1,356	1,209	56%
Al Huseyneyat	565	185	196	207	207	187	37%
Al Badiah Al Shamaliyah	76	59	62	63	63	39	83%
Al Duleil	266	362	367	371	373	286	140%
New Dair Alla	861	140	210	340	325	291	38%
Total	4,172	2,043	2,141	2,300	2,324	2,012	56%

Sources: The revised targets were calculated by the evaluator; actual values were provided by the executing agency.
Notes: (1) For Al Huseyneyat DS and Al Duleil DS respectively, 75% and 85% of the final amount of waste disposed of were deemed to be disposed of in a hygienic manner and considered as the actual values.
(2) The values for 2024 are the average from January to June 2024. As with TSs, the full year is expected to be similar to or slightly higher than the values in 2023.

As with the TSs, some reasons for the targets not being achieved can be attributed to the surrounding environment of the DSs. These include a decrease in the waste generated due to a slowdown in economic activity, targets for the indicator being set too high, and a waste collection rate of less than 100%. The following factors also contributed to targets not being achieved.

- The definition of this indicator was ‘quantity disposed of hygienically. However, for Al Huseyneyat DS and Al Duleil DS, there were some areas where hygienic disposal was not implemented at the time of the ex-post evaluation. Therefore, based on the evaluator’s observations during the visit, and the opinions of the person in charge of MOLA and the two DSs, hygienic disposal was set at 75% and 85% of the actual values for Al Huseyneyat DS and Al Duleil DS respectively. Therefore, for Al Huseyneyat DS, the fact that some of the waste delivered was not disposed of in a hygienic manner was also a factor for that target not being achieved.
- The planned construction of a large-scale sanitary landfill in Al Ekaider DS has been delayed for about two years due to unsuccessful tenders and other factors, so the existing landfill site continues to be used. The volumes transferred to the DS cannot be increased much because it has a limited capacity; this is another reason why this DS has not achieved its targets.

The actual quantity for Al Duleil DS was higher than the target, although only the amount of waste being disposed of hygienically was considered. The DS is next to an industrial zone and a free trade zone, and a large amount of waste is delivered from business entities in these zones in addition to waste from the municipality.

3.3.1.2 Qualitative Effects

(1) Qualitative Effects Expected from the TSs

Table 8 shows the qualitative effects expected from the TSs that the evaluator identified based on issues at the time of planning. It also shows the extent to which these effects have been realized, as found through the inspection visits of the evaluator and interviews she had with stakeholders during the ex-post evaluation.

Table 8: Status of Realization of the Qualitative Effects Expected from the TSs

Expected Qualitative Effects	Status at the time of Ex-post Evaluation
(a) Closure of the adjacent DS and improvement of the surrounding environment due to the closure.	The effect has been realized in all three TSs concerned.
(b) Reduced waiting time at the TSs for waste collection vehicles due to provision of an additional compactor and several semi-trailers and tractor heads.	The effect has been realized in all four TSs concerned.
(c) Improvement of the environment around the TSs due to reduced waiting times for municipal waste collection vehicles.	The effect has been realized in all four TSs concerned.
(d) Operation of the TSs after it has snowed.	The effect was realized in 1 of the two TSs concerned, but the effect was not confirmed in one TS because it had not snowed.
(e) Extending the life of vehicles by cleaning them with high pressure car washing machines.	The effect was realized in two of the four TSs concerned. The other two TSs are cleaning vehicles, but the machine procured by the project was not being used.

(a) Closure of the adjacent DS and improvement of the surrounding environment due to the closure

At the time of planning there were DSs near Aghwar Shamaliyah TS and Rabiet Al-Kura TS. This had led to a lot of waste lying around and bad smells, and residents in the area had complained. These DSs should have been closed, but at the time the TSs did not have sufficient capacity to handle all the waste brought in so the DSs continued to be used.

Based on the assumption that the project would improve the TSs' capacity, these DSs were to be closed. The DSs were closed in 2019, as planned by UNDP with funding from the Government of Canada. At the time of the ex-post evaluation, the DS sites had been covered with soil, vegetation had returned, there was no dumping or scattering of waste, landfill gases, leachate, fires, bad smells or dust, and the environment had improved significantly.

In this evaluation, nine residents living in the vicinity of these two TSs were asked for their views on the changes to their environment and their lives due to the closure of the DSs.[7] They all said that the living environment used to be very bad, with waste being scattered around the DS, bad smells, smoke from fires and many flies. After the DS was closed, these problems were solved, the environment improved, and outdoor activities could easily be carried out. There was also a positive impact on livelihoods because of the improved environment: people started building houses and cultivating land, crops grew better, and roads around the TSs were improved and more convenient. At the time of planning there was also a DS at the construction site of the Al Taybeh TS that nearby residents had complained about, but the DS was closed when the new TS was built.

As mentioned above, the project has contributed to improving the surrounding environment of the TSs through the closure of the adjacent DSs.

(b) Reduced waiting time at the TSs for waste collection vehicles due to provision of an additional compactor and several semi-trailers and tractor heads

At the time of planning, Aghwar Shamaliyah TS, Rabiet Al-Kura TS, Ajloun TS and Al Shoneh Al Wsta TS only had one hopper and one waste compactor. As a result, when several waste collection vehicles arrived from the municipalities they had to wait for one to one and a half hours to discharge waste into the compactor. This was causing a problem with waste being scattered around, and a bad smell from the waiting vehicles.

At the time of the ex-post evaluation, waste collection vehicles were discharging waste one after the other into the hopper at the TSs, and there were no vehicles waiting. As a result of the project, there are now two hoppers and two compactors at each DS (see photo below). The number of semi-trailers and tractor heads that transport waste to the DS after compacting has also increased, resulting in an increased capacity for receiving, compacting and transporting waste, with almost no waiting time.

Ajloun TS at the Time of Planning

Ajloun TS at the Time of the Ex-post Evaluation

Sources: Photo at the time of planning was taken from the Preparatory Survey Report, and the photo at the time of the ex-post evaluation was taken by the evaluator.

[7] Residents were interviewed in July 2024. The head of each TS was asked to gather residents living around the DS who could describe the situation before and after closure of the DS. There were 5 participants from Aghwar Shamaliyah TS, and 4 from Rabiet Al-Kura TS. Six of the participants were farmers, and 1 each were in the police, sewing and tourism industries. All participants were men, as it was difficult to find women who were willing to participate in the interviews.

(c) Improvement of the environment around the TSs due to reduced waiting times for municipal waste collection vehicles

At the time of the ex-post evaluation there were almost no bad smells or waste being scattered at the four TSs, and the sites were kept clean. The reduced waiting time for collection vehicles at the TS has contributed to this. In addition, the project's skid steer loader was effectively used in the cleaning operation to collect litter that had been scattered around when the waste was discharged into the compactors.

(d) Operation of the TSs after it had snowed

It sometimes snows in Ajloun TS and Rabiet Al-Kura TS, but at the time of planning neither TSs had the equipment needed to remove snow. Their operations were sometimes delayed after it had snowed. Since completion of the project, Ajloun TS has been able to clear snow from the TS premises and delivery road using snow removal attachments procured under the project, and the operation of the TS has not been disrupted. After completion of the project and up to the time of the ex-post evaluation it had not snowed in Rabiet Al-Kura TS due to a mild winter climate and the snow removal attachments had not been used, so the effectiveness of the project for this could not be verified.

(e) Extending the life of vehicles by cleaning them with high pressure car washing machines

At the time of the ex-post evaluation, Al Shoneh Al Wsta TS and Ajloun TS were using high pressure car washing machines that had been procured to clean their vehicles. Staff at the TSs said that cleaning vehicles as soon as they returned from the DS had reduced the amount of vehicle defects. Aghwar Shamaliyah TS and Rabiet Al-Kura TS were not using the machines of the project at the time of the ex-post evaluation, but they were cleaning vehicles of the project appropriately with a larger capacity high pressure car washing machine of their own.

(2) Qualitative Effects Expected from the DSs

Table 9 shows the qualitative effects expected from the DSs that the evaluator identified based on issues at the time of planning, and the status of realization of these effects that were found through the evaluator's inspection visits of and interviews she had with stakeholders during the ex-post evaluation.

Table 9: Status of Realization of the Qualitative Effects Expected from the DSs

Expected Qualitative Effects	Status at the time of Ex-post Evaluation
(a) Procured equipment enabled adequate waste leveling and contributed to extending the life of the DSs.	The effect has been realized in three of the five DSs concerned. The effect has been realized to some extent in two DSs.
(b) Procured equipment enabled the implementation of sufficient soil cover and improved the environment around the DSs.	The effect has been realized in three of the five DSs concerned. The effect has been realized to some extent in two DSs.
(c) Operation of the DSs after it has snowed.	The effect has been realized in all two DSs concerned.
(d) Extending the life of vehicles by cleaning them with high pressure car washing machines.	The effect was realized in four of the five DSs concerned; the other DS is cleaning vehicles, but the machine procured by the project is not being used.

(a) Procured equipment enabled adequate waste leveling and contributed to extending the life of the DSs

Waste leveling is the process of excavating a final disposal site, placing the waste and then compacting it with heavy machinery. At the time of planning, the DSs of the project did not have the necessary equipment and the waste was not sufficiently leveled.

At the time of the ex-post evaluation, waste leveling was properly implemented in Al Badiah Al Shamaliyah DS and New Dair Alla DS, using equipment procured by the project. Although it was not possible to visit Al Ekaider DS due to public safety measures, it was confirmed through discussions with the DS manager that the excavation and leveling had been carried out properly. Proper leveling in these DSs has contributed to extending the life of the DSs.[8] As mentioned above, in Al Duleil DS and Al Huseyneyat DS, the leveling was not totally conducted adequately. This was because there is little land at these DSs for the amount of waste they are receiving, and the rocky terrain made excavation difficult.

(b) Procured equipment enabled the implementation of sufficient soil cover and improved the environment around the DSs

Al Badiah Al Shamaliyah DS and New Dair Alla DS were fully able to cover the waste after leveling at the time of the ex-post evaluation, using equipment procured under the project (see photos below). These DSs were also able to use the procured water trucks to spray the landfill site with water to prevent dust from being blown up, and to use sprayers to spray insecticide onto the

[8] By leveling the ground, the waste does not pile up in the disposal site, and the DS can be used for longer. The number of years the DSs can be used were unknown since MOLA does not estimate them.

site to efficiently prevent the breeding of pests. In these DSs, there were few bad smells and little scattering of waste. In Al Ekaider DS it was noted that soil covering had been implemented even at the time of planning and continued until the ex-post evaluation. In Al Duleil DS and Al Huseyneyat DS, it was observed that some areas were not adequately covered by soil for the reasons mentioned above (see photos below).

Al Badiah Al Shamaliyah DS

New Dair Alla DS

Al Duleil DS

Al Huseyneyat DS

Status of Soil Covering at the DSs

Photos: Taken by the evaluator.

(c) Operation of the DSs after it has snowed

At the time of planning, Al Ekaider DS and Al Huseyneyat DS did not have equipment to remove snow, which sometimes prevented them from operating when it had snowed. In these DSs, the snow removal attachments and small wheel loaders procured under the project were used to remove snow, enabling them to operate even after it had snowed.

(d) Extending the life of vehicles by cleaning them with high pressure car washing machines

In four of the five DSs, the procured high pressure car washing machines are being used to wash the vehicles, which is expected to prolong the life of the vehicles. In Al Huseyneyat DS, at the time of the ex-post evaluation the procured machine was not in use as it had broken down, but they had a larger machine that was used to clean the vehicles of the project.

(3) Reduction of waste transport costs for the municipalities by using the TSs

It was expected that municipalities that had been delivering waste to distant DSs at the time of planning would be able to use a TS nearby because the project increased capacity of the TSs, thereby reducing their waste transportation costs.

This effect has been achieved through the establishment of the new Al Taybeh TS. West Irbid and Al Taybeh municipalities had been using Al Ekaider DS before the project was implemented, but the project has enabled them to use the newly constructed Al Taybeh TS. The distance that waste was transported by these municipalities was significantly reduced from 44.6 km to 11.7 km

and from 48 km to 6.7 km, respectively. This effect has also been partially manifested in the four other TSs. TS staff explained that, at the time of planning, municipalities had to transport waste to distant DSs if the compactor at the TS broke down, or if there was a long waiting time at the TS. Since implementation of the project this has not occurred.

From the above examples, it can be assumed that the project has resulted in a reduction in waste transport costs for the municipality. The amount of reduction could not be calculated due to a lack of information on the transport of waste at the time of planning.

3.3.2 Impacts

3.3.2.1 Intended Impacts

It was expected that the project would improve the waste management situation and contribute to improved sanitation and living conditions in the northern region, as well as improve the living conditions of refugees. This evaluation investigated whether there are concrete examples of this. At the time of planning, the project was implemented in a situation where social services had deteriorated due to the influx of refugees, leading to increased dissatisfaction among host communities. Therefore, the evaluator also studied whether this dissatisfaction had been reduced, and whether the project had contributed to it.

(1) Impact on improving sanitation and living conditions in the northern region

(a) Opinion of the staff of the JSCs

According to officials of the Joint Service Council[9] (JSC), which is responsible for the operation and maintenance of the project's TSs and DSs, at the time of planning the amount of waste in the project's TSs and DSs had risen rapidly due to the population increase caused by the influx of refugees. Collection and disposal of waste could not keep pace and were in disarray. In due course they were able to collect and manage waste without any problem, because the equipment of the project improved the efficiency of waste management, and the number of refugees had stopped increasing. They believe that sanitary conditions in the city had improved as a result.

(b) Opinion of residents living near the facility

As discussed in section 3.3.1.2 Qualitative Effects (1)(a), the living conditions around the TS improved significantly due to closure of the adjacent DS in Aghwar Shamaliyah TS, Rabiet Al-Kura TS and Al Taybeh TS.

(c) Opinion of the general public

The evaluator conducted street interviews with 50 citizens in the main cities in the project area, and asked about waste collection and sanitation during the influx of Syrian refugees and during

[9] JSC is a support organization for local authorities that operates TSs and DSs and cleans and greens public facilities.

the ex-post evaluation.[10] First, when asked if the waste collection situation had worsened due to the influx of Syrian refugees, 28 (56%) said it had worsened, 18 (36%) said it had not changed, and four (8%) did not remember. When asked whether the influx of refugees had worsened the sanitation in the city, 27 (54%) said it had worsened, 19 (38%) said it had not changed and four (8%) could not remember. The 36% - 38% of respondents who said there had been no change may be because in Jordan household waste can be disposed of at any time in waste containers in the street (Figure 2) and there is no door-to-door collection, so some citizens are not aware of the details of the waste collection situation.

Twenty-eight respondents who said that 'the waste collection situation had worsened' were asked whether the situation had improved since then - Twelve (43%) said it had, 12 (43%) said it had not, and four (14%) were not sure. Nearly half the respondents felt that the situation had improved, but some did not.

Finally, the respondents were asked if they knew of any foreign organizations supporting waste management: Seven out of 50 respondents (14%) said they knew of some organizations, but there was no clear answer as to the name of the organization; no one mentioned JICA. Citizens' awareness of the project appears to be low. Thus, from the results of these interviews, it can be said that the project's contribution to the improvement of sanitation and living conditions in the northern region of the country was limited.

(d) Opinion of NGO staff working in the northern region

Officials from OXFAM and Future Pioneers (both British NGOs), which are implementing activities related to waste recycling and composting in the northern region, were asked about the impact of the project on improving sanitation and living conditions in the northern region. These are civil society organizations that assist developing countries. Both organizations believed that the project has contributed to strengthening the capacity of TSs and DSs. It may have indirectly contributed to improving sanitation and living conditions in the northern region, but it was difficult to identify specific examples of this contribution.

[10] Interviews were conducted in Irbid, Mafraq, Jerash and Ajloun cities. These are the capital cities in the four northern governorates, which had experienced a large influx of Syrian refugees. In addition, interviews were also conducted in the city of Al Taybeh, which is using the newly established Al Taybeh TS. The interviews were conducted from 9th to March 29, 2024. The sample size was ten people in each city, a total of 50 people. The target population was those who had lived in the vicinity of the facility from the time of planning the project, and they were selected using a quota sampling method (a type of significant sampling method in which certain conditions are set to select the sample). The age groups were 21 people in their 30s, 21 in their 40s, 4 in their 50s, and 4 in their 60s. There were 35 men and 15 women. The evaluator tried to have an equal number of men and women, but it was difficult to find women who were willing to participate in the interviews. Therefore, there were more men. As many Syrian refugees who fled to Jordan live with the host communities and have the same access to waste management services, respondents were selected for interview without making a distinction between host communities and refugees.

(2) Impact on improving the living condition of refugees

Al Huseyneyat DS receives between 30 and 35 tons of waste from Zaatari refugee camp daily, while Al Duleil DS receives about ten tons of waste from Azraq refugee camp daily (see Figure 1 for the location of the refugee camps). Strengthening the capacity of these DSs through the project may contribute to the proper management of waste in the refugee camps. When the NGO officials mentioned above and officials of JSC, DS and TS were asked for specific examples of these contributions, they believed the project may have indirectly contributed to an improvement in living conditions of the refugees, but that specific examples were not known. This is because an improvement in living conditions requires not only waste collection, but also improved water supply, housing and others, and the project has not implemented any activities that directly contribute to an improvement in living conditions in the camps. The evaluator could not conduct a quantitative survey on changes in the living environment of the refugees due to the limited period of survey for this evaluation. Therefore, the evaluator was unable to identify any examples where the project directly contributed to improve the living environment of refugees.

(3) Impact on reducing dissatisfaction of the host community with social services

Of the 27 respondents in street interviews who said that 'sanitation had deteriorated due to the refugee influx,' 20 (74%) stated that their emotional status had become worse due to the worsening sanitation in the city. Of these 20, only four (20%) said that their emotional status had improved since then. The host communities' dissatisfaction with social services is a complex issue not only about waste management, but also about water supply, education, employment, housing and many others. This is thought to be the reason why some respondents have not felt any improvement.

3.3.2.2 Other Positive and Negative Impacts

1) Impacts on the Environment

In accordance with the JICA Guidelines for the Confirmation of Environmental and Social Consideration (established in April 2010), this project was determined to fall under Category C because it had minimal undesirable effects on the environment. An environmental impact assessment or initial environmental study was not required, and there were no specific monitoring items. There were no negative environmental impacts, problems, or complaints because of the project.

2) Resettlement and Land Acquisition

Resettlement and land acquisition were not planned and have not occurred.

3) Gender Equality

There were no specific positive or negative impacts on gender equality.

4) Marginalized People, People's Well-being and Human Rights

The survey investigated whether the project has contributed to improving the living conditions of Syrian refugees and reducing the dissatisfaction of host communities. As noted above, no specific examples could be identified.

5) Unintended Positive/Negative Impacts

(a) Establishing a model for an indoor TS

Interviews with staff of the newly established Al Taybeh TS confirmed that the following effects have been achieved. This TS is one of the first three indoor TSs in the country, and these effects can serve as a model for future planning of constructing indoor TSs in the country.

- The TS has a lower environmental impact compared with conventional TSs, because the hopper and compressor are installed indoors and there is a treatment facility for the leachate. In addition, the floor of the building hardly needs to be cleaned, reducing the workload and water consumption (see photo below on the right).
- Compressed waste is automatically loaded into containers, and only a few staff are needed for the loading. The weighing device built into the compressor prevents overloading.
- Waste delivered from municipalities at night can be stored in containers and then transported the next morning, and there is no need for the drivers to work at night (see photo below on the left).

An Arm Roll Truck and Containers at Al Taybeh TS

Indoor Hopper and Compressor at Al Taybeh TS

Photos: Taken by the evaluator.

(b) Contribution to environmental education

A sorting and recycling factory at Aghwar Shamaliyah TS and a compost production factory at Rabiet Al-Kura TS were constructed by UNDP with financing of the Government of Canada after closure of the adjoining DS. They are open to visits from students at neighboring schools for the purpose of environmental education.

As indicated above, although the qualitative effects expected from the project have generally been achieved, both operation and effect indicators were below the target. Although the project contributed to improving sanitation and living conditions in the northern region to a certain extent, no examples of its direct contribution to improving the living conditions of refugees could be

identified. This project has only achieved its objectives to a certain extent. Therefore, effectiveness and impacts of the project are moderately low.

3.4 Sustainability (Rating: ③)

3.4.1 Policy and System

At the time of this evaluation, the importance of waste management in the National Development Plan '*Jordan 2025* (2016 - 2025)'; and the importance of improving urban waste management and policies such as expanding the functions of the TSs stated in the National Strategy are expected to continue, and support sustainability of the effect of the project.

No policy or institutional issues are identified regarding sustainability of the effect of the project.

3.4.2 Institutional/Organizational Aspect

At the time of the ex-post evaluation, the ministry with jurisdiction over waste management was MOLA, which has jurisdiction over 104 municipalities in the country. The department in charge of waste management at MOLA is the Solid Waste Management Department. This was set up in 2017 in view of the need for a department with specialist knowledge.

At the time of the ex-post evaluation, the JSCs or municipalities were operating and maintaining the TSs and DSs of the project. The names and number of personnel in these JSCs and municipalities are shown in Table 10. Only the Al Shoneh Al Wsta TS is operated and maintained by the municipality.

JSCs and municipalities are staffed as required according to their role and the number and size of the facilities they manage. Regarding the staff allocation for the TSs and DSs, Al Taybeh TS had insufficient number of drivers and restricted the amount of waste accepting until February 2024. This restriction was lifted in March 2024 when the number of drivers was increased from two to four. Other TSs and DSs were staffed with the necessary personnel for operation and maintenance, and no staffing problems were observed.

Table 10: Name of the Institutions and Number of Personnel Engaging the Operation and Maintenance of the Facilities of the Project (as at End of December 2023)

JSC/Municipalities/TS/DS	No. of Staff
Irbid JSC	
Aghwar Shamaliyah TS	89
Rabiet Al-Kura TS	22
Al Taybeh TS	16
Al Ekaider DS	112
Other facilities and sectors	75
Total	314
Ajloun JSC	
Ajloun TS	38
Other facilities and sectors	54
Total	92
Al Shoneh Al Wsta Municipality	
Al Shoneh Al Wsta TS	13
Other facilities and sectors	249
Total	262

JSC/Municipalities/TS/DS	No. of Staff
Mafraq JSC	
Al Huseyneyat DS	77
Other facilities and sectors	39
Total	116
Al Badiah Al Shamaliyah JSC	
Al Badiah Al Shamaliyah DS	32
Other facilities and sectors	31
Total	63
Zarqa JSC	
Al Duleil DS	38
Other facilities and sectors	198
Total	236
Aghwar Al Westa JSC	
New Dair Alla DS	80
Other facilities and sectors	0
Total	80

Source: Document provided by MOLA.

3.4.3 Technical Aspect

There is no equipment from the project that was not used due to technical problems or that was used extremely infrequently at the time of the ex-post evaluation. There are technicians who have been trained in the training component of the project at each facility, and technology transfer is also taking place through daily operations. Tractor heads and semi-trailers are used in compliance with the revised maximum loading weights.

When checking if advice in the training component was followed, it was found that access roads had been constructed in Al Badiah Al Shamaliyah DS and New Dair Alla DS in accordance with the advice. Although none of the facilities were using the recommended checklist for periodic inspection of equipment as it was, each facility had developed their own daily and periodic inspection forms for inspection, operation and maintenance, using the checklist for reference. In Ajloun TS, staff members used software they had developed to carry out operation and maintenance work on equipment and spare parts and to prepare reports. This self-help efforts improved work efficiency.

The operation and maintenance of the indoor Al Taybeh TS requires special tasks, such as loading waste onto the arm-roll truck via the control panel, and replacing the sensors attached to

the truck. The staff of the TS have been carrying out these special tasks without a problem, using the skills they learnt in training component and guidance from equipment suppliers.

As mentioned above, no technical issues related to sustainability were found.

3.4.4 Financial Aspect

The annual budget for MOLA is shown in Table 11. The budget has increased year on year, and the expenditure situation is satisfactory. The proposed budget for 2024 is 180,729,000JD, a slight decrease compared to the previous year; MOLA considers that this will not affect its activities, as additional budget is expected to be provided if necessary. The planned budget for 2025 is 183,789,000JD, which is slightly higher than in 2024.

Table 11: MOLA's Annual Budget and Actual Expenditure

(Unit:1,000JD)

Fiscal Year	Budget Allocation	Actual Expenditure
2021	142,262	137,523
2022	165,840	154,942
2023	184,637	184,637

Source: Reply to the questionnaire by MOLA, and 2023 budget report of the government.
Note: Fiscal year of Jordan is from January to December.

The budget for the development of waste management facilities in MOLA is shown in Table 12. The budget for execution of the national strategy is increasing. The expenditure of the items in 2023 was less than the expenditure in 2022 because construction of the new Al Ekaider sanitary landfill, supported by the French Development Agency (AFD), had been delayed and there was no expenditure for this.

Table 12: Annual Budget for the Development of Waste Management Facilities of MOLA

(Unit: 1,000JD)

Items	Actual Expenditure			Budget	
	2021	2022	2023	2024	2025 (plan)
Rehabilitation of existing DSs	0	100	100	100	100
Implementation of National Strategy	3,865	5,000	4,000	7,000	9,000

Source: 2023 budget report of the government.

Revenue in 2023 for the JSCs and municipalities managing the project's facilities is shown in Figure 3. The main source of funding for the JSCs is a grant from the Ministry. The Irbid JSC and the Mafraq JSC collect fees from the municipality for use of their facilities, while the other JSCs do not. All the JSC in Jordan collect fees from municipalities and other entities using their facilities by the nuisances and waste collection fees bylaw. But not all of them have fully

committed to pay the due fees because of its limited financial resources. All JSCs charge a fee for waste delivered by private companies.

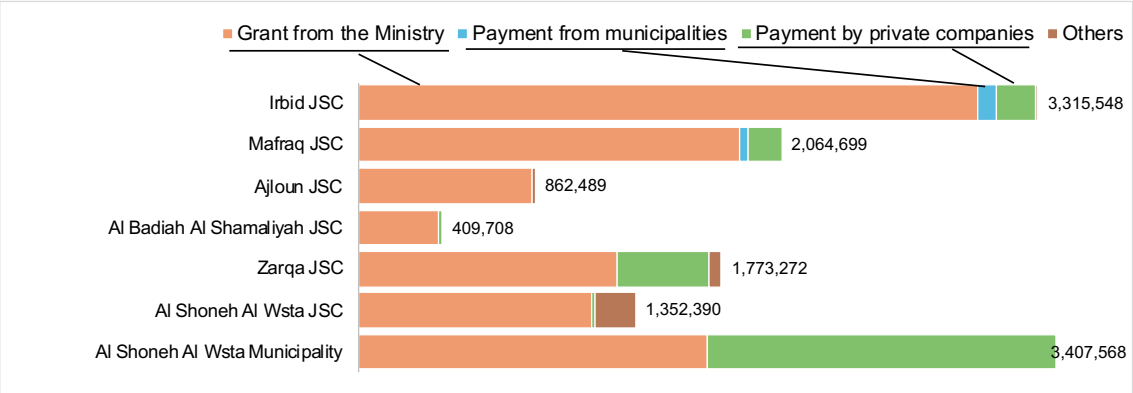


Figure 3: Revenue of JSCs and Municipalities that Operate and Maintain the Project's Facilities (2023, in JD)

Source: Illustrated by the evaluator based on the document provided by MOLA.
Note: The revenue of Al Shoneh Al Wsta Municipality includes the tax payment from the private sector in addition to facility user fees.

JSCs and municipalities are allocated grants based on the size of their operations and workload. Revenue covers the costs of personnel, fuel for vehicles, maintenance and repairs that are required to operate the facilities, so there are no financial problems associated with the operation of the facilities.

3.4.5 Environmental and Social Aspect

In the 5 TSs of the project there are almost no bad smells, noise, dust or vibration, and no negative impact on the surrounding environment was observed. The operation and maintenance management has been properly implemented, and the improvement in the surrounding environment achieved by the project is expected to continue in the future. The following issues were found regarding the DSs.

- As mentioned above, there was waste scattered around the premises of Al Duleil DS and Al Huseyneyat DS. Waste levelling and soil covering there was not properly conducted in some areas because the sites are small, and excavation of the land is difficult due to the rocky terrain. MOLA is aware of the challenges for these DSs and is preparing to convert Al Duleil DS into an indoor TS, and Al Huseyneyat DS into a sanitary landfill in future. These DSs are frequently cleaned, and there is no waste dispersed into the surrounding area.

- The evaluator checked the DSs in Google Maps, and found there were fires in Al Badiah Al Shamaliyah DS (see photo on the right). She also studied images of the satellite Sentinel-2 for the past seven years and found intermittent fires each year. The frequency of fires has been decreasing since completion of the project according to images taken by the Sentinel-2 satellite over the past seven years. MOLA confirmed that fires are sometimes caused by methane gas emitted from the waste, and that they promptly extinguish the fires by covering them with sand. There is no land use in the vicinity of the DS, and there is no social impact from the fires on the surrounding environment.

Fire in Al Badiah Al Shamaliyah DS
Source: Google map (August 2024)

The facilities of the project have some minor issues in terms of environmental and social considerations, but improvements are expected.

3.4.6 Preventative Measures to Risks

No risks were identified that could hinder the continued effectiveness of the projects.

3.4.7 Status of Operation and Maintenance

All the equipment procured by the project is in operation and well utilized, except for three high pressure car washing machines. Daily and regular maintenance of the equipment, periodic inspections and repair of breakdowns are carried out by the staff in charge. Operation and maintenance of the equipment are well done.

Three of the nine high pressure car washing machines procured were not in use. The facility that owns these three units has a larger high-pressure washer than the procured equipment and washes the vehicles of the project using this. It is planned to transfer the two machines owned by Aghwar Shamaliyah TS and Rabiet Al-Kura TS to Al Ekaider DS, and for them to be used there. The machine of Al Huseyneyat DS is being repaired; once repaired, it will be used at the DS for cleaning smaller vehicles.

Projects supported by other donors to the waste management sector in the target area include the construction of a new sanitary landfill in Al Ekaider and the conversion of Al Huseyneyat DS to a sanitary landfill, which are being implemented by AFD with EU funding, and OXFAM's recycling projects. The implementation of these donor-supported projects is expected to ensure sustainability of the effects of this project.

Slight issues have been observed in the operation and maintenance in terms of environmental and social considerations; however, there are good prospects for improvement and resolution. Therefore, sustainability of the project effects is high.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project was carried out to improve waste management in the northern region of the country, which is hosting Syrian refugees. The project procured the necessary equipment for the TSs and the DSs, thereby helping to improve the sanitation and living conditions in the region.

The project was in line with the development policy and needs of Jordan, consistent with Japan's ODA policy at the time of planning, and there were no problems with the plan and approach of the project. There was no plan for collaboration with other JICA projects. As planned, coordination with the UNDP enabled a rapid response to urgent needs. Accordingly, the relevance and coherence of the project are high.

Equipment was procured as planned, including the compactors and semi-trailers required for the TSs to compact and transfer waste, and the excavators and bulldozers required at the DSs for final disposal. The project period exceeded the plan, but the project costs were within the plan. As a result, the efficiency of the project is high.

As operation and effect indicators, the project was expected to increase the amount of waste transferred by the TSs, and the amount handled for final disposal by the DSs. At the time of the ex-post evaluation these amounts had not reached the targets. A slowdown in economic activity and target values being too high are considered the main reasons for not achieving the targets. The expected qualitative effects, such as improving the environment around the TSs and hygienic landfill in the DSs, have generally been achieved. The project contributed to the improvement of sanitation and living conditions in the northern region to a certain extent, which was expected as an impact. It was not possible to identify any examples that the project directly helped improving the living conditions of refugees. This project has only achieved its objectives to a certain extent. Therefore, the effectiveness and impacts of the project are moderately low.

There are some minor problems in the operation and maintenance of the facilities of the project in terms of environmental and social considerations, but the prospects for improvement and resolution are high. Therefore, sustainability of the project effects is high.

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

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

(1) Measurement of amount of waste received at the project's facilities

As stated in section 3.3.1.1. 'Operation and Effect Indicators,' at the time of the ex-post evaluation, at Aghwar Shamaliyah TS, Rabiet Al-Kura TS, Ajloun TS, Al Badiah Al Shamaliyah DS and Al Duleil DS, weighing bridges had been installed but were not in use due to malfunctioning. The waste delivered to the sites is not measured. Accurate knowledge of the amount delivered is essential for planning and facility operation. MOLA should encourage the JSCs managing these facilities to ensure that the defective weighing bridges at these facilities are repaired, and the amount of waste they are receiving is measured.

(2) Frequent cleaning of premises of Al Duleil DS and Al Huseyneyat DS

As noted in the effectiveness section, leveling and covering has not been done in some areas in Al Duleil DS and Al Huseyneyat DS. These DSs are, respectively, planned to be converted into an indoor TS and a sanitary landfill in future. Meantime, it is important to continue the proper operation and frequent cleaning of the facility to avoid negative impacts on the surrounding environment.

4.2.2 Recommendation to JICA

None.

4.3 Lessons Learned

(1) Verification of the effect of improved operation of TSs and DSs through several operation and effect indicators

The operation and effect indicator for the project set at the time of planning was the amount of waste the facilities received. The indicator depends on the operation and maintenance of the facility, as well as the economic situation and waste collection. The per capita waste generation rate used for calculating the target values could be unreliable.

Therefore, future similar projects should consider adopting not only the amount of waste received, but also other operation and effect indicators. For example, for measuring operational efficiency of TSs indicators, such as reduced waiting time for delivery vehicles and a reduced number of days when the facility is inoperable due to hopper breakdowns, can be operation and effect indicators. For the implementation of hygienic landfill at DSs, the frequency of fires can be used an indicator - this can be measured using satellite images or by installing fire sensors in the DSs.

It is necessary to ensure the reliability of the per capita waste generation rate for setting targets when using the volume of waste received as an indicator.

(2) When preparing specifications for the procurement of vehicles, carefully check local laws and road conditions

In this project, a problem occurred in which the gears on the shaft of the procured tractor heads were damaged. The local laws and regulations were studied, and the maximum gross weight was clearly stated in the specifications at the time of procurement of the tractor head in the project, but the number of axles required for the gross weight was not stated. Tractor heads with a maximum loading capacity of 23 tons was procured by the project in accordance with the specifications. However, when investigating the cause of the above problem, it was found that the traffic laws of Jordan required three or more axles for tractor heads with a maximum load capacity of 23 tons, but the procured tractor heads had two axles. (Afterwards, JICA and the executing agency discussed the matter, took necessary measures; and at the time of the ex-post evaluation, the tractor heads were being used without any problems.) To prevent such problems, when preparing specifications for vehicle procurement, it is important to check local laws in detail, investigate the local terrain and road conditions and ensure that the specifications can withstand these conditions.

(3) Specifications should be drawn up with sufficient care to ensure that the equipment can be properly connected

In this project, the height of the connection of the procured tractor head and the semi-trailer did not match, resulting in damage to parts of the connection. When two types of equipment are to be connected, specifications should be drawn up with great care to ensure that both can be connected without any problem.

5. Non-Score Criteria

5.1 Performance

5.1.1 Objective Perspective

Close coordination in collaboration with UNDP

MOLA greatly appreciates the close coordination between JICA project officials and UNDP in this evaluation of the project, which contributed to the establishment of the new Al Taybeh TS. JICA staff and consultants confirmed the specifications and quality of UNDP's works through frequent site visits, ensured that the equipment of the project was properly installed, and advised MOLA on issues and solutions; this was particularly useful in achieving effective coordination.

5.2 Additionality

Responding to urgent needs in conflict-affected areas through coordination and collaboration with international organizations

The project selected the area of waste management as support in response to an urgent need in the context of the Syrian crisis, where there is no difference between host communities and refugees as beneficiaries. The project also positively considered collaboration with UNDP and contributed to the construction of the new Al Taybeh TS, which is essential for improving waste management in the northern region. Equipment was procured that could be used effectively in the future, while considering the urgency of the assistance. The project is a good example of assistance in a conflict-affected country, where the urgent need was addressed in coordination with international organizations while considering equitable benefits and contributed to the continued effectiveness of the assistance.

(END)