Ministry of Municipal Affairs (MOMA)
The Hashemite Kingdome of Jordan

PREPARATORY SURVEY REPORT
ON THE PROJECT
FOR IMPROVEMENT OF
WASTE MANAGEMENT EQUIPMENT
IN NORTHERN REGION
HOSTING SYRIAN REFUGEES
IN THE HASHEMITE KINGDOM OF JORDAN

OCTOBER 2017

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

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（Average rate of three months from Dec 2016, Jan and Feb 2017）

Summary

1. Outline of the Country

(1) Land and Nature

Jordan, formally known as the Hashemite Kingdome of Jordan, has an area of about 89,000 km2, surrounded by Syria on the north and Iraq, Saudi Arabia and Israel in a clockwise order. Its coastline is only 15 km on the south end facing the Gulf of Aqaba.

The Jordan Valley, which forms the northern tip of the African Great Rift Valley, runs in the west of the country from south to north and is famous for the world's lowest elevation at 200 to 400 meters below sea level. Being warm in winter and hot in summer, the area is prosperous in irrigated agriculture. To the east are hilly plateaus of Mediterranean climate with some peaks over 1,500 m high. In the hilly plateaus in winter, sometimes there is snowfall that makes the passage of vehicles difficult. Further to the east is desert, which covers as much as 80% of the country. Its southeast part is extremely dry as the yearly rainfall can be less than 35 mm.

(2) Social Conditions

According to the national census in 2015, Jordan's total population is 9,531,712, of which 30.6% or 2,918,125 people are non-Jordanians mostly consisting of refugees from Palestine, Iraq and Syria. Due to the outbreak of the Syrian crisis in March 2011, a number of Syrian refugees have entered Jordan. As of March 2017, the number of Syrian refugees registered at UNHCR (United Nations High Commissioner for Refugees) of Jordan is about 660,000. This is the third highest number of Syrian refugees accepted by a country, behind Turkey and Lebanon.

About 80% of Syrian refugees in Jordan live outside of camps as city-dwelling refugees. Amman Governorate hosts the largest number of such city-dwelling refugees (35.2%), followed by Irbid Governorate (26.5%) and Mafraq Governorate (15.4%). This shows most city-dwelling refugees stay in the capital and the northern area. With the increase of refugees, it has been getting difficult for those refugee hosting areas to provide social services such as education, healthcare and solid waste management.

(3) Economic Conditions

GDP growth rate of Jordan was 6.5% on average from 2000 to 2009, while it declined to 2.7% from 2010 to 2016[1]. Jordan's GDP and GNI data are shown in the table below. The major part of GDP (65.2%) is produced by the tertiary industries such as finance, real estate, information technology and tourism.

Table 1: Economic Indicators of Jordan

Item	Data	Source
GDP	USD 38.74 billion	2016, IMF
GDP per capita	USD 5,554	2016, IMF
GNI	USD 34.07 billion	2014, World Bank
GNI per capita	USD 5,160	2014, World Bank

2. Background and Outline of the Project

(1) Upstream Plans

National Agenda for Sustainable Development (2006-2015), which was Jordan's national development plan, highlighted the solid waste management sector as one of the priority areas. The next 10-year national policy is the Jordan National Vision and Strategy 2025, where the scenarios and performance target indicators of solid waste management were stated under the subject of

[1] World Bank Group, "Country Partnership Framework for Hashemite Kingdom of Jordan for the Period FY17-22, June 2016

environmental policy goals. This project will contribute to the promotion of the Jordan National Vision and Strategy 2025 in terms of appropriately transporting waste generated within people's living environment and final disposal safely among the five scenarios.

Further, in addressing the aforementioned issues and challenges associated with the Syrian refugee influx, the Government of Jordan worked out the Jordan Response Plan 2017-2019 (hereafter JRP) to call for international support. JRP pointed out the importance of appropriately managing increasing solid waste.

In line with such policy direction, the Ministry of Municipal Affairs (MOMA) and Cities and Villages Development Bank (CVDB) formulated the National Solid Waste Management Improvement Strategy (NSWMS) with the assistance of World Bank and AFD (Agence Française de Développement), which was officially approved in September 2015. NSWMS's overall goal is to achieve a modern and integrated municipal solid waste management (MSWM) system that will be based on the 3Rs approach. The time frame, from the present to the target year of 2034, is divided into three terms, namely short-term, mid-term and long term, with objectives outlined for each term. It also sets out eleven policies under which necessary measures are proposed.

There are two policies that the Project is closely related to: Policy 1 "Serving the emergency MSWM needs of Jordanian societies due to the influx of refugees from the neighboring countries" and Policy 11 "Required studies to fulfil the actions/measures". Following Policy 11, MOMA intends to formulate Regional Municipal Solid Waste Management Plan (hereafter MSWM M/P) for the three regions of the country (north, central and south). As of June 2017, the MSWM M/Ps of the northern region and central region have been approved by the NSWMS Technical Committee. The Project is in line with NSWMS and MSWM M/P.

(2) Current Status and Challenges of the Solid Waste Management Sector

The short-term target toward 2019 of NSWMS is "focus on resolving the extreme problems of today and preparatory actions for the next period". The policies applied to achieve this target include Policy 1, stated above, Policy 2 "Provision of MSWM services to the entire (100%) permanent and temporary population of Jordan" and Policy 3 "Improvement of MSWM in local, regional and national levels".

Considering the overall goal of NSWMS is to establish 3R-based waste management, Jordan faces various problems such as waste discharge and collection without segregation and reliance on the informal sector in waste recycling. In light of the short-term target mentioned above, the current status and challenges of the sector can be summarized as below.

- The MSWM of Jordan largely consists of only collection (plus transportation) and final disposal, with very limited practice of intermediate treatment.
- It is getting significantly difficult to find land for final disposal near the urban area because of urbanization, growth of waste amount and NIMBY (not-in-my-backyard) syndrome. Therefore, new final disposal sites and/or newly planned ones tend to be in remote places.
- Due to this, waste transport distances increase, waste transportation costs rise considerably, and the provision of waste collection service becomes harder.
- The municipalities which use final disposal sites at a distance have high demand for the use of transfer stations. The equipment of transfer stations; however, is not performing its expected function, being partly out of service or subject to frequent breakdowns because it was mostly procured in 2004.
- Further, the development of new transfer stations is not proceeding as scheduled due to opposition from people living in the neighborhood, difficult negotiations on land acquisition and limited fund availability.
- The operation of final disposal sites is not appropriate as equipment capacity is insufficient and waste disposal is not properly planned, which is causing environmental deterioration of surrounding areas.

(3) Objectives of the Grant Assistance

Under such circumstances, JICA carried out "Data Collection Survey on Waste Management in northern Region accepting Syrian Refugees" (hereafter, Data Collection Survey) from February to April, 2016. The Data Collection Survey examined the fundamental data and information about the current solid waste management of the country and the assistance activities of various donors and identified the assistance needs in solid waste management in the areas hosting Syrian refugees.

Based on the findings of the Data Collection Survey, JICA decided to carry out the preparatory survey on "Project for Improvement of Waste Management Equipment in Northern Region Hosting Syrian Refugees" (hereafter "the Project"). It aims to improve the sanitation and living conditions of both local communities and Syrian refugees in the refugee hosting northern region (namely, Governorates of Irbid, Marfaq, Ajloun, Zarqa, Balqa and Jerash) by upgrading the equipment used in waste transfer stations and final disposal sites to cope with waste increase triggered by the influx of refugees.

The objective of the Project is to procure equipment necessary for efficient waste transportation and final disposal so that the operation system of transfer stations and final disposal sites of the target area will be improved.

3. Outline of the Survey Results and Content of the Project

(1) Outline of the Survey Results

JICA dispatched the preparatory survey team to Jordan for the following periods. The team carried out site surveys in the six target governorates.

- First site survey: January 14 – March 4, 2017
- First site survey additional 1: April 10 – April 19, 2017
- First site survey additional 2: May 3 – May 12, 2017
- Second site survey: August 12 –August 26, 2017

The survey results can be outlined as below.

1) Selection of Target Facilities to be Covered by the Project

The Project improves the waste management equipment at transfer stations and final disposal sites in the northern region (governorates of Irbid, Mafraq, Ajloun, Zarqa, Balqa and Jerash) where waste amount has increased as a result of refugee inflow from Syria. During the first site survey, the team studied 12 transfer stations and 14 final disposal sites in the planned target area. MOMA and the team discussed the survey findings and concluded that five transfer stations (four existing and one new site) and five final disposal sites (all five existing sites), shown in the table below, were selected as project targets and equipment necessary for them were to be designed.

Table 2: Transfer Stations and Final Disposal Sites Targeted by the Project for Equipment Improvement

Target Facilities		Facility Types
TS01	Aghwar Al Shamaliyah	Existing Transfer Station
TS02	Rabiet Al-Kura	Existing Transfer Station
TS03	Ajloun	Existing Transfer Station
TS09	Al Shoneh Al-Wsta	Existing Transfer Station
TP03	Jerash	Planned Transfer Station
DS02	Al Ekaider	Existing Final Disposal Site
DS05	Al Huseyneyat	Existing Final Disposal Site
DS06	Al Badiah Al Shamaliyah	Existing Final Disposal Site
DS07	Al Duleil	Existing Final Disposal Site
DS09	New Dair Alla	Existing Final Disposal Site

Source: Preparatory survey team.

Based on this selection result, the Government of Jordan submitted an official request letter for the Project on March 21, 2017 to the Government of Japan.

2) Review of Requested Equipment

Recognizing that the Project is only to procure equipment, the requested equipment was reviewed from the viewpoints shown in the table below.

Table 3: Examination of Necessary Equipment

Items	Points of Review
1. Is facility construction necessary?	All equipment that requires facility construction for installation must be excluded.
2. Does it require installation work in Al Ekaider final disposal site?	Since Al Ekaider disposal site is located in the Syrian border areas where persons engaging in JICA activities are not allowed to enter according to JICA safety measures (as of October 2017), all equipment which requires installation or any other works within the site is excluded.
3. Is it for waste management?	All equipment that is not used in actual waste management operations is excluded.
4. How many units of equipment is needed?	After the processes above from one to three, the necessary number of units of equipment remaining is calculated based on the planned waste transfer amount at the transfer stations and the planned waste disposal amount at the final disposal sites.
5. How many units of the existing equipment will still be functional?	From the number of existing units of equipment at each facility, their condition of performance and the years of usage, equipment that can still be functional in the target year of 2022 is identified. This is subtracted from the necessary number of equipment.
6. What equipment will be provided by other donors?	Any equipment that will be provided by other donors is subtracted from the number of equipment.

Source: Preparatory survey team.

3) Design Policy

The basic policy of outline design of the Project is as follows.

- With cost reduction in mind, the size and specification of equipment should be appropriate as a grant aid project for the JSCs (Joint Services Councils) and municipalities in the northern region of Jordan.
- The provision of appropriate equipment should be planned so as to contribute to the improvement of solid waste management that has been affected by population increase due to the influx of Syrian refugees.

4) Number and Types of Equipment

The equipment to be procured by the Project is listed below.

Table 4: Equipment to be Procured by the Project (for Transfer Stations)

Equipment Types	Unit	Total	Transfer Stations				
			Aghwar Shamaliyah	Rabiet Al-Kura	Ajloun	Al Shoneh Al Wsta	Jerash
Outdoor Hopper+Compactor	Unit	3	-	1	1	1	-
Tractor head	Unit	18	5	5	5	3	-
Semitrailer (50 m^3)	Unit	19	5	6	5	3	-
Indoor Hopper+Compactor	Unit	1	-	-	-	-	1
Armroll truck	Unit	6	-	-	-	-	6
Container (35 m^3)	Unit	7	-	-	-	-	7
Tractor	Unit	4	1	1	1	1	-
Sprayer	Unit	4	1	1	1	1	-
Skid steer loader (0.6 m^3)	Unit	4	1	1	1	1	-
Snow removal blade	Unit	2	-	1	1	-	-
Wastewater collection truck (8 m^3)	Unit	2	-	-	1	-	1
Water tanker (8 m^3)	Unit	4	1	1	1	1	-
Air compressor (30 L)	Unit	4	1	1	1	1	-
Car washing machine (15 L/min)	Unit	4	1	1	1	1	-

Table 5: Equipment to be Procured by the Project (for Final Disposal Sites)

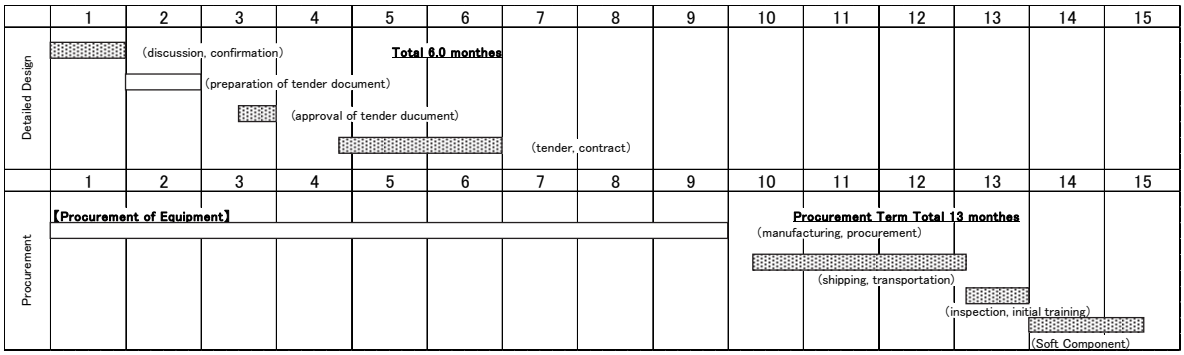
Equipment Types	Unit	Total	Final Disposal Sites				
			Al Ekaider	Al Huseyneyat	Al Badiah Al Shamaliyah	Al-Duleil	New Dair Alla
Bulldozer (28 t)	Unit	6	4	1	-	-	1
Excavator (0.7 m^3)	Unit	2	2	-	-	-	-
Excavator (0.5 m^3)	Unit	3	-	1	1	-	1
Tipper (10 m^3)	Unit	4	2	-	1	-	1
Tractor	Unit	4	-	1	1	1	1
Sprayer	Unit	4	-	1	1	1	1
Skid steer loader (0.6 m^3)	Unit	2	1	1	-	-	-
Snow removal blade	Unit	2	1	1	-	-	-
Water tanker (8 m^3)	Unit	5	1	1	1	1	1
Air compressor (30 L)	Unit	5	1	1	1	1	1
Car washing machine (15 L/min)	Unit	5	1	1	1	1	1

4. Implementation Schedule and Project Cost

(1) Implementation Schedule

The implementation schedule is shown in the following table.

Table 6: Implementation Schedule of the Project



(2) Project Cost

Total project cost borne by the Jordan side is approximately 7 million yen.

5. Project Evaluation

(1) Relevance

From the result of the preparatory survey, it is considered that the relevance of the Project is sufficiently high, as the following points show.

i. The beneficiary of the Project is all the people living in the target area including the Syrian refugees and the socially vulnerable group. This totals 3,561,000 people (including 348,000 Syrian refugees), which is significantly large.
ii. Due to the difficulty to cope with the waste increase caused by the influx of Syrian refugees, the increasing amount of waste remains uncollected or undergoes inappropriate treatment. The project will meet the pressing needs for the improvement of daily lives and living conditions.
iii. The Project is in line with NSWMS and also contributes to the accomplishment of mid-term and long-term developmental objectives of Jordan.
iv. The Project is consistent with the policy direction of official assistance of the Government of Japan for Jordan.

(2) Effectiveness

Based on the survey results, it is concluded that the Project is effective as shown below.

1) Quantitative Effect

a. Increase of Waste Amount Accepted in Transfer Stations and Final Disposal Sites

As a result of equipment improvement by the Project, the waste amount to be treated in transfer stations and to be disposed in final disposal sites will be increased as shown in the table below.

Table 7: Increase of MSW transfer/ transportation amount and final disposal amount

Indicators	Reference Value※3 (2017)	Target Value※4 (2022) 【3 years after the Project completion】
MSW transfer/ transportation amount ※1(ton/day)	374	1,073
Sanitary Final disposal amount※2 (ton/day)	2,211	3,977

＊1: Municipal solid waste (MSW) transfer/ transportation amount: The reference value is the MSW transfer and transportation amount of the existing 4 transfer stations (TSs), and the target value includes the amount of Jerash new TS in addition to the existing 4 TSs. The MSW transfer/ transportation amount (indicator) will be measured by the incoming MSW amount to the transfer stations.

＊2: Sanitary final disposal amount: Both of the reference value and target one are the MSW sanitary disposal amount of the existing 5 final disposal sites (DSs). The MSW sanitary disposal amount of a DS is the incoming MSW amount to the DS and sanitary disposed (levelled, compacted and covered by soil) there.

＊3: Reference value: The Project's target transfer stations and final disposal sites do not have corresponding data of the amount of incoming MSW to the facilities. Therefore, the reference value for the MSW transfer/ transportation amount has been estimated based on the result of questionnaire survey conducted with the 4 existing transfer stations by the Survey Team The reference value of the final disposal amount is a total of the estimated disposal amounts of Al Ekaider disposal site and Al Huseyneyat disposal site, which have been calculated similarly based on the result of the questionnaire survey with the two disposal sites where disposal is conducted in a sanitary manner as of February 2017.

＊4: Target value: The target value is a total of the planned amounts of the facilities, and the target for transfer stations has been calculated with an assumption of 6 operating days a week, and the one for final disposal sites has been calculated with an assumption of 7 operating days a week.

b. Increase of Beneficiaries

Because of the implementation of the Project, the beneficiary population of transfer stations and final disposal sites will increase by 456,000 and 979,000, respectively, in 2020 from 2017.

c. Reduction of Transportation Cost using Transfer Stations

As a result of equipment improvement by the Project, cost of waste transportation via transfer stations can be reduced by 6,446 JD/day, or 2.01million JD/year, compared to the case where waste is transported from the municipalities to the final disposal sites directly.

2) Qualitative Effect

a. Equipment Improvement for Transfer Stations

Equipment Improvement for Transfer Stations by the Project will bring the following qualitative effects.

- There will be no need to dispose of waste at the dumpsites next to the transfer stations which would be no longer in use.
- The surrounding environment will be improved as the nearby dumpsites can be totally closed.
- Waste collection vehicles, which used to have to wait for waste unloading at the transfer stations due to insufficient operation capacity of the transfer stations, will no longer waste time.
- The municipalities that will use the transfer stations will be able to save the capacity of waste collection and transportation and, instead, allocate it to expand the waste collection services so that the waste amount that is uncollected or inappropriately treated will decrease.
- The transfer stations located in the hilly plateaus can be operated even in snow fall conditions.

b. Equipment Improvement for Final Disposal Sites

Equipment Improvement for Final Disposal Sites by the Project will bring the following qualitative effects.

- Since disposed waste will be adequately leveled and compacted, the lifetime of the final disposal sites can be extended.
- Since soil cover operation will be properly conducted, negative effects to the surrounding area of five target final disposal sites such as foul odor, littering and fire will be abated.
- The final disposal sites located in the hilly plateaus can be operated even in snow fall conditions.
- Spreading of insecticide will enable control of pests.
- Washing the equipment for waste final disposal will extend its service life.

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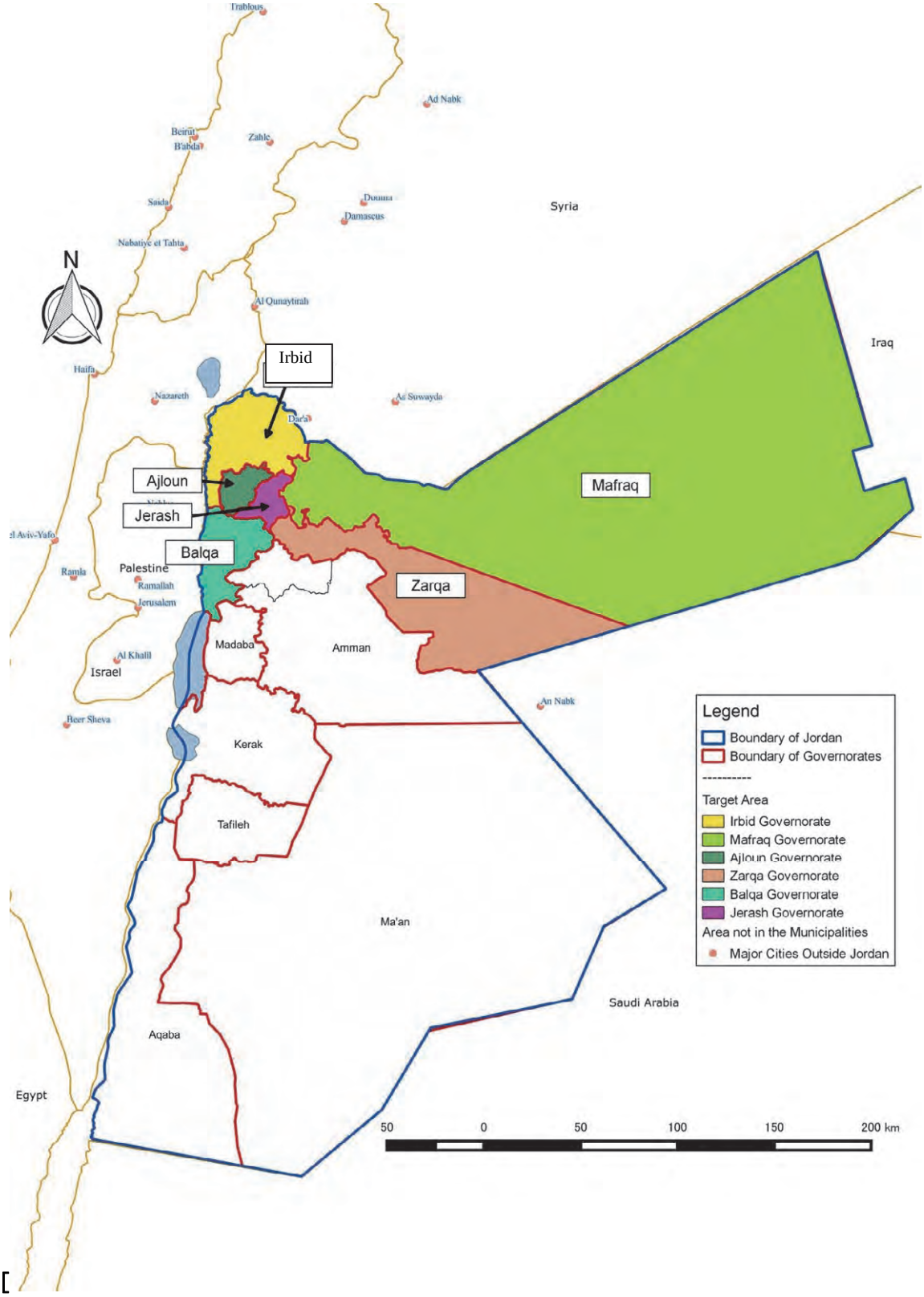

Figure 1: Area of the Preparatory Survey

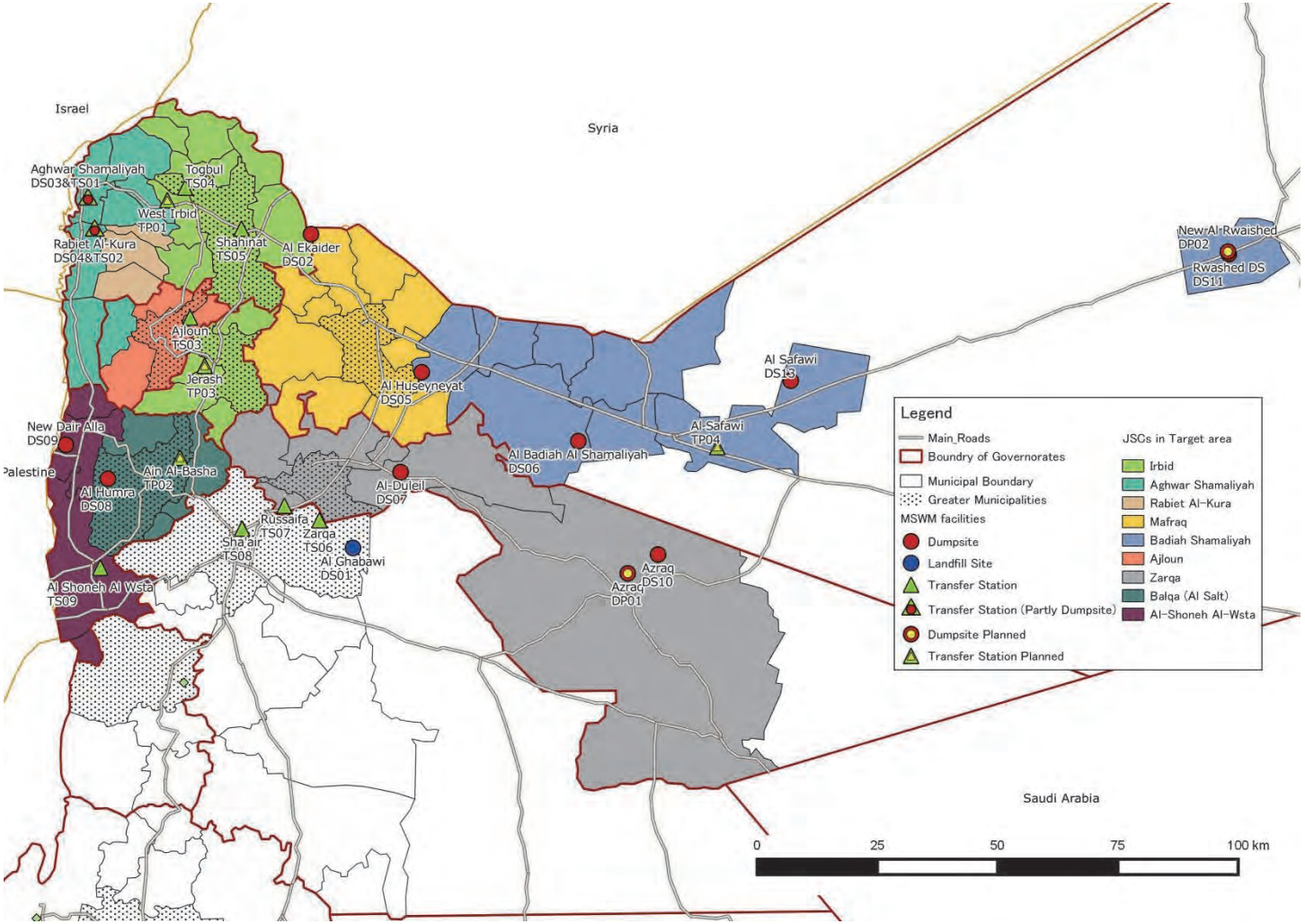

Figure 2: Existing and Planned Transfer Stations and Final Disposal Sites in the Survey Area

Facility Names	Operation Body
Existing Transfer Stations	
TS01. Aghwar Al Sharmaliyah	Aghwar Al Sharmaliyah JSC
TS02. Rabiet Al-Kura	Rabiet Al-Kura JSC
TS03. Ajloun	Ajloun JSC
TS09 Shoneh Al Wsta	Al-Shonen Al-Wsta JSC
Planned Transfer Stations	
TP03. Jerash	Irbid JSC

Facility Names	Operation Body
Existing Final Disposal Sites	
DS02. Al Ekaider	Irbid JSC
DS05. Al Huseyneyat	Mafraq JSC
DS06. Al Badiah Al Shamaliyah	Badiah Shamaliyah JSC
DS07. Al-Duleil	Zarqa JSC
DS09. New Dair Alla	Al-Shonen Al-Wsta JSC

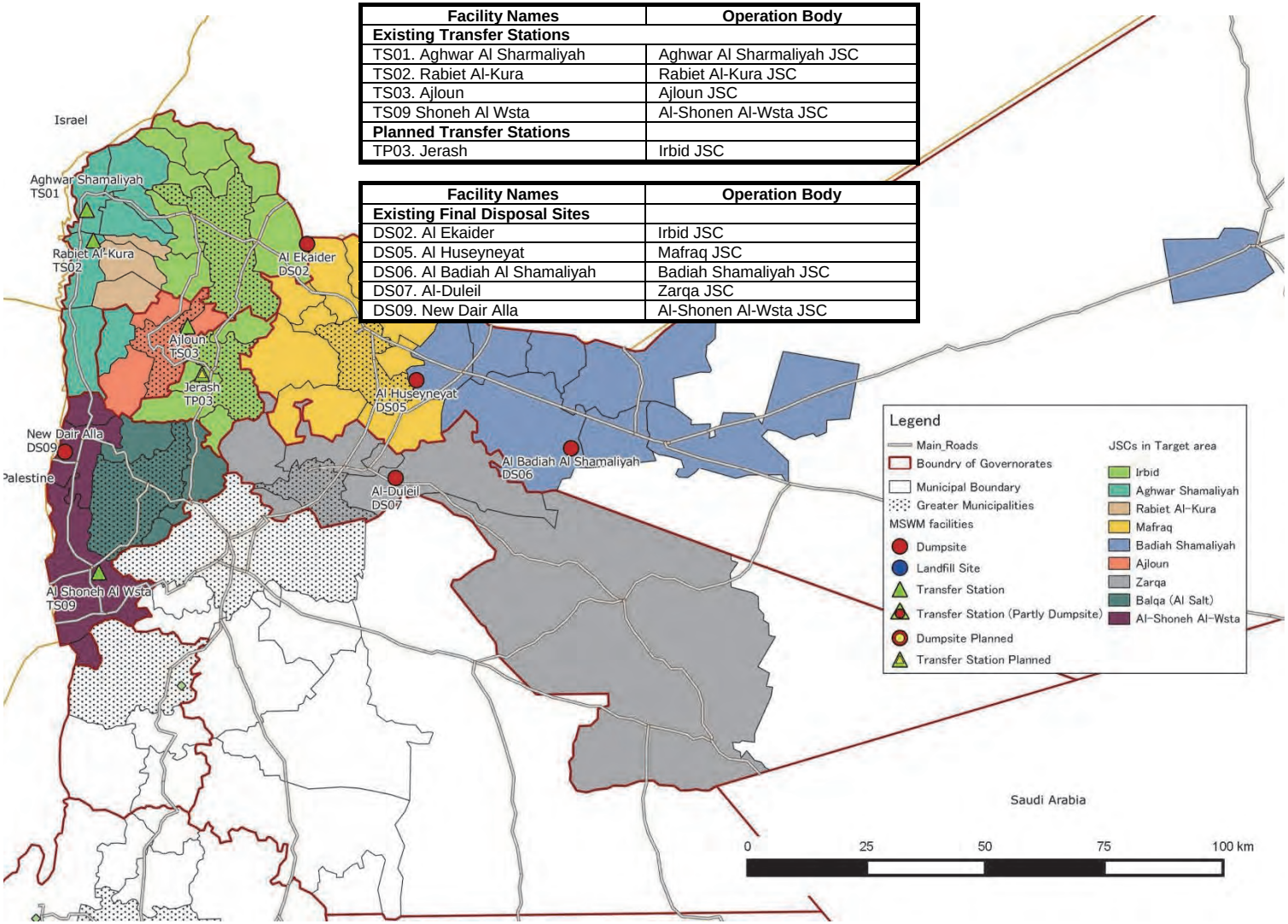

Figure 3: Transfer Stations and Final Disposal Sites to be Covered by the Project

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Abbreviations

AFD	Agence Française de Développement
CVDB	Cities and Villages Development Bank
DPA	Department of Palestinian Affairs
DS	Disposal Site
EBRD	European Bank for Reconstruction and Development
EEA	European Environmental Agency
EIA	Environmental Impact Assessment
ESSRP	Emergency Services and Social Resilience Project
EU	European Union
F/S	Feasibility Study
GAM	Greater Amman Municipality
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
HDI	Human Development Index
IEE	Initial Environmental Examination
ISWA	International Solid Waste Association
JCP	Jordan Competitiveness Program
JD	Jordan Dinar
JICA	Japan International Cooperation Agency
JRP	Jordan Response Plan
JRPSC	Jordan Response Platform for the Syria Crisis
JSC	Joint Services Council
KfW	Kreditanstalt für Wiederaufbau
M/P	Master Plan
MOA	Ministry of Agriculture
MOE	Ministry of Environment
MOEMR	Ministry of Energy and Mineral Resources
MOH	Ministry of Health
MOI	Ministry of Interior
MOMA	Ministry of Municipal Affairs
MOPIC	Ministry of Planning and International Cooperation
MRF	Material Recovery Facility
MSWM	Municipal Solid Waste Management
NS (NSWMS)	National Solid Waste Management Improvement Strategy
RDF	Refuse Derived Fuel
RLDP	Regional and Local Development Project
SWM	Solid Waste Management
TS	Transfer Station
UN	United Nations
UNDP	United Nations Development Programme
UNHCR	United Nations High Commissioner for Refugees
UNRWA	United Nations Relief and Works Agency for Palestine Refugees in the Near East
USAID	United States Agency for International Development
WB	World Bank
WtE	Waste to Energy
3Rs	Reduce, Reuse and Recycle

Chapter 1 Background of the Project

1-1 Current Conditions and Issues of MSWM Sector

1-1-1 Current Conditions and Issues

(1) Current Conditions

According to the national census in 2015, Jordan's total population is 9,531,712, of which 30.6% or 2,918,125 people are non-Jordanians, mostly consisting of refugees from Palestine, Iraq and Syria. The population of the survey area, six governorates (Irbid, Mafraq, Ajloun, Jerash, Balqa and Zarqa), is 4,589,832 and comprises 48.2% of Jordan's total population.

The figure below shows the present (2017) MSWM flow of 62 municipalities and 3 Syrian refugee camps (Za'atari, Azarqa, Emirati) in the 6 governorates of the survey area.

Table 1-1: Present MSWM Flow in the Survey Area (2017)

No	Governorate	Municipality	① Population (Except ②、③) (persons)	② Population (Syrian) (persons)	③ Population (Camp) (persons)	⑤ Waste collection (ton/day)	Total population (persons)	Transportation (TS or Direct haulage)	Disposal amount (ton/day)
G1-01	Irbid	Khalid Bin Al Walid	30,489	355		26	227,705	TS01 Aghwar Al 188 ton/day (Note: More than half of waste disposed of at the dump site next to the TS)	DS02 Al Ekaider DS 1,829 ton/day
G1-02		Mo'az Bin Jabal	53,115	241		44			
G1-04		Tabaket Fahil	39,806	75		33			
G1-05		Taibah	59,212	2,607		51			
G1-06		Wastyyeh	39,532	2,273		34			
G1-07		Barkash	79,635	1,617		67	166,184	TS02 Rabiet Al Kura 137 ton/day (Note: 40% is dumped to the own site)	
G1-08		Deir Abi Said	39,909	3,086		36			
G1-09		Rabyet El Koora	40,944	993		34			
G1-10		Greater Irbid	786,638	84,151		217	30%	TS04 Togbul TS 217 ton/day	
						505	70%	Direct haulage 505 ton/day	
G1-11		Ramtha	150,462	22,044		143	461,493	Direct haulage 384 ton/day	
G1-12		Sahil Houran	67,486	7,101		62			
G1-13		West Irbid	80,614	4,398		70			
G1-14		Yarmouk	24,242	1,198		21			
G1-15		Kaffarat	38,897	1,638		34			
G1-16		Mazaar	21,225	2,462		20			
G1-17		Saroo	22,708	1,093		20			
G1-18		Sho'la	15,320	605		14			
G1-03		Sharhabil Bin Hasna	81,501	316		68	81,817	Direct haulage 68 ton/day → go to DS09	
G2-01	Ajloun	Greater Ajloun	57,104	2,956		50	179,844	TS03 Ajloun TS 147 ton/day	
G2-02		Junaid	29,580	3,016		26			
G2-03		Kafrangeh	37,985	1,093		32			
G2-04		Oyoon	22,107	433		18			
G2-05		Shafa	25,245	325		21			
G3-01	Jerash	Bab Amman	21,439	355		18	242,125	Direct haulage 193 ton/day	
G3-02		Burma	19,469	24		15			
G3-03		Greater Jerash	109,187	4,910		91			
G3-04		Me'raad	54,509	3,025		46			
G3-05		Nasim	27,834	1,373		23			
G4-01	Mafraq	Housha	22,522	3,122		21	71,002	Direct haulage 58 ton/day	
G4-10		Baslieh	6,260	105		5			
G4-14		Manshiet Bani Hasan	10,109	2,017		10			
G4-16		Sarhan	20,759	6,108		22			
G4-02		Bani Hashim	7,575	75		6	53,528	Direct haulage 43 ton/day	DS06 Al Badiah Al Shamaliyah DS 43 ton/day
G4-03		Dair Al Kahif	10,806	346		9			
G4-05		Salhieh Wa Nayfeh	17,494	3,673		17			
G4-08		Umm al Gtain Wa Al Mkaifteh	11,945	1,614		11			
G4-06		Umm Al Jimaal	26,266	3,784		24	427,732	Direct haulage 341 ton/day	DS05 Al Huseyneyat DS 382 ton/day
G4-07		Sabha Wa Dafyaneh	128,715	4,160		106			
G4-09		Bal'ama	31,522	2,691		27			
G4-11		Erehaab	27,484	1,930		23			
G4-12		Greater Mafraq	91,655	32,981		100			
G4-13		Khaldieh	34,255	5,984		32			
G4-15		Prince Hussein Bin Abdulla	14,374	3,149		14			
G4-17		Za-atari wa Al Manshie	12,162	6,620		15			
G4-19		Za'atari Camp			79,660	41	79,660	Direct haulage 41 ton/day	
G4-04		Safawi	6,525	205		6	6,730	Direct haulage 6 ton/day	DS13 Safawi DS (unofficial site) 6 ton/day
G4-18		Rwaished	1,665	1,045		2	2,710	Direct haulage 2 ton/day	DS11 Own DS 2 ton/day
G5-01	Zarqa	Baireen	28,223	452		24	214,952	Direct haulage 180 ton/day	DS07 Al Duleil DS 180 ton/day
G5-02		Dhlail	55,318	3,850		50			
G5-03		Hallabat	33,185	157		28			
G5-04		Hashimyah	90,206	3,561		78			
G5-05		Azraq	58,648	1,758		50	60,406	Direct haulage 50 ton/day	DS10 Azraq DS (unofficial site) 81 ton/day
G5-08		Azraq & Emirati Camp			61,330	31	61,330	Direct haulage 31 ton/day	
G5-06		Greater Zarqa	720,273	30,151		626	750,424	TS06 Zarqa TS 626 ton/day	
G5-07		Russaifa	350,250	8,519		209	358,769	TS07 Russaifa TS 209 ton/day	DS01 Al Ghabawi DS 925 ton/day
						90		Direct haulage 90 ton/day	
G6-01	Balqa	Ain Al Basha	118,286	9,865		105	352,355	Direct haulage 288 ton/day	DS08 Al Humra DS 288 ton/day
G6-02		Al Aarda	18,794	126		15			
G6-03		Fuhais	22,015	449		18			
G6-04		Greater Salt	156,393	5,343		132			
G6-05		Mahis	20,395	689		18			
G6-07		M'aadi	26,562	72		22	26,634	Direct haulage 22 ton/day	DS09 New Dair Alla DS G01-03 58 ton/day 191 ton/day
G6-08		Dair Alla	59,172	1,454		50	60,626	Direct haulage 50 ton/day	
G6-06		Central Shuna	56,614	1,210		47	57,824	TS09 Al Shonen Al Wsta TS 51 ton/day	
G6-09		Swaimah	4,778	0		4	4,778		
		Total	4,377,399	301,028	140,990	3,927			3,927 ton/day

Source: Preparatory survey team; made based on the following information obtained by the field survey:

1. Population census data in November 2015 provided by MOMA
2. NSWMS.
3. Northern and Central region MSWM M/P.
4. UNHCR Syrian refugees' data.

Based on the table above and the field survey results, the current state of MSWM (Municipal Solid Waste Management) in 2017 in the target area is as follows:

- **MSW Generation Amount**: The total population of the survey area is estimated at 4,819,000 people. Based on this population, using the waste generation rate of 2017 (urban area 1.05 kg/ person/day, rural area 0.89 kg/person/day) applied to the NSWMS (National Solid Waste Management Improvement Strategy), the total amount of MSW in the survey area is estimated at 4,910 tons/day.
- **Collection and Final Disposal Amount**: Using the average collection rate of 2014 (90% in urban areas and 70% in rural areas) applied to the NSWMS, the MSW collection and final disposal amount in the surveyed area is estimated to be 3,927 tons / day.
- **Discharge**: Public containers made of iron, generally 1.1 m^3, are used for discharging MSW, and MSW is mixed and discharged without being separated.
- **Collection**: In the municipal collection work, 62 municipalities in the target area take charge of each administrative area, and most of the municipalities provide services directly operated by local governments. Regarding Syrian refugee camps, each camp is outsourcing to the private sector. MSW mixed and discharged in public containers is collected by collection vehicles and transported to a TS, if one is available, or directly to a final disposal site in the absence of a TS. Since many donors support the procurement of collection vehicles for local governments, the collection equipment of the municipalities in charge of collection is well lined up.
- **Transfer and Transportation**: In the survey target area, eight TSs shown in the following table have been constructed in order to reduce transportation costs, and a total of 18 municipalities use them. However, as of March 2017, the TS05 Shahinat TS, managed by the Greater Irbid Municipality, is not in operation because the compaction unit is out of service. All the TSs under the jurisdiction of JSC are operated by JSC directly. Regarding the TSs under the jurisdiction of the municipality, there are cases of direct management and private consignment.

Table 1-2: Outline of Existing Transfer Stations (TSs)

Name of TS	Responsible Organization	Nos of User Municipality	Transfer & Transport Amount in 2017 (tons/day)
TS01. Aghwar Sharmaliyah	Aghwar Sharmaliyah JSC	5	94 Note 1
TS02. Rabiet Al-Kura	Rabiet Al-Kura JSC	3	82 Note 2
TS03. Ajloun	Ajloun JSC	5	147
TS04. Togbul	Greater Irbid Municipality	1	217
TS05. Shahinat	Greater Irbid Municipality	Out of service	0
TS06. Zarqa	Greater Zarqa Municipality	1	626
TS07. Russaifa	Russaifa Municipality	1	209
TS09 Al Shoneh Al Wsta	Al Shoneh Al Wsta Municipality	2	51
Total		**18**	**1,426**

Source: Preparatory survey team made based on the information obtained by the field survey:

Note 1: It is estimated that more than half of MSW coming to the TS are disposed of at the dump site next to it.

Note 2: It is estimated that 40% of MSW coming to the TS are disposed of at the dump site next to it.

- **Intermediate Treatment and Recycling**: There are neither recycling facilities nor intermediate treatment facilities in the survey target area. However, recycling is actively carried out for valuable substances through the informal sector (businesses which have not been registered/controlled by government agencies, such as waste pickers). Recovery of valuables by waste picker is done both in town and at the final disposal site. Many Syrian refugees are engaged in collecting valuables at the final disposal site[2].
- **Final Disposal**: The eleven final disposal sites shown in the following tables are operated in the survey target area. The management of the final disposal sites is all done under the jurisdiction of JSC or local governments. Recovery of valuables at the final disposal site, operated by JSC, is permitted, registered and managed by JSC.

Table 1-3: Outline of Existing Disposal Sites (DSs)

Name of DS	Responsible Organization	Nos of User Municipality	Final Disposal Amount in 2017 (tons/day)
DS02. Al Ekaider	Irbid JSC	31	1,829
DS03. Aghwar Shamaliyah	Aghwar Sharmaliyah JSC	5 Note 1	94 Note 1
DS04. Rabiet Al-Kura	Rabiet Al-Kura JSC	3 Note 2	55 Note 2
DS05. Al Huseyneyat	Mafraq JSC	8＋1 Camp	382
DS06. Al Badiah Al Shamaliyah	Al Badiah Al Shamaliyah JSC	4	43
DS07. Al-Duleil	Zarqa JSC	4	180
DS08. Al Humra	Balqa JSC	5	288
DS09. New Dair Alla	Al Shoneh Al Wsta JSC	5	191
DS10. Azraq	Azraq Municipality	1＋1 Camp	81
DS11. Rwashed	Rwashed Municipality	1	2
DS12. Swaimah	Swaimah Municipality	1	6
Total		**68** Note 3	**3,151** Note 4

Source: Preparatory survey team; made based on the information obtained by the field survey:

Note 1: Since the DS is located next to a TS, it is estimated that more than half of MSW coming to the TS are disposed of at the DS next to it.

Note 2: Since the DS is located next to a TS, it is estimated that 40% of MSW coming to the TS are disposed of at the DS next to it.

Note 3: MSW of user municipalities for DS03 and DS04 is disposed of at DS02 by transfer and transportation operated by the TSs next to the DSs.

Note 4: MSW of Greater Zarqa Municipality and Russaifa Municipality, 925 tons/day, is disposed of at Al Ghabawi DS of GAM, which is outside of the survey target area.

[2] In the interview survey to waste pickers at Al Huseyneyat final disposal site, 70% said that they came to work from neighboring Za'atari Syrian refugee camp.

(2) Issues

1) Discharge

Due to adoption of public containers for discharge and collection, the following problems exist.

1. Since MSW can be discharged at any time, when collection is insufficient, waste overflows from public containers, is scattered around and remarkably deteriorates the landscape and environment of the city.
2. Solid waste other than MSW such as construction waste and industrial waste is discharged.
3. Currently, there is no intermediate treatment system, so it is not a problem, but it is difficult to introduce separate collection, which is necessary for promoting intermediate treatment and recycling.

2) Collection

Although the collection equipment is being lined up with the support of many donors, the maintenance and management system such as procurement of spare parts has not been sufficiently established.

Currently, all MSW collected is being disposed of at final disposal sites directly or through a TS. Municipalities that do not have a final disposal site or TS nearby have the following problems.

1. Because the transportation distance is very long, it takes time for one trip (collection start => transport => final disposal => collection start), so the number of trips of the collection vehicle is limited.
2. To increase the number of trips the collection vehicles are used for a long time, which frequently causes failures.
3. In addition, due to fuel costs and labor costs for transportation, the burden of collection costs of municipalities is very large.

3) Transfer and Transportation

Judging from the location of the final disposal site, the necessity of constructing a new TS is extremely high in order to reduce the collection and transportation expenses of remote municipalities and to improve the occupancy rate of collection vehicles. However, with regard to the construction of a new TS, there is also opposition movement against TS from the neighboring residents; therefore, a cautious response is required.

On the other hand, the following are problems with the existing eight TSs.

1. Since the majority of existing transfer and transport equipment was procured in 2004, some of them have already become useless and frequently fail. Therefore, urgent renewal is required.
2. As for TS01 and TS02, due to insufficient processing (transfer and transport) capacity in

addition to occurrence of failure, some of MSW incoming to the TSs are disposed of at the nearby final disposal sites where usage was stopped originally.

3. Since TS03, TS04, and TS09 have a shortage of processing capacity in addition to occurrence of failures, some users suspend transportation directly to the final disposal site because collection vehicles have a long standby time.

4. At TS05, TS06 and TS07, incoming MSW are unloaded on the ground and directly transferred to the transportation vehicles by using a Wheel Loader because the equipment of TSs, including the compaction unit, are broken. Therefore, it has a serious impact on the environment in the surrounding area such as the scattering of waste and the generation of offensive odor. TS 05 has canceled transfer and transportation operation due to failures of compaction unit, and has shifted the available equipment to TS 04.

4) Intermediate Treatment and Recycling

To promote intermediate treatment and recycling, it is necessary to overcome the following issues.

1. A considerable expense burden is required for construction and operation of intermediate treatment/recycling facilities. It is necessary to construct a mechanism of cost burden and to form an agreement on tipping fees for processing costs and others.

2. Furthermore, in order to efficiently operate the intermediate treatment/recycling facilities and to achieve the prescribed outcomes, it is necessary to introduce MSW separation and separate collection system according to the purpose of the facility. A substantial expense burden is required to abolish the present mix collection system and construct a new separate collection system. It is necessary to construct a mechanism for burden of the cost and form a consensus.

3. The recycling currently being conducted mainly involves collecting valuables by the informal sector, but it is necessary to convert this to a mechanism involving the administration.

5) Final Disposal

As a general situation, it is difficult for a final disposal site to be located near an urban area that is the source of MSW, due to progress of urbanization, increase in waste generation, NIMBY (not-in-my-backyard) syndrome, etc. Consequently, the final disposal site is being located in a remote area far from the urban area.

Regarding the existing 11 final disposal sites, the following problems exist.

1. Except for sanitary cells newly constructed at Al Ekaider DS (disposal site), none of the final disposal sites were constructed and operated as sanitary landfill. For this reason, adverse effects on the environment such as groundwater contamination by leachate water are a concern.

2. In all final disposal sites, proper landfill operation is not conducted due to lack of landfill equipment, improper operation of equipment (For instance wheel loader is used for waste

levelling and compaction and soil covering instead of bulldozer and excavator), etc.

3. Except for some final disposal sites, wastes of incoming collection vehicles are not controlled and managed.

4. There is no management of landfill gas, leachate, etc.

1-1-2 Development Plans

(1) Governmental Plans for Short and Medium Terms

In the National Agenda for Sustainable Development (2006-2015), the government of Jordan recognized the SWM sector as one of the priority areas and established the following four targets:

1. Improve the financial status, technical capacity and human resources, strengthen the capability of relevant institutions and extend SWM services.

2. Promote the treatment and disposal of waste for environmental conservation.

3. Minimize waste generation.

4. Maximize environmentally sound reuse and recycling of waste.

Following the National Agenda, the government of Jordan issued the Jordan National Vision and Strategy 2025, which declares government policies of different sectors for the coming 10 years. To create a rich and strong nation it has four pillars: "Social and active citizen", "Safe and stable society", "Dynamic global competitive economic world" and "Effective and efficient government". In regard to the environmental sector, the following scenarios and performance indicators of SWM are presented.

Table 1-4: Scenarios and Indicators for SWM from the Jordan National Vision and Strategy 2025

Scenarios	Indicators	2017	2021	2025
・ Safe disposal of solid waste ・ System development of waste separation, reuse and recycling ・ Integrated management of hazardous waste ・ Investment and job creation in SWM sector ・ Private sector participation in SWM sector	Rate of solid waste disposed in landfills (without treatment and reuse/recycling)	80%	75%	60%
	Rate of solid waste treated and reused	20%	25%	40%
	Rate of hazardous industrial waste treated	50%	70%	80%
	Rate of infectious/hazardous medical waste treated	70%	75%	80%

Source: Jordan National Vision and Strategy 2025

The Project contributes to the promotion of Jordan National Vision and Strategy 2025 in line with the above scenario regarding proper transportation and safe disposal of waste generated within people's living environment.

(2) NSWMS and MSWM M/P for Northern and Central Regions

Since MSWM has high cost burden among urban services, the National Solid Waste Management Strategy (NSWMS) was developed in the Regional and Local Development Project (2007-2015) financed by the World Bank and AFD with MOMA and CVDB as counterparts as part of strengthening the urban service function of municipalities.

In the NSWMS, the country is divided into three regions; northern, central and southern region. In order to promote the implementation of the NSWMS more concretely, the MSWM M/P was formulated with the assistance of EU and GIZ and approved by the NSWMS Technical Committee in June 2017. The outline of the plan of MSWM M/P is described below. The southern region MSWM M/P is scheduled to be developed by AFD soon.

1) Outline of the NSWMS

- **Goals**

Vision	To shift from an old, inefficient, costly and environmentally unstable municipal solid waste management system towards a modern and integrated one that will be based on the 3Rs (Reduce, Reuse and Recycle) approach.
Short term (2015-2019)	Focus on resolving the extreme problems of today and preparatory actions for the next period.
Mid-term (2020-2024)	Supplement the short-term activities and evolve towards set targets for materials or other (e.g. energy) recovery.
Long term (2021-2034)	Focus on achieving a state-of-the-art level of MSWM and bring Jordan in-line with the European and International state.

- **Planning Area** (Governorates underlined are the target areas of the Project.)

Northern Region: Irbid, Ajloun, Jerash and Mafraq Governorates

Central Region: Amman, Balqa, Madaba and Zarqa Governorates

Southern Region: Karak, Tafilah, Aqaba and Ma'an Governorates

- **Policies**

Policy 1. Serving the emergency MSWM needs of Jordanian societies due to the influx of refugees from the neighbouring countries.

Policy 2. Provision of MSWM services to the entire (100%) permanent and temporary population of Jordan.

Policy 3. Improvement of MSWM in local, regional and national levels

Policy 4. Avoidance of co-management of MSW with hazardous or special streams currently

ending up in the city containers

Policy 5. Mitigation of informal waste-picking of MSW through integration of informal sector into the MSWM system

Policy 6. Improvement of cost recovery of the MSWM system in Jordan, including the establishment of partnerships between the public and the private sectors

Policy 7. Improvement of the institutional set-up of local, regional and national authorities in relation with MSWM

Policy 8. Motivation of the public to participate in safe MSWM practices by increasing public awareness and education in MSWM related issues

Policy 9. Improvement of monitoring mechanisms for MSWM in terms of operational and environmental performance

Policy 10. Updating the MSWM related legislative framework in Jordan

Policy 11. Required studies to fulfil the actions/measures

Among these policies, Policy 1 is planned to take the following actions in the short term, and this project is positioned to be in line with the following action plans of Policy 1:

- Procurement of road cleaning, collecting and transporting equipment for municipalities.
- Procurement of the final disposal site equipment for municipalities and JSCs.
- Improvement of existing TSs and construction of new TSs.
- Construction of sanitary landfill cells at the final disposal site.
- Rehabilitation of half of final disposal sites (open dumping sites).

2) MSWM Facility Plan

According to the MSWM M/P, the short and medium term facility plan for the target area of the Project is shown in the table below..

Table 1-5: Short and Medium Term Facility Plan of MSWM M/P

Region	Type of Facility	Name of Facility	Contents of the Plan
Northern	Final Disposal Site (DS)	DS02 Al Ekaider DS	• Rehabilitation of current disposal operation area. • Operation of sanitary landfill at Al Ekaider DS from 2018 and other 2 DSs from mid-2018.
		DS05 Al Huseyneyat	
		DS11 New Al Rwaished	

Region	Type of Facility	Name of Facility	Contents of the Plan
		Other Current DSs (Including DS06. Al Badiah Al Shamaliyah)	In accordance with the construction of the above three sanitary landfill cells and TSs, the plan is to gradually implement safe closure of DSs from 2020 to 2024, but the timing of closures will be reviewed in 2020.
	Transfer Station (TS)	TS01. Aghwar Sharmaliyah	To be improved by 2020.
		TS02. Rabiet Al-Kura (Iskayeen)	
		TS03. Ajloun	
		TS04. Togbul	
		TS05. Shahinat (Truck City)	
		TP01. West Irbid	To be constructed by 2020.
		TP03. Jerash	
		TP04. Safawi	
Central	Final Disposal Site (DS)	DS01. Al Ghabawi	To construct and operate sanitary landfill continuously.
		DP01. Azraq	To start operation of sanitary landfill by mid-2018.
		DS07. Al-Duleil	In accordance with the construction of the above two sanitary landfill cells and TSs, the plan is to gradually implement safe closure of DSs from 2020 to 2024, but the timing of closures will be reviewed in 2020.
		DS09. New Dair Alla	
		DS08. Al Humra	To implement safe closure of DSs by 2020.
		DS10. Azraq	
	Transfer Station (TS)	TS06. Zarqa	To be improved by 2020.
		TS07. Russaifa	
		TS08. Sha'air	
		TS09 Al Shoneh Al Wsta	
		TP02. Ain Al-Basha	To be constructed by 2020.
		Southwest GAM	
		Northwest GAM	
		Northeast GAM	

Region	Type of Facility	Name of Facility	Contents of the Plan
		Southeast GAM	

Source: Northern and Central Region MSWM M/P

3) Institutional Development Plan

The NSWMS plans organizational reforms in the mid-term stage at the national, JSC, and local government (municipalities) levels.

First of all, at the national level, various provisions necessary for MSWM are prepared, and at MOMA, a department specializing in MSWM is established and more authority is delegated to JSC and local governments.

As for JSC, in principle, one JSC is set for a sanitary landfill (final disposal site) – which accepts MSW from several municipalities, one scope of municipalities – by integration of the current JSCs in the mid-term (2020 - 2024). In the NSWMS, this municipality scope is called as a waste catchment area. After the integration, the JSC and the municipalities are grouped in the project target area as follows.

Table 1-6: Service Area, JSC and Scope of Municipalities

Service Area	JSC	Scope of Municipalities
North West Jordan MSWM Service Area	Northwest Jordan JSC	18 municipalities in Irbid Governorate 5 municipalities in Jerash Governorate 5 municipalities in Ajloun Governorate 3 municipalities (New Hosha, Al-Basilieh, Al-Sarhan) in Mafraq Governorate
North East Jordan MSWM Service Area	Northeast Jordan JSC	15 municipalities (other than New Hosha, Al-Basilieh, Al-Sarhan) in Mafraq Governorate
Amman MSWM Service Area	GAM	9 municipalities in Amman Governorate (including GAM) Note 1
Zarqa MSWM Service Area	Zarqa JSC	7 municipalities in Zarqa Governorate
Balqa/Madaba MSWM Service Area	Balqa/Madaba JSC	4 municipalities in Madaba Governorat Note 1 9 municipalities in Balqa Governorate

Source: NSWMS and MSWM M/P of Northern and Central Region

Note 1: Outside of the project target area

(3) JRP (Jordan Response Plan)

The JRP is a plan formulated to seek support from the international community in two aspects, reinforcement of responding ability as a host country (Resilience) and support to refugees in response to the sudden influx of refugees (Refugee). It is a rolling plan with a period of 3 years, in January 2017, a draft of JRP targeting 2017-2019 was released. For each of 12 sectors, the Resilience type project and the Refugee type project are listed, with Res + number or Ref + number and ID, respectively.

Regarding municipal solid waste management (MSWM), in the sector of "local governance and urban services", the subproject within the project Res 1.2 listed in JRP 2016-2018 of last year was reorganized and the following seven items of Res 1.5 - Res.1.11 are published as a project plan.

In the JRP project which MOMA is responsible, the Planning and Development Department of MOMA is in charge of the project. According to the person in charge, the JRP project is part of the NSWMS, and it is also flexibly recombined in accordance with a priority task for the implementation of the NSWMS.

The content of this project is considered to partially contribute to Res 1.5 and Res 1.8.

Table 1-7: MSWM Project in the JRP2017-2019

Project ID	Name of Project
Res 1.5	Purchasing of needed equipment and containers
Res 1.6	Capacity building programmes developed and delivered on SWM process
Res 1.7	New landfill sanitary cells designed and constructed
Res 1.8	New transfer stations including segregation and recycling units designed and constructed
Res 1.9	New digester and waste to energy units constructed
Res 1.10	New compost plants including recycling plant constructed
Res 1.11	Impact study of SW on other services such as aquifers in the northern governorates conducted

Source: Annex of The Jordan Response Plan for the Syria Crisis 2017-2019

1-1-3 Socio-economic Conditions

(1) Population and Influx of Refugees

In 2015, Jordan implemented a population housing census. According to the results, the population is 9,531,712 people, which is tenfold in the past 55 years. In addition, 30.6% of the population, 2,918,125 people are non-Jordanian, and it shows the history of accepting numerous Palestinians, Iraq and Syrian refugees. Especially a large number of Syrian refugees have flowed into the northern region and Amman Governorate since the Syrian crisis of 2011 occurred.

The census data of 2015 and the number of Syrian refugees registered in UNHCR as of March 2017 according to the governorate are presented in the table below.

Table 1-8: Population of Jordan and Registered Syrian Refugees

Governorate		2015 (*1)			Registered Syrian refugees (*2)		Urban Syrian Refugee Share	Urban Syrian refugees distribution
		Total (A)	Jordanian	Other	Urban (B)	In Camps	B/A (%)	(%)
Northern	**Irbid**	**1,770,158**	**1,316,618**	**453,540**	**136,670**		**7.7%**	**26.5%**
	Mafraq	**549,948**	**314,164**	**235,784**	**79,517**	**79,660**	**14.5%**	**15.4%**
	Ajloun	**176,080**	**157,162**	**18,918**	**7,769**		**4.4%**	**1.5%**
	Jerash	**237,059**	**167,751**	**69,308**	**9,639**		**4.1%**	**1.9%**
Central	Amman	4,007,526	2,554,923	1,452,603	181,463		4.5%	35.2%
	Balqa	**491,709**	**396,939**	**94,770**	**19,240**		**3.9%**	**3.7%**
	Zarqa	**1,364,878**	**923,652**	**441,226**	**48,193**	**61,330**	**3.6%**	**9.3%**
	Madaba	189,192	156,787	32,405	11,125		5.9%	2.2%
Southern	Kerak	316,629	272,449	44,180	8,641		2.7%	1.7%
	Tafilah	96,291	90,108	6,183	1,563		1.6%	0.3%
	Ma'an	144,082	127,989	16,093	7,447		5.2%	1.4%
	Aqaba	188,160	135,045	53,115	3,403		1.8%	0.7%
Total		9,531,712	6,613,587	2,918,125	515,923	140,990	5.4%	99.8%
Survey area		**4,589,832**	**3,276,286**	**1,313,546**	**301,028**	**140,990**	**6.6%**	**58.3%**

(*1) Department of Statistics of Jordan, National census carried out during November and December, 2015

(*2) Data as of 15 March 2017, http://data.unhcr.org/syrianrefugees/regional.php, UNHCR. Urban total includes 1,253 of refugees without information of specific location.

(2) Economic Conditions

In Jordan, the GDP growth rate was maintained as high as 6.5% on average from 2000 to 2009, but it was affected by the destruction of the gas supply line from Egypt, and the stagnation of the onshore trade transport accompanying Syrian crisis, the average GDP is 2.7% from 2010 to 2016, which is a slow growth. According to the World Bank Report, as the table below shows, the GDP growth is expected to continue to increase slightly upward in the future.

Table 1-9: Growth Rate of GDP (Actuals and Forecasts)

	2014	2015	2016	2017	2018	2019
GDP growth rate	3.1	2.4	2.3	2.6	3.1	3.4

Source: World Bank Group, “Global Economic Prospects”, 2017

Note: After 2016 forecast value.

Most of the GDP is produced by tertiary industries such as finance, real estate, information and tourism. In the secondary industry, garments, fertilizers, pharmaceuticals, etc. are major export items. Although primary industries occupy only a small percentage of both labor force and GDP,

vegetables and fruits are produced in the Jordan Valley area by irrigation system development.

Table 1-10: Industrial Structure

	Primary Industry	Secondary Industry	Tertiary industry
Labor force ratio (2013) Note 1	2%	20%	78%
GDP ratio (2015) Note 2	4.1%	30.0	66.2%

Note 1: World Factbook, https://www.cia.gov/library/publications/the-world-factbook/fields/2048.html, accessed on 27 January 2017.

Note 2: World Bank national accounts data and OECD National Accounts data files, http://data.worldbank.org/indicator/, accessed on 27 January 2017.

In addition, Jordan National Vision and Strategy 2025 states that the economic disparities in each governorate, especially the high unemployment rate in young people and the delay in women's social advancement are issues. For example, economic activity is extremely concentrated in GAM, and the unemployment rate continues to be as high as 12 to 13%. The employment situation of men and women aged 15 to 64 is 71% for males and 21% for females[3].

Table 1-11: Unemployment Rate

	2011	2012	2013	2014	2015
Unemployment Rate (%)	12.9	12.2	12.6	11.9	13.0

Source: Central Bank of Jordan, “Summary of Economic Development in 2015”

1-1-4 Natural Conditions

The country is geographically composed of the three areas with different topographical, climate and land use characteristics.

1. Jordan Valley area: Jordan Valley, which is the northern tip of the African Great Rift Valley, runs in the west of the country from south to north and is famous for its world-lowest elevation at 200 to 400 meters below sea level. Being warm in winter and hot in summer, the area is prosperous in irrigated agriculture.
2. Hilly plateau area: To the east of the Jordan Valley is hilly plateau of Mediterranean climate with some peaks over 1,500 m high. It has relatively high precipitation and is rich in vegetation.
3. Desert area: To the east of hilly plateau is the desert, which covers as much as 80% of the country. Its southeast part is extremely dry as the yearly rainfall can be less than 35 mm.

1-1-5 Environmental and Social Considerations

The preparatory survey team presented the outline of the Project to Licensing & Pollution

[3] Department of Statistics, Population and Housing Census 2015

Prevention Directorate of Ministry of Environment of Jordan, which is the agency responsible for environmental impact assessment (EIA), and confirmed that the Project did not require EIA approval as the Project would only entail the procurement and installation of additional equipment and/or equipment for replacement.

Meanwhile, the development of Jerash transfer station was required for EIA approval procedure. The EIA report was prepared by the Royal Scientific Society and endorsed by the Minister of Environment on April 12, 2017.

1-2 Background and Outline of the Grant Aid

Due to the outbreak of the Syrian crisis in March 2011, a number of Syrian refugees have entered Jordan. As of March 2017, the number of Syrian refugees registered at UNHCR (United Nations High Commissioner for Refugees) of Jordan is about 660,000. This is the third highest number of Syrian refugees accepted by a country, behind Turkey and Lebanon.

About 80% of Syrian refugees in Jordan live outside of camps as city-dwelling refugees. Amman Governorate hosts the largest number of such city-dwelling refugees (35.2%), followed by Irbid Governorate (26.5%) and Mafraq Governorate (15.4%). This shows most city-dwelling refugees stay in the capital and the northern area. With the increase of refugees, it has been getting difficult for those refugee hosting areas to provide social services such as education and healthcare. Also, due to the increase of waste amount together with the insufficient number and deterioration of waste collection vehicles, the capacity of waste collection, treatment and final disposal have become insufficient. This is causing illegal waste dumping, inappropriate waste treatment and open burning, and further leading to environmental problems and insanitary conditions.

The Government of Jordan formulated the Jordan Response Plan 2016-2018 (hereafter, JRP) based on the assessment of development needs and vulnerability derived from the influx of Syrian refugees. Solid waste management is one of the concerns addressed in JRP. The international and bilateral aid agencies have been providing assistance to the solid waste management sector in and around the refugee hosting region, but much still has to be supported.

Under such circumstances, JICA carried out “Data Collection Survey on Waste Management in Northern Region accepting Syrian Refugees” (hereafter, Data Collection Survey) from February to April, 2016. The survey examined the fundamental data and information about the current solid waste management of the country and the assistance activities of various donors and identified the assistance needs in solid waste management in the areas hosting Syrian refugees.

Based on the findings of the Data Collection Survey, JICA decided to carry out the preparatory survey on “Project for Improvement of Waste Management Equipment in Northern Region Hosting Syrian Refugees” (hereafter “the Project”). It aims to improve the sanitation and living conditions of local communities and Syrian refugees in the refugee hosting northern region (namely,

governorates of Irbid, Marfaq, Ajloun, Zarqa, Balqa and Jerash) by upgrading the equipment used in waste transfer stations and final disposal sites to cope with waste increase triggered by the influx of refugees.

1-3 Trend of Japanese ODA

1-3-1 Japan's Development Cooperation Policy for Jordan

Country development assistance policy for Jordan, formulated by the Government of Japan in July 2017, states that the assistance to Jordan has two significant meanings: the contribution to the regional stability, that Jordan has been playing an important role, and the development of a friendly relationship between the two countries since the establishment of diplomatic ties. It also shows the basic assistance policy "Maintenance of Stability and Development of Industrial Basis" and its three pillars of priority as shown below:

- Priority Pillar 1: Boosting autonomous and sustainable economic growth
- Priority Pillar 2: Poverty reduction and correcting social disparities
- Priority Pillar 3: Regional Stability

Under one of the pillars "Regional Stability", the rolling plan, annex to the country assistance policy, lists cooperation programs including a stability promotion program, having an objective which is "to contribute to Jordan's stability through the assistance to Syrian refugees and local communities hosting Syrian refugees".

1-3-2 Past Japan's Development Cooperation for Jordan

Recent Japan's Development Cooperation for Jordan on SWM sector is presented in the table below.

Table 1-12: Recent Japan's Technical and Loan Cooperation for Jordan on SWM Sector

Type of Cooperation	Fiscal Year	Project Name	Contents
Preparatory Survey	Year 2004	Basic Design Study for the Project for the Improvement of Solid Waste Management in the Greater Amman (Phase II) in the Hashemite Kingdom of Jordan	The Study investigated waste management situation of Amman city (GAM), identified improvement plan, and investigated the necessity of procurement of waste collection and transportation equipment, landfill disposal equipment and management equipment necessary for improvement.
Data Collection Survey	Year 2016	Data Collection Survey on Waste Management in Northern Region accepting Syrian Refugees in the Hashemite Kingdom of Jordan	The Survey collected information on the waste management sector of Jordan and the international organizations and the donor's support status for the sector for the Syrian refugees influx area (GAM and the six northern governorates), and examined JICA's short- and medium-term assistance plan (draft).

Source: JICA Library Portal Site, (https://libportal.jica.go.jp/library/public/index.html)

Table 1-13: Recent Japan's Development Cooperation for Jordan on SWM Sector (Unit Million Yen)

Fiscal Year	Project Name	Grant Aid Amount	Outlines
1993年	The Improvement of Solid Waste Management in the Greater Amman in the Hashemite Kingdom of Jordan	504	Procurement of waste collection and transportation equipment, landfill disposal equipment and management equipment for GAM.
1995年	The Project for Improvement of Solid Waste Management in Major Local Areas in the Hashemite Kingdom of Jordan	1,155	Procurement of waste collection and transportation equipment, landfill disposal equipment, management equipment for major municipalities.
2004年	The Improvement of Solid Waste Management in the Greater Amman (Phase II) in the Hashemite Kingdom of Jordan	745	Procurement of waste collection and transportation equipment (waste collection trucks, waste transport trailers, tractor heads, etc.), landfill disposal equipment (bulldozers, backhoes, etc.), management equipment (water tankers, etc.) to GAM.
2015年	The Economic and Social Development Programme in the Hashemite Kingdom of Jordan FY2015	1,850	To procure equipment for waste management (waste collection vehicles, landfill disposal equipment (bulldozers, backhoes, etc.), management equipment (water tankers, etc.)) and water fields.

Source: Homepage of Ministry of Foreign Affairs of Japan
(http://www.mofa.go.jp/mofaj/gaiko/oda/region/middle_e/jordan/exchange.html)

Furthermore, the Syrian refugee assistance through international organizations are shown below.

Table 1-14: Japan's Assistance for Syrian Refugees through International Organizations

Year	Amount of Aid	International Organization
March 2013	27,500 thousands US$	UNICEF, WFP, UNHCR
March 2014	19,183 thousands US$	UNICEF, WFP, UNHCR, IFRC, IOM, UNIDO, UNOPS
March 2015	27,698 thousands US$	UNICEF, WFP, UNHCR, IFRC, IOM, UNOPS, UNODC, UN Women

Source: Homepage of Embassy of Japan in Jordan, http://www.jordan.emb-japan.go.jp/files/000121262.pdf

1-4 Assistance from Other Donors

The influx of refugees caused by the Syrian crisis in 2011 has given more burden to the SWM service provision capacity of the municipalities, which originally is not sufficient to satisfy the population that increased in the city. Therefore, as emergency response support to Jordan, donors of each country and international organizations have been provided assistance to strengthen the urban services supporting the municipalities and/or MOMA and City and Village Development Bank (CVDB), which should give support the municipalities. Moreover, the assistance of waste management projects (mainly waste collection), which is one of the urban services, has also been provided.

Meanwhile, since a large proportion of the municipal expenditure spend is the waste management

field and the rebuilding of the waste management system is urgent due to the influx problems of Syrian refugees, the "Regional and Local Development Project" (2007-2015) by the World Bank (Co-financed AFD), has formulated the NSWMS while supporting the municipalities. The NSWMS was approved by Jordan in September 2015 and since then the assistance for the waste management field is in transition from the previous emergency response to support the implementation of NSWMS.

The following trends of assistance by other donors currently underway or planned are shown below.

Period	Donor	Name of Project	Amount of Aid		Type of Aid	Outline	Situation in March 2017
2013 - 2017	UNDP	Mitigating the impact of the Syrian refugee crisis on Jordanian vulnerable host communities	43,744,084	EUR (€)	G, TA	Aiming to contribute to sustaining social and economic stability, the project strengthened the social services and invested in employment creation. Among five outputs expected, Output 3 "Improved delivery of municipal and social services" entailed the activities for SWM. Its achievement included: - Municipalities Needs Assessment Report - SWM plans for selected municipalities - Procurement of SWM equipment The Japanese government provided 17,329,200 € (EUR).	The schedule until the year 2015 is extended by 2017 and is planned to extend for another year. Activities range from livelihood improvement, legal institution support, social safety management, etc. In regard to waste management, in addition to strengthening collection service capacities including equipment procurement and planning, the Windrow type compost Improvement of facilities is being developed at the Huseyneyat final disposal site of Mafraq.
2014 - 2017	UNDP	Improving Solid Waste Management and Income Creation in Host Communities-Rehabilitation of Al Ekaider Landfill	13,500,000	USD	G, TA	Its components include: 1. Infrastructure improvement of Al Ekaider DS (development of existing buildings, road, lighting and buffer zones); 2. Construction of sanitary landfill (SLF) cell and training of SLF operation; 3. Efficiency improvement of waste collection and transportation by the transfer station, 4. Procurement of equipment for Al Ekaider DS, 5. Livelihood improvement of local communities and formulation of new contracts for waste collection and recycling to improve the working conditions of waste pickers at the final disposal site in Jordan; and 6. Capacity development of JSC and landfill staff. The Government of Canada provided US$ 13.5 million.	1. Completed the administrative building and workshop, etc. Ceremony in mid-February in 2017. Completion of road and lighting, etc. will be by the completion of the new cell of 2. 2. After completing the EIA, design review, etc., select a contractor and start construction on January 15, 2017. 3. EIA study was completed and is waiting for approval of MOE. Construction bid preparation in progress. 4. On April 5, 2016, 14 heavy machineries were procured. 5. Pilot composting facility and improvement of the working environment of waste pickers are planned. 6. Training in Turkey. Implementation of the training on integrated waste management, fleet management and financial management. Submission of a survey report titled "Human Resources Development for Improvement of Al Ekaider DS " to MOMA.

Period	Donor	Name of Project	Amount of Aid		Type of Aid	Outline	Situation in March 2017
2016 - 2017	EU	Support to the formulation of a Solid Waste Management Programme	N.A.		TA	In order to materialize the NSWMS, MSWM M/P for Central region is formulated. A support program for the implementation of the NSWMS for EU is prepared.	The MSWM M/P for Central region will be submitted to MOMA at the end of March 2017. The EU support program was formed as a new project of 100 million € shown in the next line.
2017 - 2023	EU	Support to the Implementation of the National Solid Waste Management Strategy	100,000,000	EUR	G, TA	It is a program that contributes 70 million € in 2016 and 30 million € in 2017 over six years from the EU's general budget. Of this, 40 million € contributes according to the conditions to the Jordanian treasury as budget support for implementation of measures of MOMA and MOE. The other 60 million € will support the implementation of the project as the executing agency with AFD and GIZ. The Specific Objectives (SO) are SO 1 institutional system improvement support, SO 2 infrastructure development support, SO 3 informal sector improvements and SO 4 enlightenment education. SO 1 and SO 2 are to be done by the budget support and AFD projects. SO 3 and SO 4 are to be conducted by GIZ project.	Grant agreement with EU-Jordan is scheduled to be exchanged in April 2017.
2014 - 2017	WB	Emergency Services and Social Resilience Project (ESSRP) Additional Funding (2017)	10,800,000	USD	G, TA	This targets the municipalities in the northern region with a large influence of Syrian refugee influx. This project has been conducted to strengthen the social services (including SWM) and to respond to the emergent needs for the improvement of living conditions with US$ 65.5 million of grant for three years from 2014 to 2016. The amount of aid is for the extension of one year for 2017.	Although it was extended for one year, the activity is continuation of last year's one. Materials and equipment including waste collection equipment for project activities according to the needs of municipalities are procured.
2016 - 2019	AFD	T/A for the Implementation of National Strategy to Improve SWM			TA	To dispatch experts to MOMA to promote implementation of NSWMS.	From August 2016, experts from Tunisia have been dispatched to MOMA for 18 months.

Period	Donor	Name of Project	Amount of Aid		Type of Aid	Outline	Situation in March 2017
2014 - 2020	GIZ	Support to solid waste management in refugee hosting communities	6,000,000	EUR	G, TA	This project include such activities as the improvement of operation and maintenance functions of a collection vehicle depo, optimization of collection routes and collection points and facilitation of communication between the communities and the waste collection authority in Greater Irbid Municipality, Greater Mafraq Municipality and Greater Karak Municipality financed by BMZ (Federal Ministry of Economic Cooperation and Development).	Although the project was until 2017, it is extended for three years. The project strengthens municipality taff, especially enhancement of vehicle management aspect and formulates Municipality's SWM plan.
2015 - 2017	GIZ	Support to solid waste management in Jordanian communities hosting Syrian refugees	9,800,000	EUR	G, TA	The project is for Greater Irbid Municipality, Greater Mafraq Municipality and Ramtha Municipality and has the following three components: 1. Construction of one sanitary landfill cell and training of its operation in the Al Ekaider DS; 2. Procurement of equipment such as waste containers, cleansing tools and landfill compactor (37 ton) for Mafraq; and 3. Trainings of the subjects such as SWM in general, budgeting, planning and recycling. Financed by EU.	Al Ekaider new cell construction work started For equipment support, landfill compactor for Mafraq JSC was procured. Support for capacity building is also targeted for Irbid JSC and Mafraq JSC.
	GIZ	Formulation of Regional SWM Plan for Northern Region	Included in the above		TA	A northern region M/P on SWM is to be formulated for the materialization of NSWMS.	The final report is expected to be submitted to MOMA at the end of March 2017.
	GIZ	Feasibility Study for the Rehabilitation of Al Ekaider Landfill (Revision of former F/S)	Included in the above		TA	Implemented as part of the above. It reviews and updates the F/S formulated by the EU's Mediterranean Hot Sport Investment Program (MeHSIP) (2010-2012).	It is scheduled to end in March 2017. Closing the existing dump site, leveling the leachate treatment pond part, etc., and construct a new sanitary landfill cell. Also as planned in the national strategy, MRF (material recovery facility) is also planned.

Period	Donor	Name of Project	Amount of Aid		Type of Aid	Outline	Situation in March 2017
2015 - 2019	GIZ	Waste to Energy Project (aiming at Livelihood Improvement)	35,000,000	EUR	G, TA	This is to improve the livelihood and to create jobs in the SWM sector in Irbid and Mafraq Governorate. A committee is to be established with members from the municipalities and local social groups. Project concepts are shared at the committee based on the technical input from GIZ and real actions are determined in a participatory manner. 20 municipalities are targeted. The theme is promotion of employment. The core activity is to create a labor-intensive collection and sorting system of resources and job creation among them.	We plan to make compost centers (market waste, farm waste targets) in the resource recovery center (build Hunger) in 2 places (Wastyyeh, Karak). Also, as a rehabilitation of Truck City TS (Shahinat), we plan to update the compressor, build the office and improve the lamps etc. Regarding employment of Syrian refugees, we are balancing the race of employment based on the idea of reducing frictions by receiving Syrian refugees.
2014 - 2018	USAID	Community Engagement Program (CEP)	50,000,000	USD	G, TA	This started in 2014 to develop the capacity of 16 municipalities/20 communities in Irbid, Mafraq and Tafileh Governorates. Implementing agencies include NGOs of "Global Communities", and “Jordan River Foundation”.	Organize a community enhancement team to support identification, planning and implementation of regional development needs. Concerning waste management, containers and collection vehicles are procured for Municipalities.
2016- 2021	USAID	Cities Implementing Transparent, Innovative, Effective Solutions (CITIES)	58,600,000	USD	G, TA	It aims for a bottom-up approach of exploring development needs from glass roots and reflecting it in administrative services, and strengthens the municipal-level Good Governance. Strengthen urban services, improve administrative sustainability, strengthen responsiveness to citizen needs, strengthen regional cohesion and capacity to respond to problems, and so on.	The project plans to select 32 Municipalities (excluding GAM and Aqaba) from all over the country and discusses selection criteria with MOMA. After selecting 32, it starts activities at eight places and plans projects according to the situation of each municipalities. It may include waste management according to regional needs.
	USAID	Waste management field New project					It is a preparatory stage and no detailed information available. It decides the content by the summer of 2017, and expects it to start in 2018.
	KfW	Solid Waste Management Project	15,000,000	EUR	G, TA	In December 2015, 15 million € (EUR) grant was committed. The contents of the project is being studied (requesting detailed information).	Investigations by consultants are being conducted to plan the contents pf the project.

Type of aid: G Grant、TA Technical Assistance

Chapter 2 Contents of the Project

2-1 Basic Concept of the Project

2-1-1 Upstream Plans

The Government of Jordan formulated the National Solid Waste Management Improvement Strategy (NSWMS) to improve the SWM sector, which shares a large portion of the cost of urban services. The Government divides the county into the three administrative regions (Northern, Central and Southern) and puts the NSWMS into practice by formulating Regional Municipal Solid Waste Management Plans (hereafter MSWM M/P) for each region.

As of June 2017, the MSWM M/Ps of the northern and central regions have been formulated with assistance from GIZ and EU respectively, and approved by the Ministry of Municipal Affairs (MOMA), and are currently under the review of MOMA. The MSWM M/Ps set out eleven policies and Policy 1 is "Serving the emergency MSWM needs of Jordanian societies due to the influx of refugees from the neighboring countries". The Policy 1 is planning to take the following actions in the short term (2015 - 2019). This project is, therefore, positioned to be in line with Policy 1 and especially supports Actions 2 and 3.

Action 1. Procurement of street sweeping, MSW collection and transportation equipment for municipalities

Action 2. Procurement of final disposal site equipment for municipalities and JSCs

Action 3. Improvement or construction of transfer stations

Action 4. Construction of landfill cells

Action 5. Rehabilitation of half open dump sites

2-1-2 Outline of the Project

Based on the upstream plans mentioned above, outline of the Project is described below.

1) Overall Goal

The overall goal of the Project is that MSWM services are sustainably provided in the Northern[4] Region of Jordan and the sanitary conditions of both the Syrian refugees and the hosting communities are improved.

2) Project Purpose

The Project purpose is that the operation of the transfer stations and the final disposal sites in the Northern Region of Jordan are improved.

3) Output

The output of the Project will be that the necessary equipment, which will improve the efficiency of waste transportation and final disposal site operation in the Northern Region of Jordan, is provided.

4) Target Transfer Stations and Disposal Sites

As shown in the Figure 2 in the Location Maps, there are eight existing transfer stations (TSs) and four Planned TSs in the target area. As a result of the first field survey, four existing TSs and one planned TS were selected as the target for the equipment provision. As for the excluded TSs from the Project, MOMA will improve and/or develop them with the assistance of EU, AFD, etc.

[4] The target area of the project is the six Governorates of Irbid, Mafraq, Ajloun, Zarqa, Balqa and Jerash. The Governorates of Zarqa and Balqa; however, are included in the Central Region in the MSWM M/P.

As for the final disposal site (DS), there are 11 existing DSs and 2 Planned DSs in the target area as shown in Figure 2. As a result of the first field survey, five existing DSs, which will be operated at least until 2022; and the target year of the Project, were selected as the target for the equipment provision. As for the excluded DSs from the Project, MOMA will improve and/or develop them with the assistance of EU, GIZ, etc.

The table below shows the target TSs and DSs selected for the equipment provision of the Project, and their locations are as shown in Figure 3.

Table 2-1: Target TSs and DSs for the equipment provision of the Project

Target Facility		Type
TS01	Aghwar Shamaliyah	Existing TS
TS02	Rabiet Al-Kura	Existing TS
TS03	Ajloun	Existing TS
TS09	Al Shoneh Al Wsta	Existing TS
TP03	Jerash	Planned TS
DS02	Al Ekaider	Existing DS
DS05	Al Huseyneyat	Existing DS
DS06	Al Badiah Al Shamaliyah	Existing DS
DS07	Al-Duleil	Existing DS
DS09	New Dair Alla	Existing DS

Source: Preparatory survey team using the data locally collected.

2-2 Outline Design of the Japanese Assistance

2-2-1 Design Policy

(1) Basic Policy

The equipment which will be procured should be designed with appropriate scale and specifications for JSCs and municipalities in the northern region considering minimum cost. The basic policies for the outline design are described as below.

(2) Policy on Natural Environmental Conditions

Since the yearly average temperature in the northern region is between 8 to 26 ℃, it is not necessary to utilize equipment with specifications applicable to the cold weather in Japan. Furthermore, the altitude of the target areas is less than 1,500 meters, hence, high-altitude specifications is not considered for the selection of vehicles.

(3) Policy on Socio-economic Conditions

There are no issues to be considered like current lifestyle, heritage, religion, architectural style, economic status.

(4) Policy on Equipment Procurement

1) Country of Origin and Procurement Country

The procurement country of the equipment is basically Japan or the recipient country. However, if there are no such manufacturers or only one manufacturer in Japan, it is possible to consider a third country as a procurement country. In the target area, the large-scale transfer and transportation equipment which is not manufactured in Japan is being used. The equipment being used in the Project target sites have been manufactured in a third country other than Japan and Jordan, and shall be renewed and additionally procured in the Project. Therefore, such third countries manufacturing the equipment may also be considered qualified for the procurement in the Project. Especially manufacturers and their brand names of the compaction units and semitrailers (50 m^3) for existing

transfer stations are to be named from third countries. The equipment, other than transfer and transportation equipment, will mainly be procured from Japan or Jordan.

2) Exhaust Gas Regulation of Procured Vehicles

According to the law against the importation of vehicles to Jordan, there is no provision for measures against exhaust gas. In November 2011; however, the Prime Minister's Office of Jordan sent an official letter to each ministry concerned, which instructs that vehicles for SWM should conform to the exhaust gas regulation "Euro 2 or Euro 3". The vehicles to be procured; therefore, shall conform to "Euro 2".

3) Supply of Spare Parts

Regarding the equipment that is assumed to be procured under the third country, there are no problems with supply as spare parts are distributed in Jordan. There is also an authorized distributor in Jordan for vehicles which are assumed to be procured in Japan, and it is possible to procure their spare parts within Jordan.

4) Lot Division

Basically, the following three lot divisions will be applied to:

① Equipment of which manufacturer and brand name are to be named: Outdoor compaction unit (hopper + compactor), tractor head and semitrailer (50 m^3)

② Equipment requiring special installation work: indoor compaction unit (hopper + compactor), arm-roll truck, and container (35 m^3)

③ Other equipment than the above

(5) Policy on Operation and Maintenance

JSCs and municipalities, which are direct users of the equipment, operate and maintain the equipment for MSW transfer stations and final disposal sites procured by the Project. The improvement of operation and maintenance capacity of the executing institutions will be planned according to the following policies:

- Implementation of initial operation guidance of the equipment is carried out by the manufactures
- Provision of technical assistance for reviewing and formulating the transfer and transportation plan, and the operation and maintenance system of equipment for transfer stations; and for reviewing the disposal plan and the operation and maintenance system of equipment for disposal sites, as the soft component, is carried out in the Project.

(6) Policy on Equipment Grade

The preparatory survey confirmed that the skill level of personnel in terms of operation and maintenance of present equipment was high. However, the existing equipment was manufactured 10-20 years ago and is comprised of old models. Therefore, the equipment to be procured through the Project need to be simple, without complicated electronic devices and special specifications, allowing the local personnel an ease operation.

(7) Methods of Procurement and Implementing Schedule

Under Japanese Grand Aid scheme regulations, it is a precondition that equipment is procured through general competitive tender amongst Japanese private companies. Furthermore, the procurement schedule was developed considering the manufacturing schedule, transportation, administration procedure, initial operational guidance, and inspection of delivered goods.

(8) Soft Component

In order to properly utilize the equipment to be procured, the following technical guidance will be

implemented as soft component plan.

- Revision guidance of the existing transfer/transportation plan and the operation and maintenance system of equipment of the 4 existing TSs;
- Guidance on planning of the transfer/transportation plan and the operation and maintenance plan for equipment of the new Jerash TSs; and
- Revision guidance of the existing landfill operation plan and the operation and maintenance plan of the equipment for the targeted five disposal sites

2-2-2 Basic Plan (Equipment Plan)

(1) Estimation of MSW Generation and Collection Amount

There are 62 municipalities in the target area and municipal solid waste (MSW) collection services are provided by each municipality. Most of the collected MSW are directly transported to the disposal site by municipalities. Some of MSW are transported to the disposal site via transfer stations. The Survey Team estimated the MSW amount which would be generated in and collected from the 62 municipalities in the target year 2022, as described below.

1. **Target Year**: The target year of the Project is set as 2022, three years after procurement of the equipment.
2. **Basic Population Data**: The Department of Statistics of Jordan has carried out the National census during November and December 2015. This census data is applied to the population in 2016. Since data of the Department of Statistics are compiled in the District base without municipal data, the population data of the municipality is provided by MOMA. The Governorate population of MOMA and Department of Statistics is the same. As for the population of Syrian refugees, the number provided by UNHCR as of March 2017 is applied.
3. **Population Increase Rate**: The permanent population of the Department of Statistics is broadly divided into Jordanian and Others. The population of the others includes refugees, including Syrian refugees. The increase rate[5] of the NSWMS (National SWM Improvement Strategy) is applied to calculate the increase of the permanent population, as shown in the Table below. The survey team decided that the population of the Syrian refugee camps will not change referring to the NSWMS. Based on the population increase rate mentioned above, the population (2017-2022) in the target area is estimated as shown in the Table 2-3.

Table 2-2: Population Increase Rate of the Target Area (2017-2022)

Unit: %

Category of Population	2017	2018	2019	2020	2021	2022
A. Permanent (except B and C)	2.137	2.088	2.041	1.994	1.949	1.905
B. Syrian Refugees outside Camps	2.137	2.088	2.041	1.994	1.949	1.905
C. Syrian Refugees in Camps Note 1	1.000	1.000	1.000	1.000	1.000	1.000

Source: National SWM Improvement Strategy (NSWMS)

Note 1: Increase rate of NSWMS is + 10% in 2017, 0% in 2018/2019 and - 10% from 2020 to 2022.

Table 2-3: Estimated Population in the Target Area (2017-2022)

Unit: person

Category of Population	2017	2018	2019	2020	2021	2022
A. Permanent (except B and C)	4,377,399	4,468,717	4,559,924	4,650,848	4,741,491	4,831,814
B. Syrian Refugees outside Camps	301,028	307,307	313,581	319,836	326,071	332,286

[5] "Values of estimated growth rate (%) of permanent population of Jordan" applied in the National Solid Waste Management Improvement Strategy (NSWMS)

C. Syrian Refugees in Camps	140,960	140,960	140,960	140,960	140,960	140,960
Population of the Target Area (person)	4,819,387	4,916,984	5,014,465	5,111,644	5,208,522	5,305,060

Source: Preparatory survey team using the data locally collected.

4. **MSW Generation Rate (kg/person/day)**: MSW generation rate[6] of the NS is applied. MSW generation rate of the permanent population in urban and rural areas is changed as shown in the table below. The rate of the population in the refugee camps is set as 0.64kg/person/day and is not changed. The rate of population in urban and rural areas follows the census in 2015, provided by the Governorate, as shown in the Table 2-5.

Table 2-4: MSW Generation Rate of Permanent Population (2017-2022)

Unit: kg/person/day

	2017	2018	2019	2020	2021	2022
Urban	1.05	1.07	1.09	1.12	1.14	1.16
Rural	0.89	0.90	0.91	0.92	0.93	0.94

Source: National SWM Improvement Strategy

Table 2-5: Population in Urban and Rural Area (2017-2022)

Unit: person

Governorate / Category	Irbid	Mafraq	Ajloun	Jerash	Zarqa	Balqa
A. Urban	1,634,771	383,073	147,742	182,434	1,315,193	403,665
B. Rural	135,387	166,875	28,338	54,625	49,685	88,044
A/(A+B)	0.92	0.70	0.84	0.77	0.96	0.82

Source: National Census in 2015

5. **Calculation of MSW Generation**: The population of urban and rural areas in each municipality is calculated by multiplying the population of each municipality with the ratio of urban and rural population in the Governorate that it belongs to. Then MSW generation (ton/day) is calculated by multiplying the rate with its population.
6. **Collection Rate of Generated Waste**: The collection rate is set as 100% in accordance with the MSWM M/P.

With the condition set as the above population (forecast population of 2022), MSW generation and collection amount are estimated as shown in the Table below.

Table 2-6: Estimated Population and MSW Generation in Target Year 2022

Governorate		Municipality		2022				
				Population (persons)				MSW Generation (Collection) Amount (ton/day)
				Permanent Population	Syrian Refugee outside Camp	Syrian Refugee in Camp	Total Population	
G1	Irbid	G1-01	Khalid Bin Al Walid	33,656	390	0	34,046	39
		G1-02	Mo'az Bin Jabal	58,629	266	0	58,895	67
		G1-03	Sharhabil Bin Hasna	89,959	351	0	90,310	103
		G1-04	Tabaket Fahil	43,936	85	0	44,021	50
		G1-05	Taibah	65,360	2,877	0	68,237	78
		G1-06	Wastyyeh	43,637	2,508	0	46,145	53
		G1-07	Barkash	87,902	1,786	0	89,688	102
		G1-08	Deir Abi Said	44,052	3,406	0	47,458	54
		G1-09	Rabyet El Koora	45,192	1,098	0	46,290	53
		G1-10	Greater Irbid	868,300	92,886	0	961,186	1,098
		G1-11	Ramtha	166,081	24,332	0	190,413	218

[6] Evolution of per capita MSW generation rate in Jordan of the NSWMS.

		G1-12	Sahil Houran	74,492	7,838	0	82,330	94
		G1-13	West Irbid	88,981	4,855	0	93,836	107
		G1-14	Yarmouk	26,758	1,323	0	28,081	32
		G1-15	Kaffarat	42,935	1,808	0	44,743	51
		G1-16	Mazaar	23,430	2,717	0	26,147	30
		G1-17	Saroo	25,063	1,208	0	26,271	30
		G1-18	Sho'la	16,909	670	0	17,579	20
		G2-01	Greater Ajloun	63,032	3,263	0	66,295	75
		G2-02	Junaid	32,651	3,329	0	35,980	40
G2	Ajloun	G2-03	Kafrangeh	41,926	1,208	0	43,134	49
		G2-04	Oyoon	24,402	478	0	24,880	28
		G2-05	Shafa	27,864	360	0	28,224	32
		G3-01	Bab Amman	23,667	390	0	24,057	26
		G3-02	Burma	21,488	29	0	21,517	23
G3	Jerash	G3-03	Greater Jerash	120,522	5,419	0	125,941	137
		G3-04	Me'raad	60,167	3,339	0	63,506	69
		G3-05	Nasim	30,724	1,516	0	32,240	35
		G4-01	Housha	24,860	3,446	0	28,306	31
		G4-02	Bani Hashim	8,359	85	0	8,444	9
		G4-03	Dair Al Kahif	11,929	381	0	12,310	13
		G4-04	Safawi	7,203	225	0	7,428	8
		G4-05	Salhieh Wa Nayfeh	19,310	4,055	0	23,365	26
		G4-06	Umm Al Jimaal	28,992	4,177	0	33,169	36
		G4-07	Sabha Wa Dafyaneh	142,078	4,592	0	146,670	160
		G4-08	Umm al Gtain Wa Al Mkaifteh	13,186	1,782	0	14,968	16
		G4-09	Bal'ama	34,794	2,971	0	37,765	41
G4	Mafraq	G4-10	Baslieh	6,911	115	0	7,026	8
		G4-11	Erehaab	30,338	2,130	0	32,468	36
		G4-12	Greater Mafraq	101,170	36,405	0	137,575	151
		G4-13	Khaldieh	37,810	6,605	0	44,415	49
		G4-14	Manshiet Bani Hasan	11,158	2,227	0	13,385	15
		G4-15	Prince Hussein Bin Abdulla	15,867	3,476	0	19,343	21
		G4-16	Sarhan	22,914	6,741	0	29,655	32
		G4-17	Za-atari wa Al Manshieh	13,424	7,308	0	20,732	23
		G4-18	Rwaished	1,836	1,155	0	2,991	3
		G4-19	Za'atari Camp[Note1]	0	0	79,660	79,660	51
		G5-01	Baireen	31,155	497	0	31,652	36
		G5-02	Dhlail	61,061	4,249	0	65,310	75
		G5-03	Hallabat	36,632	172	0	36,804	42
G5	Zarqa	G5-04	Hashimyah	99,572	3,930	0	103,502	119
		G5-05	Azraq	64,736	1,941	0	66,677	77
		G5-06	Greater Zarqa	795,045	33,280	0	828,325	954
		G5-07	Russaifa	386,608	9,404	0	396,012	456
		G5-08	Azarqa & Emirati Camp[Note1]	0	0	61,300	61,300	39
		G6-01	Ain Al Basha	130,564	10,890	0	141,454	158
		G6-02	Al Aarda	20,743	141	0	20,884	23
		G6-03	Fuhais	24,303	494	0	24,797	28
		G6-04	Greater Salt	172,628	5,897	0	178,525	200
G6	Balqa	G6-05	Mahis	22,514	759	0	23,273	26
		G6-06	Central Shuna	62,491	1,335	0	63,826	72
		G6-07	M'aadi	29,318	82	0	29,400	33
		G6-08	Dair Alla	65,315	1,604	0	66,919	75
		G6-09	Swaimah	5,275	0	0	5,275	6
Total				4,831,814	332,286	140,960	5,305,060	5,941

Source: Preparatory survey team using the data collected locally.

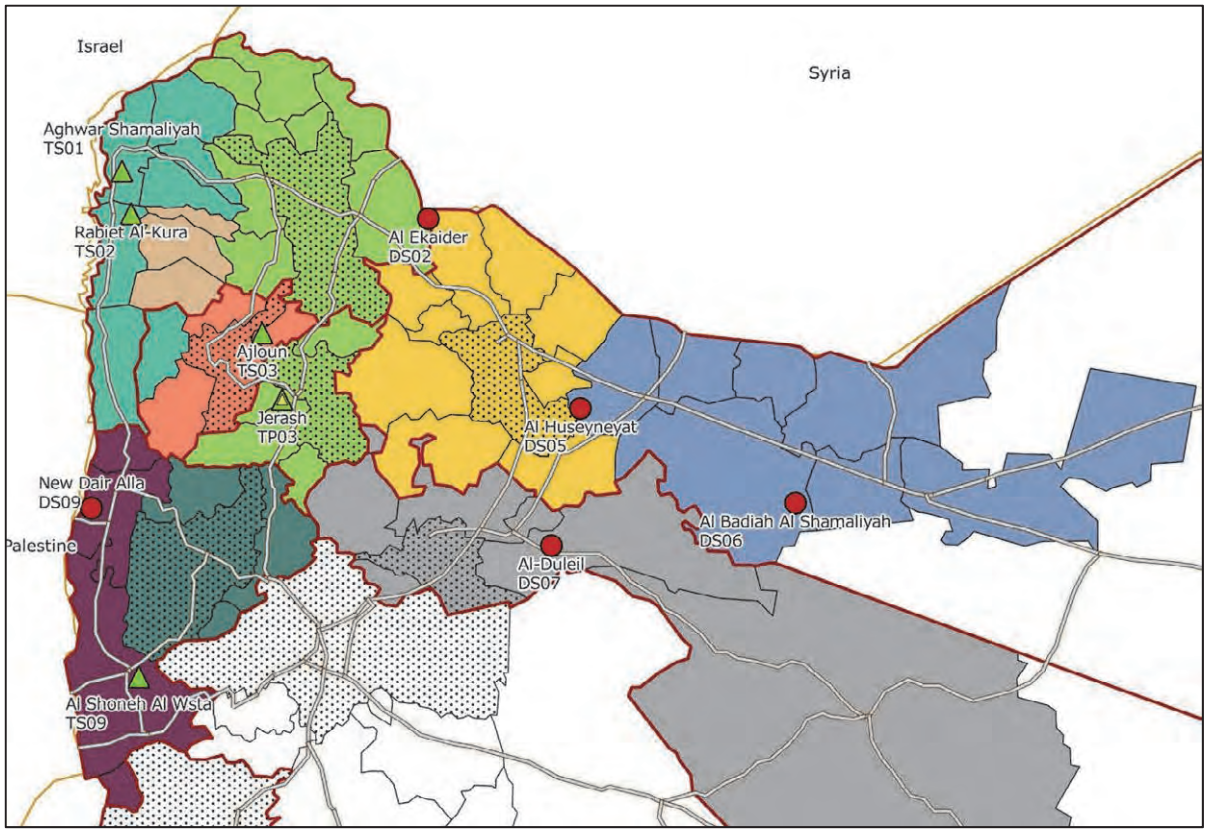
Note 1: From UNHCR

(2) Transfer & Transportation and Final Disposal Plan

1) Target Transfer Station and Final Disposal Site and Planning Conditions

a. Target Transfer Station and Final Disposal Site

The target for equipment procurement of this project is the 5 transfer stations (TSs) (4 existing TSs and 1 new TS) and 5 final disposal sites (DSs) (5 existing DSs) as shown in Table 2-1 and the Figure below.



Source: Preparatory survey team using the data locally collected.

Figure 2-1: Location of Target Transfer Stations and Final Disposal Sites

b. Planning Conditions

The plan is made considering the following conditions:

1. Location, user municipalities and operators of the facilities are based on the MSWM M/P of the Northern and Central regions.
2. However, the Contents of the Minutes of Discussion agreed between MOMA and JICA on February 19th, 2017 are given priority.

The transfer and transportation plans of the target TSs and the final disposal plans of the target DSs are presented below.

2) Transfer Station (TS)

a. TS01 Aghwar Sharmaliyah TS

As of March 2017, this TS receives MSW from 5 municipalities in Irbid Governorate. The TS; however, will receive only MSW from one municipality in 2022 as shown in the Table below, according to the MSWM M/P of the northern region. Then the MSW hauled by the municipality will be transferred to the 50 m^3 trailer and transported to and disposed of at the Al Ekaider disposal site (DS02). Collection and transportation plan and planned transfer and transportation amount of the TS01 are shown in the Table and Figure below.

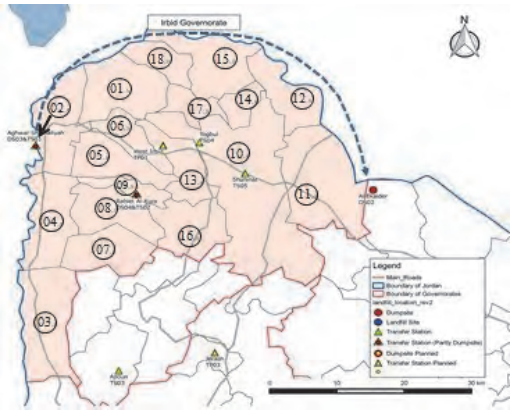


Figure 2-2: MSW Collection and Transportation Plan of Aghwar Shamaliyah TS (TS01) in 2022

Table 2-7: MSW Transfer and Transportation Amount of Aghwar Shamaliyah TS (TS01) in 2022

JSC No.	TS No.	Municipality				Incoming MSW from Municipality (ton/day)	Transfer & Transportation Amount (ton/day)
		No.	Name	Beneficiary Population	Syrian Refugees among Beneficiaries		
JSC01	TS01	G1-02	Mo'az Bin Jabal	58,895	266	67	67

Source: Preparatory survey team using the data locally collected.

b. TS02 Rabiet Al-Kura TS

As of March 2017, this TS receives MSW from 3 municipalities in Irbid Governorate. In 2022, the TS, however, will receive MSW from 4 municipalities including G1-04 Tabaket Fahil, which uses TS01 at present, according to the MSWM M/P of the northern region, as shown in the Table below.. The MSW hauled by the 4 municipalities will be transferred to the 50 m^3 trailer and transported to and disposed of at the Al Ekaider disposal site (DS02). The collection and transportation plan and the planned transfer and transportation amount of the TS02 are shown in the Table and Figure below.

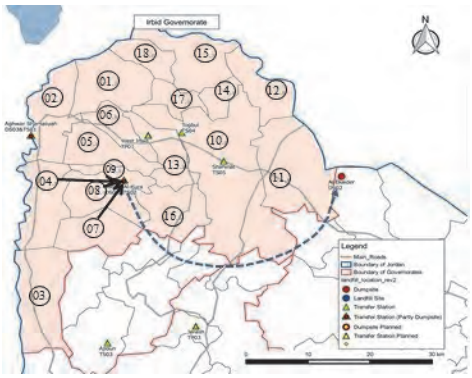


Figure 2-3: MSW Collection and Transportation Plan of Rabiet Al-Kura TS (TS02) in 2022

Table 2-8: MSW Transfer and Transportation Amount of Rabiet Al-Kura TS (TS02) in 2022

JSC No.	TS No.	Municipality				Incoming MSW from Municipality (ton/day)	Transfer & Transportation Amount (ton/day)
		No.	Name	Beneficiary Population	Syrian Refugees among Beneficiaries		
JSC02	TS02	G1-04	Tabaket Fahil	44,021	85	50	259
		G1-07	Barkash	89,688	1,786	102	
		G1-08	Deir Abi Said	47,458	3,406	54	
		G1-09	Rabyet El Koora	46,290	1,098	53	
Total				**227,457**	**6,375**	**259**	

Source: Preparatory survey team using the data locally collected.

c. TS03 Ajloun TS

As of March 2017, this TS receives MSW from 5 municipalities in Ajloun Governorate. In 2022 the TS, however, will receive MSW from 6 municipalities including one municipality in Jerash Governorate, in addition to the 5 municipalities at present, , according to the MSWM M/P of the northern region, as shown in the Table below. The MSW hauled by the 6 municipalities will be transferred to the 50 m^3 trailer and transported to and disposed of at the Al Ekaider disposal site (DS02). The collection and transportation plan and the planned transfer and transportation amount of the TS03 are shown in the Table and Figure below.

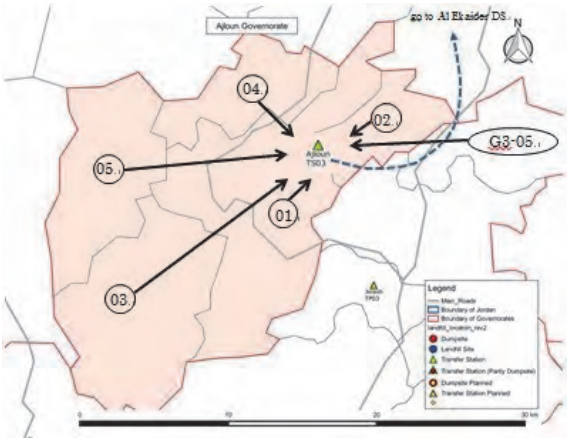


Figure 2-4: MSW Collection and Transportation Plan of Ajloun TS (TS03) in 2022

Table 2-9: MSW Transfer and Transportation Amount of Ajloun TS (TS03) in 2022

JSC No.	TS No.	Municipality				Incoming MSW from Municipality (ton/day)	Transfer & Transportation Amount (ton/day)
		No.	Name	Beneficiary Population	Syrian Refugees among Beneficiaries		
JSC03	TS03	G2-01	Greater Ajloun	66,295	3,263	75	259
		G2-02	Junaid	35,980	3,329	40	
		G2-03	Kafrangeh	43,134	1,208	49	
		G2-04	Oyoon	24,880	478	28	
		G2-05	Shafa	28,224	360	32	
		G3-05	Nasim	32,240	1,516	35	
Total				**230,753**	**10,154**	**259**	

Source: Preparatory survey team using the data locally collected.

d. TS09 Al Shoneh Al Wsta TS

As of March 2017, this TS receives MSW from 2 municipalities in Balqa Governorate. According to the Minutes of Discussions agreed between MOMA and JICA Preparatory Survey Team, the current 2 municipalities will use the TS09. The MSW hauled by the 2 municipalities will be transferred to the 50 m^3 trailer and transported to and disposed of at the New Dair Alla disposal site (DS09). The collection and transportation plan and the planned transfer and transportation amount of the TS09 are shown in the Table and Figure below.

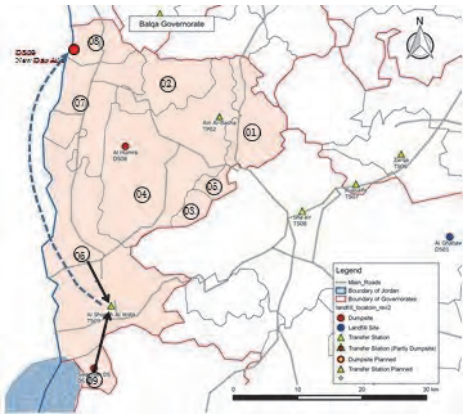


Figure 2-5: MSW Collection and Transportation Plan of Al Shoneh Al Wsta TS (TS09) in 2022

Table 2-10: MSW Transfer and Transportation Amount of Al Shoneh Al Wsta TS (TS09) in 2022

Municipality	TS No.	Municipality				Incoming MSW from Municipality (ton/day)	Transfer & Transportation Amount (ton/day)
		No.	Name	Beneficiary Population	Syrian Refugees among Beneficiaries		
Al Shoneh Al Wsta	TS09	G6-06	Al Shonen Al Wsta	63,826	1,335	72	78
		G6-09	Swaimah	5,275	0	6	
Total				**69,101**	**1,335**	**78**	

Source: Preparatory survey team using the data locally collected.

e. TP03 Jerash TS

This TS will be established and will receive MSW from 4 municipalities in Jerash Governorate as shown in the Table below. The MSW hauled by the 4 municipalities will be transferred to the 30-35 m^3 container and transported to and disposed of at the Al Ekaider disposal site (DS02). The collection and transportation plan and the planned transfer and transportation amount of the TP03 are shown in the Table and Figure below.

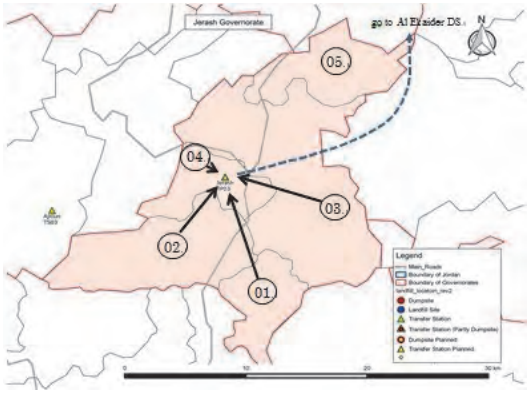


Figure 2-6: MSW Collection and Transportation Plan of the Jerash TS (TP03) in 2022

Table 2-11: MSW Transfer and Transportation Amount of the Jerash TS (TP03) in 2022

JSC No.	TS No.	Municipality				Incoming MSW from Municipality (ton/day)	Transfer & Transportation Amount (ton/day)
		No.	Name	Beneficiary Population	Syrian Refugees among Beneficiaries		
JSC04	TP03	G3-01	Bab Amman	24,057	390	26	255
		G3-02	Burma	21,517	29	23	
		G3-03	Greater Jerash	125,941	5,419	137	
		G3-04	Me'raad	63,506	3,339	69	
Total				**235,021**	**9,177**	**255**	

Source: Preparatory survey team using the data locally collected.

3) Final Disposal Site (DS)

a. DS02 Al Ekaider DS

According to the MSWM M/P, this DS will receive MSW from 2 municipalities in Irbid Governorate, 4 municipalities in Mafraq Governorate, and 7 TSs located in Irbid, Ajloun and Jerash Governorate. The incoming MSW plan and the planned incoming MSW amount of the DS02 are shown in the Table and Figure below.

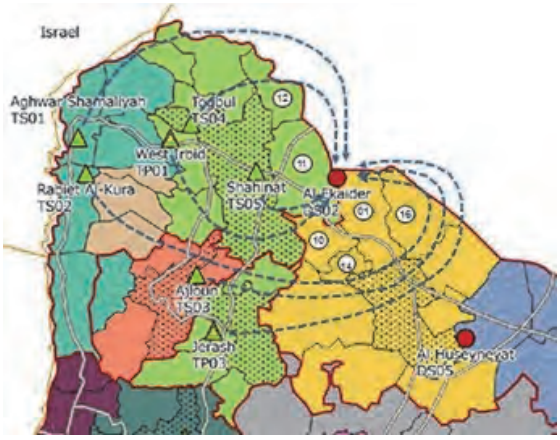


Figure 2-7: Incoming MSW Plan of Al Ekaider DS (DS02) in 2022

Table 2-12: Planned Incoming MSW Amount of Al Ekaider DS (DS02) in 2022

JSC No.	DS No.	Municipality/TS				Incoming MSW from Municipality/TS (ton/day)	Incoming MSW Amount (ton/day)
		No.	Name	Beneficiary Population	Syrian Refugees among Beneficiaries		
JSC04	DS02	G1-11	Ramtha	190,413	24,332	218	2,776
		G1-12	Sahil Houran	82,330	7,838	94	
		G4-01	Housha	28,306	3,446	31	
		G4-10	Baslieh	7,026	115	8	
		G4-14	Manshiet Bani Hasan	13,385	2,227	15	
		G4-16	Sarhan	29,655	6,741	32	
		TS01	Aghwar Sharmaliyah TS	58,895	266	67	
		TS02	Rabiet Al Kura TS	227,457	6,375	259	
		TS03	Ajloun TS	230,753	10,154	259	
		TS04	Togbul TS	693,386	60,741	793	
		TS05	Al Shahinat TS	410,621	39,871	468	
		TP01	West Irbid	242,264	10,630	277	
		TP03	Jerash TS	235,021	9,177	255	
Total				**2,449,512**	**181,913**	**2,776**	

Source: Preparatory survey team using the data locally collected.

b. DS05 Al Huseyneyat DS

According to the MSWM M/P, this DS will receive MSW from 8 municipalities in Mafraq Governorate and Za'atari Syrian refugee camp. The incoming MSW plan and the planned incoming MSW amount of the DS03 are shown in the Table and Figure below.

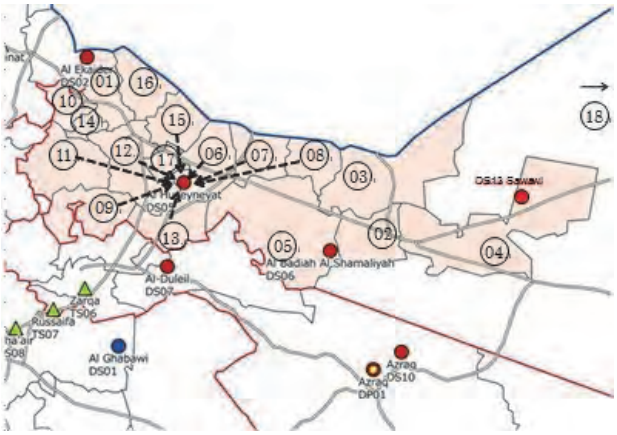


Figure 2-8: Incoming MSW Plan of Al Huseyneyat DS (DS05) in 2022

Table 2-13: Planned Incoming MSW Amount of Al Huseyneyat DS (DS05) in 2022

JSC No.	DS No.	Municipality/TS				Incoming MSW from Municipality/TS (ton/day)	Incoming MSW Amount (ton/day)
		No.	Name	Beneficiary Population	Syrian Refugees among Beneficiaries		
JSC01	DS05	G4-06	Umm Al Jimaal	33,169	4,177	36	568
		G4-07	Sabha Wa Dafyaneh	146,670	4,592	160	
		G4-09	Bal'ama	37,765	2,971	41	
		G4-11	Erehaab	32,468	2,130	36	
		G4-12	Greater Mafraq	137,575	36,405	151	
		G4-13	Khaldieh	44,415	6,605	49	

		G4-15	Prince Hussein Bin Abdulla	19,343	3,476	21	
		G4-17	Za-atari wa Al Manshieh	20,732	7,308	23	
		G4-19	Za'atari Camp	79,660	79,660	51	
Total				**551,797**	**147,324**	**568**	

Source: Preparatory survey team using the data locally collected.

c. DS06 Al Badiah Al Shamaliyah DS

This DS will receive MSW from 4 municipalities in Mafraq Governorate and Al Sawafi TS (TP04). The incoming MSW plan and the planned incoming MSW amount of the DS06 are shown in the Table and Figure below.

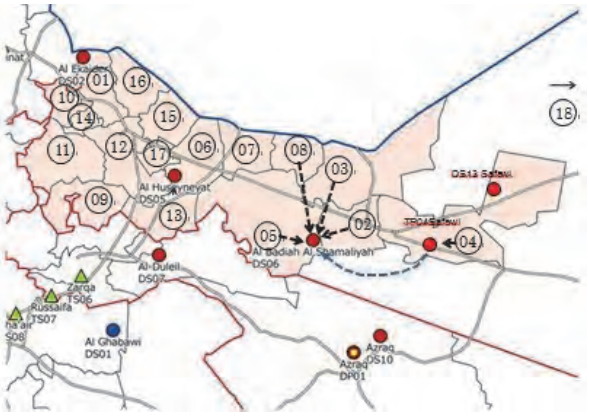


Figure 2-9: Incoming MSW Plan of Al Badiah Al Shamaliyah DS (DS06) in 2022

Table 2-14: Planned Incoming MSW Amount of Al Badiah Al Shamaliyah DS (DS06) in 2022

JSC No.	DS No.	Municipality/TS				Incoming MSW from Municipality/TS (ton/day)	Incoming MSW Amount (ton/day)
		No.	Name	Beneficiary Population	Syrian Refugees among Beneficiaries		
JSC06	DS06	G4-02	Bani Hashim	8,444	85	9	72
		G4-03	Dair Al Kahif	12,310	381	13	
		G4-05	Salhieh Wa Nayfeh	23,365	4,055	26	
		G4-08	Umm al Gtain Wa Al Mkaifteh	14,968	1,782	16	
		TP04	Safawi TS	7,428	225	8	
Total				**66,515**	**6,528**	**72**	

Source: Preparatory survey team using the data locally collected.

d. DS07 Al-Duleil DS

This DS will receive MSW from 4 municipalities in Zarqa Governorate. The incoming MSW plan and the planned incoming MSW amount of the DS07 are shown in the Table and Figure below.

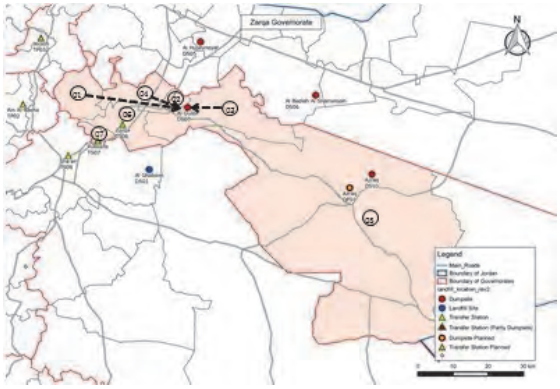


Figure 2-10: Incoming MSW Plan of Al-Duleil DS (DS07) in 2022

Table 2-15: Planned Incoming MSW Amount of Al-Duleil DS (DS07) in 2022

JSC No.	DS No.	Municipality/TS				Incoming MSW from Municipality/TS (ton/day)	Incoming MSW Amount (ton/day)
		No.	Name	Beneficiary Population	Syrian Refugees among Beneficiaries		
JSC07	DS07	G5-01	Baireen	31,652	497	36	272
		G5-02	Dhlail	65,310	4,249	75	
		G5-03	Hallabat	36,804	172	42	
		G5-04	Hashimyah	103,502	3,930	119	
Total				**237,268**	**8,848**	**272**	

Source: Preparatory survey team using the data locally collected.

e. DS09 New Dair Alla DS

This DS will receive MSW from one municipality in Irbid Governorate, 2 municipalities in Balqa Governorate and Al Shoneh Al Wsta TS (TP04) in Balqa Governorate. The incoming MSW plan and the planned incoming MSW amount of the DS09 are shown in the Table and Figure below.

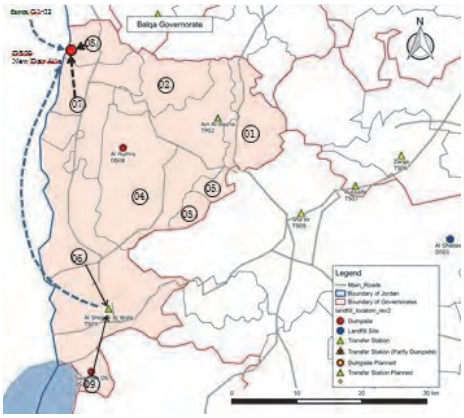


Figure 2-11: Incoming MSW Plan of New Dair Alla DS (DS09) in 2022

Table 2-16: Planned Incoming MSW Amount of New Dair Alla DS (DS09) in 2022

JSC No.	DS No.	Municipality/TS				Incoming MSW from Municipality/TS (ton/day)	Incoming MSW Amount (ton/day)
		No.	Name	Beneficiary Population	Syrian Refugees among Beneficiaries		
JSC09	DS09	G1-03	Sharhabil Bin Hasna	90,310	351	103	289
		G6-07	M'aadi	29,400	82	33	
		G6-08	Dair Alla	66,919	1,604	75	
		TS09	Al Shoonah Al Wsta TS	69,101	1,335	78	
Total				**255,730**	**3,372**	**289**	

Source: Preparatory survey team using the data locally collected.

4) MSW Amount and Beneficiary Population of Target TS and DS

The incoming MSW amount and the beneficiary population of the target TSs and DSs are shown in the Tables below.

Table 2-17: MSW Transfer and Transportation Amount and Beneficiary Population of Target TSs

Name of TS		User	Transfer & Transportation Amount (ton/day)	Beneficiary Population	Syrian Refugees among Beneficiaries	Operational Organization
TS01	Aghwar Al Shamaliyah	1 municipality	67	58,895	266	Aghwar Al Shamaliyah JSC
TS02	Rabiet Al-Kura	4 municipalities	259	227,457	6,375	Rabiet Al-Kura JSC
TS03	Ajloun	6 municipalities	259	230,753	10,154	Ajloun JSC
TS09	Al Shoneh Al-Wsta	2 municipalities	78	69,101	1,335	Al Shoneh Al-Wsta municipalities
TP03	Jerash	4 municipalities	255	235,021	9,177	Irbid JSC
Total		**17 municipalities**	**918**	**821,227**	**27,307**	

Source: Preparatory survey team using the data locally collected.

Table 2-18: MSW Disposal Amount and Beneficiary Population of Target DSs

Name of TS		User	Transfer & Transportation Amount (ton/day)	Beneficiary Population	Syrian Refugees among Beneficiaries	Operational Organization
DS02	Al Ekaider	6 Municipalities、7 TSs (24 municipalities)	2,776	2,449,512	181,913	Irbid JSC
DS05	Al Huseyneyat	8 Municipalities, One Syrian refugee camp	568	551,797	147,324	Mafraq JSC
DS06	Al Badiah Al Shamaliyah	4 Municipalities, one TS (one municipality)	72	66,515	6,528	Al Badiah Al Shamaliyah JSC
DS07	Al-Duleil	4 Municipalities	272	237,268	8,848	Zarqa JSC
DS09	New Dair Alla	3 Municipalities、one TS (2 municipalities)	289	255,730	3,372	Al Shoneh Al Wsta JSC
Total		**52 Municipalities, One Syrian refugee camp**	**3,977**	**3,560,822**	**347,985**	

Source: Preparatory survey team using the data locally collected.

(3) Examination of Requested Equipment

1) Contents of Requested Equipment

Based on the results of the first field survey, the government of Jordan submitted an official request for the Project on March 21, 2017 through the Ministry of Planning and International Cooperation (MOPIC). Moreover, the equipment procurement plan is formulated, based on the requested equipment shown in the following tables.

Table 2-19: Requested Equipment and Target Transfer Station (TS)

Name of transfer station	TS01 Aghwar Shamaliyah	TS02 Rabiet Al-Kura	TS03 Ajloun	TS09 Al Shoneh Al Wsta	TP03 Jerash	Total
Operational Organization	Aghwar Shamaliyah JSC	Rabiet Al-Kura JSC	Ajloun JSC	Al Shoneh Al Wsta Municipality	Irbid JSC	
Outdoor Hopper + Compactor		1	1	1		3
Truck head	2	3	2	2		9
Trailer (50 m^3)	3	4	3	3		13
Indoor Hoppe r+ Compactor					1	1
Arm-roll truck					3	3
Container (35 m^3)					10	10
Snow Removal Dozer			2			2
Truck with Salt Spreader			2			2
Wastewater Collection Vehicles			1			1
Pick-up Truck			1		1	2
Farm Tractor with Sprinkler		1		1		2
Small Loader	1		1			2
Weighbridge	1	1	1	1		4
Bus		1			1	2
Air Compressor					1	1

Source: Request letter submitted by MOPIC on March 21, 2017.

Table 2-20: Requested Equipment and Target Disposal Site (DS)

Name of disposal site	DS02 Al Ekaider	DS05 Al Huseyneyat	DS 06Al Badiah Al Shamaliyah	DS07 Al-Duleil	DS09 New Dair Alla	Total
Operational Organization	Irbid JSC	Mafraq JSC	Al Badiah Al Shamaliyah JSC	Zarqa JSC	Al Shoneh Al Wsta JSC	
Bulldozer 32t	6	1		1	1	9
Bulldozer 11t			1			1
Excavator	2	1	1	1		5
Farm Tractor with Sprinkler		1	1	1	1	4
Landfill Compactor	1	1		1		3
Wheel Loader	2	2		1	1	6
Textile Incinerator	1					1
Tipper for DS	4	2	1	2	2	11
Snow Removal Dozer	4	3				7
Truck with Salt Spreader	4	3				7
Bus	1		1		1	3
Wastewater Collection Vehicles	1					1
Pick-up Truck					1	1
Water Tanker	1			1	1	3
Skip Loader with Container	1					1
Air Compressor	1					1
Weighbridge			1	1	1	3
Fuel Tanker			1	1	1	3
Low Body Trailer			1			1
Truck Head for Low Body Trailer			1			1
Solar Generator			1			1

Source: Request letter submitted by MOPIC on March 21, 2017.

2) Selection Flow for Equipment to be Procured

The equipment to be procured in the Project is examined by the two steps of the selection flow shown in the table below.

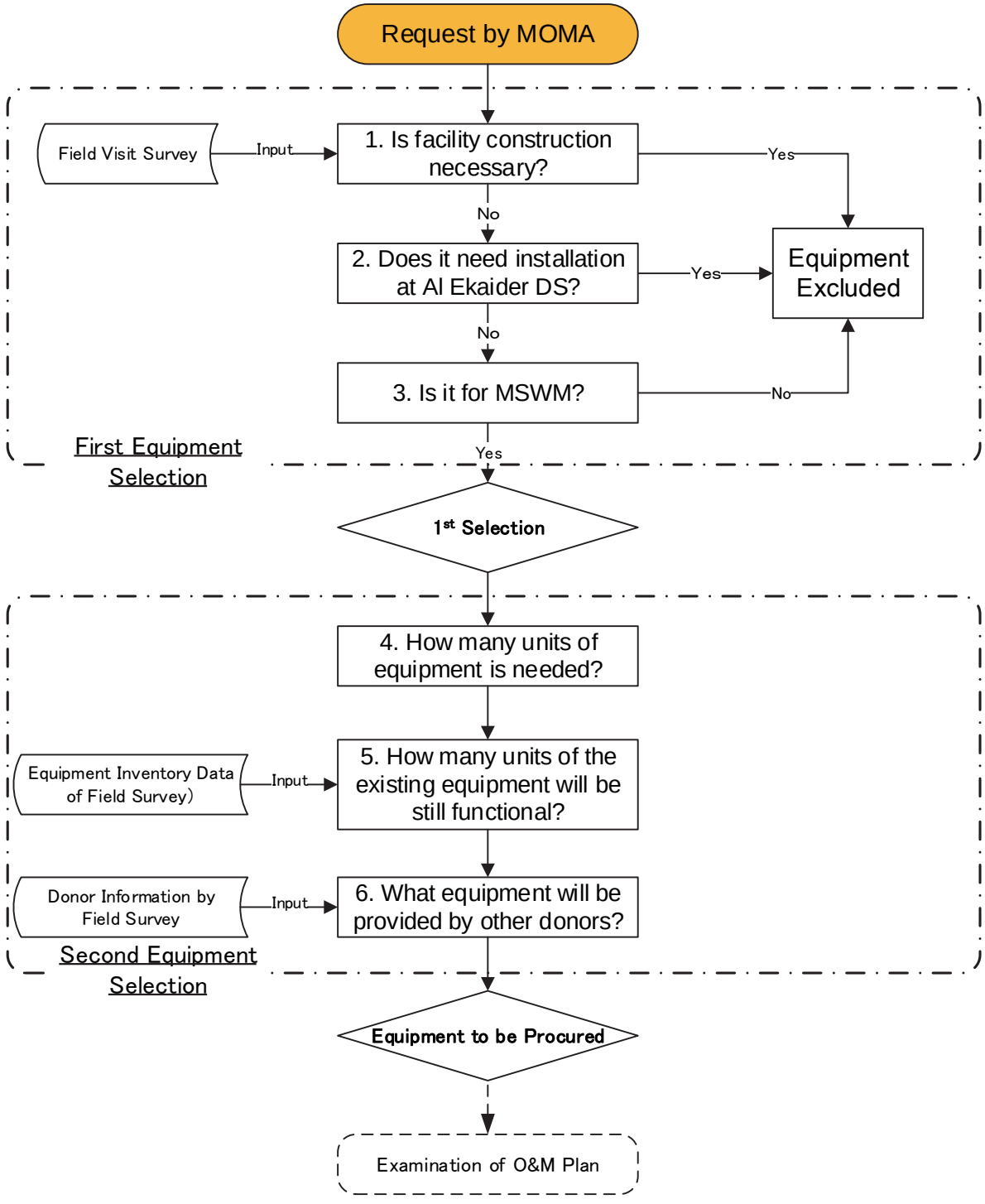


Figure 2-12: Selection Flow for Equipment to be Procured

a. First Equipment Selection

Based on the fact that the Project is for the equipment procurement, the equipment that satisfies the following basic conditions is to be selected at the first equipment selection.

1. Is facility construction necessary?

Since the Project does not include facility construction, the construction of foundations and buildings necessary for equipment installation should not be conducted. Therefore, in case that construction works are necessary for the installation of the equipment, it should be excluded from the Project.

2. Does it require installation work at Al Ekaider DS?

Since Al Ekaider disposal site is located in the Syrian border areas where persons engaging in JICA activities are not allowed to enter according to JICA safety measures (as of October 2017), the equipment which requires installation or any other works within the site is excluded. However, the equipment that does not involve on-site work can be included in the Project procurement.

3. Is it for MSWM?

Since this Project is to provide equipment for strengthening the operational capacity of final disposal sites and relay stations, the equipment that is not directly connected to MSWM should be excluded.

b. Second Equipment Selection

4. How many units of equipment are needed?

For the selected equipment in the above 1 to 3 of the first selection work, the total number of required equipment is calculated based on the planned MSW transfer/transportation amount of target transfer station (TSs) and the planned MSW disposal amount of target final disposal sites (DSs). The equipment to be procured shall be obtained by subtracting the number of equipment shown in items 5 and 6 below from the total number of required equipment.

5. How many units of the existing equipment will still be functional?

The existing equipment of each facility which is judged to be operable in the target year (2022), based on the possession status, whether operable, and years of operation of existing equipment, will not be included as the required equipment. Therefore, the number of equipment judged as operable equipment will be excluded from the number of necessary equipment.

6. What equipment will be provided by other donors?

The number of equipment to be procured from other donors will be excluded from the calculated quantity in 5 above.

c. Determination of Equipment to be Procured

O&M cost of the required equipment in 6 above is calculated. Then the financial capability of the responsible organizations on the O&M cost will be examined based on their financial conditions, which were surveyed in the field survey. If it is determined that the orginizations are able to operate with no financial problems, the equipment to be procured is finally decided.

(4) Equipment Plan

1) Policy on Equipment Plan

a. Policy on Equipment Specification

In principle, the equipment specifications are set based on the required processing capability. However, for the procurement of similar/equivalent equipment, which has better advantages and much more prestigious system to the existing equipment, the same equipment specification, manufacturer and equipment type, as the existing one is designated. For the transfer station that is planned to procure equipment in cooperation with UNDP, the specifications indicated by UNDP and agreed by MOMA are to be applied.

【Equipment of which Manufacturer and Type to be Specified】

- **Compaction Unit for Existing TSs:**

The compaction unit of the existing transfer stations (TSs) to be procured in the Project is a replacement of the existing one. The MSW inlet of the existing trailer (container with compressor for waste transportation) must have the same structure as the existing compaction unit. Therefore, in order to make effective use of the existing trailers, the same manufacturer and type of the existing compaction unit shall be applied to the specification of the equipment to be procured.

- **Trailer:**

For the same reason as above, the same manufacturer and type of the existing trailer shall be applied to the specification of the equipment to be procured.

- **Equipment for Jerash TS:**

The provision of equipment to the Jerash TS is planned in coordination with UNDP. Facility design and construction will be implemented by UNDP, but the MSW compaction unit and transport vehicles will be procured by the Japanese side. The system design of Jerash TS has already been completed by UNDP, and the procurement equipment of the Japanese side follows UNDP's equipment specifications.

b. Policy on the Calculation of Required Number of Equipment

1. Final Disposal Site: Working hours of a DS and acceptance of MSW are set as 11 hours.

Since there is no lighting facility in the final disposal site and the possible operational period is from sunrise to sunset, the working hours of a DS and acceptance of MSW are set as 11 hours from 7:00 am to 6:00 pm while the operation time of heavy equipment is 7 hours.

2. Transfer Station (TS): TSs accept MSW from municipalities for 16 hours a day

According to the field survey, the existing TSs accept MSW from municipalities (user) from early morning till late night. The reason for this is that it takes a long time to transfer MSW at the TSs. Since the same equipment as the existing compaction unit is planned to be procured in the Project, MSW is planned to be accepted for the same time as the present situation for 16 hours.

3. Capacity of Compaction Unit

According to the catalog of the waste compaction unit, the processing capacity is as follows: outdoor type 300 m^3/hr; and indoor type 500m^3/hr. According to the interview survey of the existing outdoor type TSs, one compressing and loading operation for one trailer (transportation vehicle) requires about 1 hour. Based on this achievement and nominal processing capacity, the capacity of the waste compaction unit is set as follows:

Outdoor type compaction unit: Time required for compressing and loading operation for one trailer 50 m^3 (Maximum MSW loading amount is 23 tons[7]) is set as one hour (23 tons/hr).

Indoor type compaction unit: Time required for compressing and loading operation for one Container 35 m^3 (Maximum MSW loading amount is 20 tons) is set as 40 minutes (20 tons/hr).

[7]Under Jordan's road regulations, the maximum GVW (Gross Vehicle Weight) is 51 tons. Therefore, maximum MSW amount (23ton/unit) for a trailer is deducted 18 tons of trailer weight and 10 tons of tractor head from GVW.

4. Transfer Station (TS): Traveling speed of the vehicle transporting MSW from TS to final disposal site

The running speed of the vehicle is set to 35 km/hr on the basis of the round-trip time required including the unloading time obtained in the field survey.

5. Transfer Station (TS): Calculation of required numbers of equipment for TS

The processing capacity of TS is determined by the loading time of the MSW compaction unit and the transportation time to the final disposal site. In the Project, the number of required transportation vehicles is calculated based on the processing capacity (loading time) of compaction unit and round-trip transportation time of the transportation vehicle based on the amount of MSW delivered to each TS.

6. Spare Equipment

6.1 Compaction Unit

As for the MSW compaction unit, the outdoor type is intended to replace the unit, so no reserve is provided. Regarding indoor type, there is no plan to install spare equipment in the UNDP facility design.

6.2 Tractor Head and Trailer

In the field survey of existing outdoor type TS, many vehicles with issues were seen. It was observed that primary collection vehicles of municipalities (users) have to directly transport their MSW to DS due to vehicle break downs. The above trouble is caused by a heavy load on the vehicle since it is a long distance from the TS to DS, as shown in the table below. Also, due to trouble of one of the tractor heads and semitrailers, the transfer and transportation cycle fails as shown in Table 2-22. Therefore, in addition to the required number of tractor heads and semitrailers, an additional tractor head is added to the cycle as a substitute when repairs are necessary.

This point also applies to indoor type arm-roll trucks and containers.

Table 2-21: Distance from TS to DS

TS No.	TS Name	DS Name	Distance (km)
TS01	Aghwar Shamaliyah	DS02 Al Ekaider	62
TS02	Rabiet Al-Kura	DS02 Al Ekaider	61
TS03	Ajloun	DS02 Al Ekaider	44
TS04	Togbul	DS02 Al Ekaider	39
TS05	Shahinat	DS02 Al Ekaider	20
TS06	Zarqa	DS01 Al Ghabawi	30
TS07	Russaifa	DS01 Al Ghabawi	31
TS09	Al Shoneh Al Wsta	DS09 New Dair Alla	34
TP01	West Irbid	DS02 Al Ekaider	40
TP02	Ain Al-Basha	DS01 Al Ghabawi	58
TP03	Jerash	DS02 Al Ekaider	56

Table 2-22: Example of Calculation of the Number of Equipment Required

Name of TS: AA T/S

Planned Incoming MSW Amount	234	ton/day	MSW Amount of a Trailer	23 ton/unit	Required Nos. of Trip	11 Trips
Transportation Distance	50	km	Trip Time	2.86 hr		

Required Nos. of Equipment

Equipment	Minimum Nos.	Spare	Total
Trailer ($50m^3$)	4	1	5
Trailer Head	4	1	5

	8	9	10	11	12	13	14	15	16	17
Trailer 1	Loading: 1 hour				Loading: 1 hour				Loading: 1 hour	
Trailer Head 1		Transportation: 2 hrs 52 min				Transportation: 2 hrs 52 min				
Trailer 2		Loading: 1 hour				Loading: 1 hour				Loading: 1 hour
Trailer Head 2			Transportation: 2 hrs 52 min				Transportation: 2 hrs 52 min			
Trailer 3			Loading: 1 hour				Loading: 1 hour			
Trailer Head 3				Transportation: 2 hrs 52 min				Transportation: 2 hrs 52 min		
Trailer 4				Loading: 1 hour				Loading: 1 hour		
Trailer Head 4					Transportation: 2 hrs 52 min				Transportation: 2 hrs 52 min	

	18	19	20	21	22	23	24	1	2	3
Trailer 1										
Trailer Head 1	Transportation: 2 hrs 52									
Trailer 2	Loading: 1 hour									
Trailer Head 2		Transportation: 2 hrs 52 min								
Trailer 3										
Trailer Head 3										
Trailer 4										
Trailer Head 4										

7. Working Capacity of Construction Machinery (Landfill Equipment)

The work capacity of construction machines (landfill equipment) conforms to the civil works construction integration standard of Japan's Ministry of Land, Infrastructure, Transport and Tourism (MLIT) (FY2008 edition) (hereinafter referred to as "integration standard"). However, the work capacity of the bulldozer at the final disposal site is based on accumulation standards of loose sediment soil, which is twice the standard workload of the integration standard.

2) Result of the First Selection of Equipment

a. Transfer Station

a.1 Result of the first evaluation

Regarding the equipment requested for the works related to transfer stations, the evaluation was carried out as described in the table below.

Table 2-23: Result of the first evaluation of the equipment requested for transfer stations

Name of equipment	Requested equipment						Result of the 1st evaluation
	TS01 Aghwar Shamali yah	TS02 Rabiet Al-Kura	TS03 Ajloun	TS09 Al Shoneh Al Wsta	TP03 Jerash	Total	
Outdoor waste compaction unit (hopper + compactor)		1	1	1		3	Selected
Tractor head	2	3	2	2		9	Selected
Semi-trailer(50 m^3)	3	4	3	3		13	Selected
Indoor waste compaction unit (hopper + compactor)					1	1	Selected
Arm-roll truck					3	3	Selected
Container (35 m^3)					10	10	Selected
Snow removal dozer			2			2	Selected under a condition (Explanation 1)
Truck with salt spreader			2			2	Selected under a condition (Explanation 2)
Wastewater collection truck			1			1	Selected under a condition (Explanation 3)
Pick-up truck			1		1	2	Exempted (Explanation 4)
Farm tractor with sprinkler		1		1		2	Selected under a condition (Explanation 2)
Small loader	1		1			2	Selected under a condition (Explanation 5)
Weighbridge	1	1	1	1		4	Exempted (Explanation 6)
Bus		1			1	2	Exempted (Explanation 4)
Air compressor					1	1	Selected under a condition (Explanation 7)
Car washing machine							Added (Explanation 8)
Water tanker							Added (Explanation 8)

a.2 Explanations for conditioned selections and exemptions

The following explains the reasons for selection and exemptions.

Explanation 1. **Snow removal dozer:** Since the frequency to use a snow removal dozer is limited to a few times a year, it is replaced with an attachment for a small loader. The targeted TS for this equipment are TS02 Al-Kura and TS03 Ajloun, where snowfall is expected during winter.

Explanation 2. **Truck with salt spreader, Farm tractor with sprinkler:** The request was for a salt spreader and sprinkler mounted on a tractor, but both are expected to only be used for a limited frequency. Therefore, a sprayer for tractor-towing (hereafter referred to as "sprayer") replaces them. The sprayer is to be used for both purposes of salt spreader and sprinkler. Tractor and sprayer are procured for all targeted TSs, and the capacity of a sprayer is 1000 liters.

Explanation 3. **Wastewater collection vehicle:** Among the existing TSs, TS01 Ajloun, which has a pit to collect wastewater generated from a car washing machine and waste compaction unit. Its capacity is 8,000 liters.

Explanation 4. **Pick-up truck and bus:** These are not for waste management specifically, therefore exempted.

Explanation 5. **Small loader:** A small loader is an equipment required to collect waste spilt over when transferring waste from collection vehicles to a waste compaction unit. Therefore, one small loader with 0.6 m^3 capacity is procured for each TS.

Explanation 6. **Weighbridge:** A weighbridge is necessary to understand the incoming MSW amount to a disposal site, but its installation requires ground investigation beforehand

and this project cannot manage it. Therefore, it is exempted.

Explanation 7. **Air compressor:** An air compressor is required to wash equipment at a transfer station. Therefore, a roller air compressor with a 30-liter tank is procured for each TS.

Explanation 8. **Car washing machine and water tanker:** Car washing machine and water tanker were not included in the original request. However, a car washing machine is needed to wash equipment, and water tanker is required at a TS where the water supply has not been in place. A car washing machine has a small capacity of 15 liter/min or so, and a water tanker has a capacity of about 8,000 liters.

b. Disposal Site

b.1 Result of the First Selection

Regarding the equipment requested for the works related to disposal sites, the evaluation was carried out as described in the table below.

Table 2-24: Result of the first evaluation of the equipment requested for disposal site

Name of equipment	Requested equipment						Result of the first evaluation
	DS02 Al Ekaider	DS05 Al Huseyneyat	DS06 Al Badiah Al Shamaliyah	DS07 Al-Duleil	DS09 New Dair Alla	Total	
Bulldozer 32t	6	1		1	1	9	Selected
Bulldozer 11t			1			1	Selected
Excavator	2	1	1	1		5	Selected
Farm tractor with sprinkler		1	1	1	1	4	Selected under a condition (Explanation 1)
Landfill compactor	1	1		1		3	Exempted (Explanation 3)
Wheel loader	2	2		1	1	6	Exempted (Explanation 4)
Textile incinerator	1					1	Exempted (Explanation 5)
Tipper for DS	4	2	1	2	2	11	Selected
Snow removal dozer	4	3				7	Selected under a condition (Explanation 2)
Truck with salt spreader	4	3				7	Selected under a condition (Explanation 1)
Bus	1		1		1	3	Exempted (Explanation 6)
Wastewater collection vehicle	1					1	Exempted (Explanation 7)
Pick-up truck					1	1	Exempted (Explanation 6)
Water tanker	1			1	1	3	Selected under a condition (Explanation 8)
Skip loader with container	1					1	Exempted (Explanation 9)
Air compressor	1					1	Selected under a condition (Explanation 8)
Weighbridge			1	1	1	3	Exempted (Explanation 10)
Fuel tanker			1	1	1	3	Exempted (Explanation 6)
Low body trailer			1			1	Exempted (Explanation 6)
Tractor head for low body trailer			1			1	Exempted (Explanation 6)
Solar generator			1			1	Exempted (Explanation 6)
Car washing machine							Exempted (Explanation 8)

b.2 Explanations for conditioned selections and exemptions

The following explains the reasons for selection and exemptions.

Explanation 1. **Truck with salt spreader, Farm truck with sprinkler:** As stated in Explanation 2 above for transfer stations. Each DS is targeted.

Explanation 2. **Snow removal dozer:** As stated in Explanation 1 for transfer stations, a snow removal blade and a small loader to be attached with the blade are procured for both DS02 Al Ekaider and DS05 Al Huseyneyat, where snowfall is expected in winter.

Explanation 3. **Landfill compactor:** Bulldozer can serve this purpose.

Explanation 4. **Wheel loader:** Bulldozer, excavator, and tipper can replace it.

Explanation 5. **Textile incinerator:** Exempted because Al Ekaider DS requires facility construction and installation of the equipment.

Explanation 6. **Pick-up truck, bus, fuel tanker, low body trailer, truck head for low body trailer, solar generator:** These are not for waste management specifically, therefore exempted.

Explanation 7. **Wastewater collection vehicle:** The purpose of the equipment is to collect waste water generated when washing vehicles, but a pit for storing the wastewater does not exist and a wastewater collection vehicle cannot collect wastewater from the pit. Therefore, this will be exempted.

Explanation 8. **Air compressor, car washing machine, and water tanker:** These are necessary for washing bulldozer, excavator, and tipper used at disposal site.

Explanation 9. **Skip loader with container** : These are meant for waste collection and not for the works at disposal sites.

Explanation 10. **Weighbridge:** A weighbridge is necessary to grasp the incoming MSW amount to a disposal site, but its installation requires ground investigation beforehand and this project cannot manage it. Therefore, it is exempted.

c. Result of the First Selection

As a result of the first evaluations, the equipment listed in the tables below have been selected to be procured for transfer stations and disposal sites.

Table 2-25: Result of the First Selection of Equipment for Transfer Stations

Name of Equipment	TS01 Aghwar Shamaliyah	TS02 Rabiet Al-Kura	TS03 Ajloun	TS09 Al Shoneh Al Wsta	TP03 Jerash	Total
Outdoor compaction unit (hopper + compactor)		1	1	1		3
Tractor head	2	3	2	2		9
Semi-trailer(50 m^3)	3	4	3	3		13
Indoor waste compaction unit (hopper + compactor)					1	1
Arm-roll truck					3	3
Container (35 m^3)					10	10
Snow removal blade		1	1			3
Sprayer with tractor	1	1	1	1	1	5
Wastewater collection truck (8000 liter)			1		1	2

Name of Equipment	TS01 Aghwar Shamaliyah	TS02 Rabiet Al-Kura	TS03 Ajloun	TS09 Al Shoneh Al Wsta	TP03 Jerash	Total
Small wheel loader (1.0 m^3)	1	1	1	1		4
Air compressor (30 liter)	1	1	1	1		4
Car washing machine (15 liter/minute)	1	1	1	1		4
Water tanker (8,000 liter)	1	1	1	1		4

Table 2-26: Result of the First Selection of Equipment for Disposal Sites

Name of Equipment	DS02 Al Ekaider	DS05 Al Huseyneyat	DS06 Al Badiah Al Shamaliyah	DS07 Al-Duleil	DS09 New Dair Alla	Total
Bulldozer 32t	6	1		1	1	9
Bulldozer 11t			1			1
Excavator	2	1	1	1		5
Tipper	4	2	1	2	2	11
Sprayer with tractor	1	1	1	1	1	5
Snow removal blade + Small wheel loader	1	1				3
Water tanker (8,000 liter)	1	1	1	1	1	5
Air compressor (30 liter)	1	1	1	1	1	5
Car washing machine (15 liter/minute)	1	1	1	1	1	5

3) Calculation of Number of Equipment to be Procured

a. Total Number of Required Equipment for Target Facilities

The target facilities of the Project are shown in the table below.

Table 2-27: Target Facilities for Equipment to be Procured

Transfer Station (TS)		Final Disposal Site (DS)	
TS01	Aghwar Shamaliyah	DS02	Al Ekaider
TS02	Rabiet Al-Kura	DS05	Al Huseyneyat
TS03	Ajloun	DS06	Al Badiah Al Shamaliyah
TS09	Al Shoneh Al Wsta	DS07	Al-Duleil
TP01	Jerash	DS09	New Dair Alla

a.1 Transfer Station (TS)

The processing capacity per hour of indoor type and outdoor type compaction unit is 30 tons/hr and 23 tons/hr, respectively. Operating time (MSW acceptance) per day shall be a maximum of 16 hours from 8:00 to 24:00. Operating days are set as 6 days a week.

a.1.1 TS01：Aghwar Shamaliyah TS

- Compaction Unit (Outdoor Type)

  Planned Incoming MSW Amount: 78 tons/day (= 67 x 7days/6days)

  Capacity of Compaction Unit (Outdoor Type): 23 tons/hr/unit、Max. 368 tons/day/unit

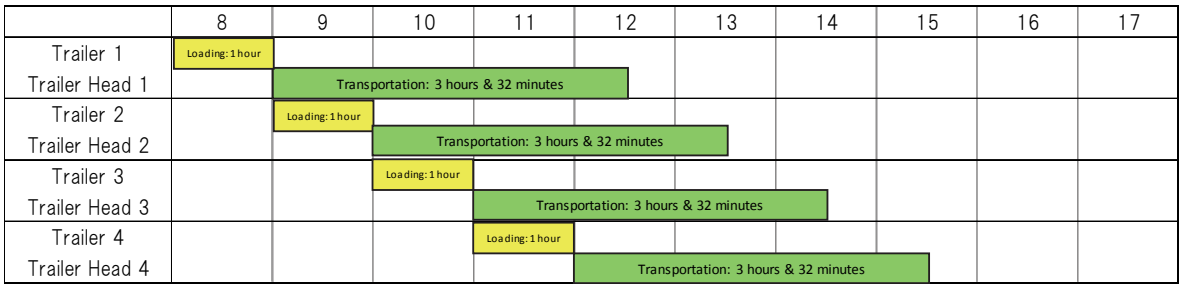
  Required Number: 1 unit

- Transport Equipment

Planned Incoming MSW Amou	78	ton/day	MSW Amount of a Trailer	23 ton/unit	Required Nos. of Trip	4 trips
Transportation Distanc	62	km	Trip Time	3.54 hr		

Required Nos. of Equipment

Equipment	Minimum Nos.	Spare	Total
Trailer (50m^3)	4	1	5
Trailer Head	4	1	5



a.1.2 TS02：Rabiet Al-Kura

- Compaction Unit (Outdoor Type)

Planned Incoming MSW Amount: 303 tons/day (= 259 x 7days/6days)

Capacity of Compaction Unit (Outdoor Type): 23 tons/hr/unit、Max. 368 tons/day/unit

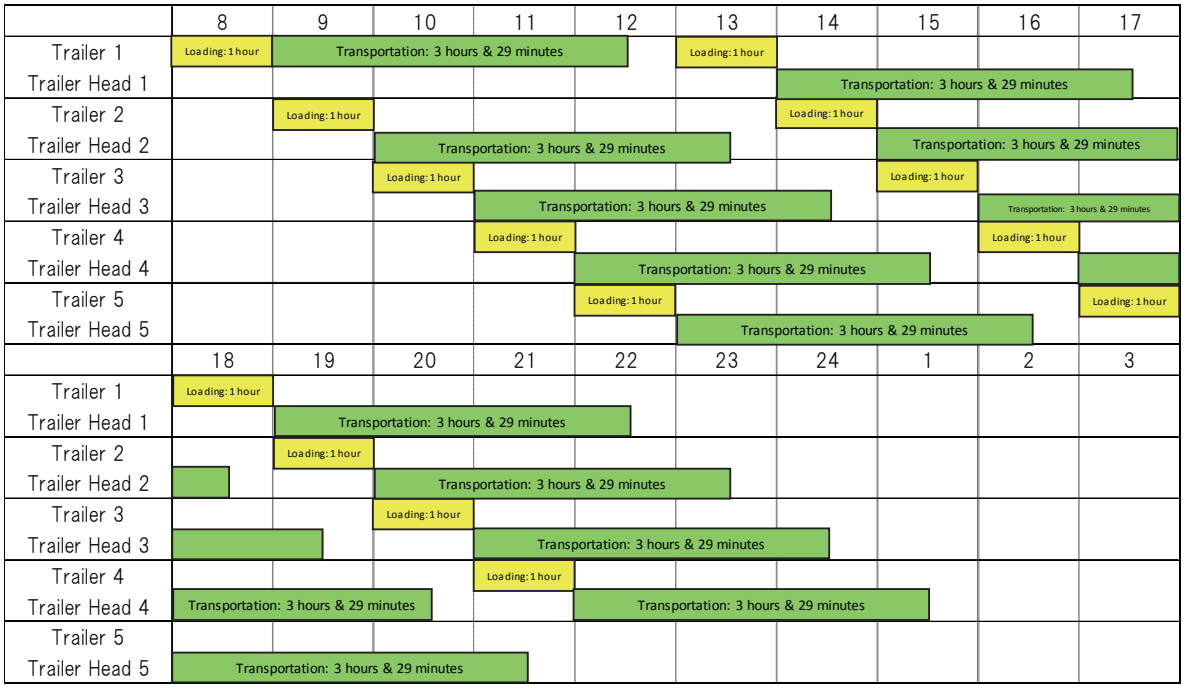
Required Number: 1 unit

- Transport Equipment

Planned Incoming MSW Amou	303	ton/day	MSW Amount of a Trailer	23 ton/unit	Required Nos. of Trip	14 trips
Transportation Distance	61	km	Trip Time	3.49 hr		

Required Nos. of Equipment

Equipment	Minimum Nos.	Spare	Total
Trailer (50m^3)	5	1	6
Trailer Head	5	1	6



a.1.3 TS03：Ajloun

- Compaction Unit (Outdoor Type)

Planned Incoming MSW Amount: 303 tons/day (=259 x 7days/6days)

Capacity of Compaction Unit (Outdoor Type): 23 tons/hr/unit、Max. 368 tons/day/unit

Required Number: 1 unit

- Transport Equipment

Planned Incoming MSW Amou	303	ton/day	MSW Amount of a Trailer	23 ton/unit	Required Nos. of Trip	14 trips
Transportation Distance	44	km	Trip Time	2.51 hr		

Required Nos. of Equipment

Equipment	Minimum Nos.	Spare	Total
Trailer (50m^3)	4	1	5
Trailer Head	4	1	5

	8	9	10	11	12	13	14	15	16	17
Trailer 1	Loading: 1 hour				Loading: 1 hour				Loading: 1 hour	
Trailer Head 1		Transportation: 2 hours & 31 minutes				Transportation: 2 hours & 31 minutes				Transportati
Trailer 2		Loading: 1 hour				Loading: 1 hour				Loading: 1 hour
Trailer Head 2			Transportation: 2 hours & 31 minutes				Transportation: 2 hours & 31 minutes			
Trailer 3			Loading: 1 hour				Loading: 1 hour			
Trailer Head 3				Transportation: 2 hours & 31 minutes				Transportation: 2 hours & 31 minutes		
Trailer 4				Loading: 1 hour				Loading: 1 hour		
Trailer Head 4					Transportation:2 hours & 31 minutes				Transportation: 2 hours & 31	

	18	19	20	21	22	23	24	1	2	3
Trailer 1			Loading: 1 hour							
Trailer Head 1				Transportation: 2 hours & 31 minutes						
Trailer 2				Loading: 1 hour						
Trailer Head 2	Transportation: 2 hours & 31 minutes				Transportation: 2 hours & 31 minutes					
Trailer 3	Loading: 1 hour									
Trailer Head 3		Transportation: 2 hours & 31 minutes								
Trailer 4		Loading: 1 hour								
Trailer Head 4			Transportation: 2 hours & 31 minutes							

a.1.4 TS09：Al Shoneh Al Wsta

- Compaction Unit (Outdoor Type)

Planned Incoming MSW Amount: 91 tons/day (= 78 x 7 days/6 days)

Capacity of Compaction Unit (Outdoor Type): 23 tons/hr/unit、Max. 368 tons/day/unit

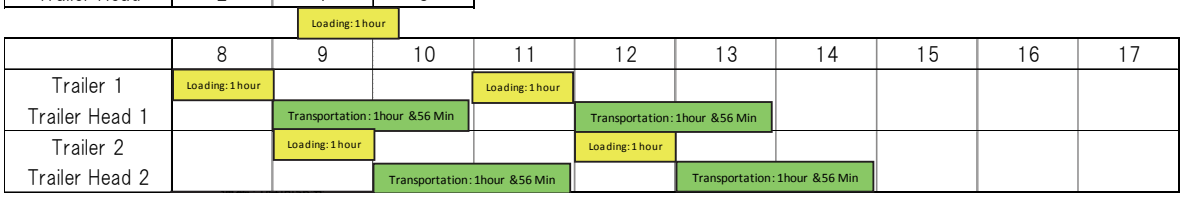
Required Number: 1 unit

- Transport Equipment

Planned Incoming MSW Amour	91	ton/day	MSW Amount of a Trailer		23 ton/unit	Required Nos. of Trip	4 Trips	
Transportation Distance	34	km	Trip Time	1.94 hr				

Required Nos. of Equipment

Equipment	Minimum Nos.	Spare	Total
Trailer (50m^3)	2	1	3
Trailer Head	2	1	3



a.1.5 TP01：Jerash

- Compaction Unit (Indoor Type)

Planned Incoming MSW Amount: 298 tons/day (= 255 x 7 days/6 days)

Capacity of Compaction Unit (Indoor Type): 30 tons/hr/unit、Max. 480 tons/day/unit

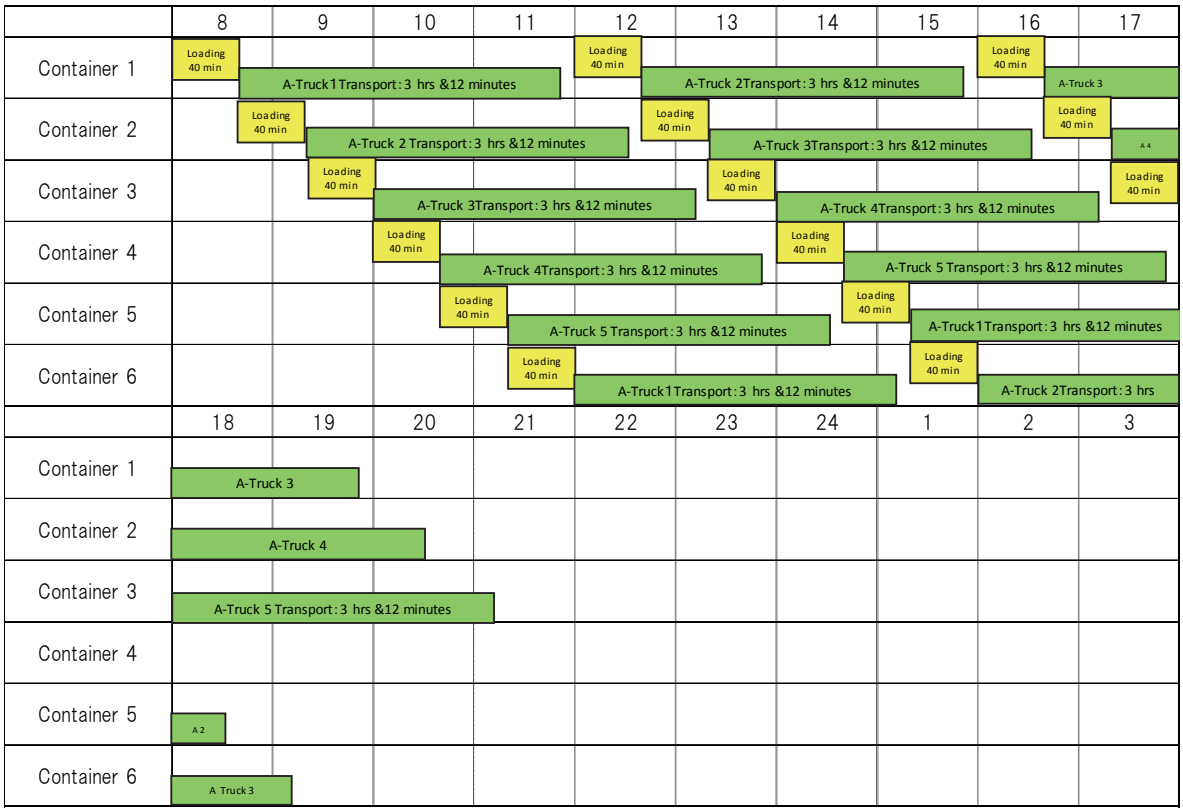
Required Number: 1 unit

- Transport Equipment

Planned Incoming MSW Amour	298	ton/day	MSW Amount of a Container		20 ton/unit	Required Nos. of Trip	15 trips	
Transportation Distance	56	km	Trip Time	3.20 hr				

Required Nos. of Equipment

Equipment	Minimum Nos.	Spare	Total
Container (35m^3)	6	1	7
Armroll Truck	5	1	6



a.1.6 Summary of Calculation for Transfer Station (TS)

The total number of required equipment for TSs is calculated as shown in the table below.

Table 2-28: Total Number of Required Equipment for TS

Equipment	Specification	Required Number					
		TS01 Aghwar Shamaliyah TS	TS02 Rabiet Al-Kura	TS03 Ajloun	TS09 Al Shoneh Al Wsta	TP01 Jerash	Total
Compaction Unit (Outdoor)	23 tons/hr	1	1	1	1		4
Compaction Unit (Indoor)	30 tons/hr					1	1
Trailer	Loading Capacity: 50 m^3	5	6	5	3		19
Tractor Head	Able to tow the above trailer	5	6	5	3		19
Container	Loading Capacity: 35 m^3					7	7
Arm-roll Truck	Able to tow the above trailer					6	6

a.2 Equipment for Disposal Site (DS)

a.2.1 Working Conditions

Working conditions at DS is presumed to be operating six days a week, seven hours a day.

Working hour (hrs/day)	Working day (days/week)
7	6

a.2.2 Bulldozers

Upon selection of equipment appropriate for the Project, the types and the quantity were decided based on the following figures.

Class (ton)	Max leveling volume (m^3/day)Note1
11	570
15	770
18	930
21	1,080
28	1,300
32	1,420

Note 1: Calculated by the project team based on "Building Construction Standard Productivity, Version 51" (2014, Construction Research Institute, Japan)

Waste apparent Gravity (ton/ m^3) (A)	Waste filling height (m) (B)	Covering soil thickness (m) (C)
0.4	2.5	0.25

Table 2-29: The result of calculation for required quantity of bulldozers

Name of Disposal site	Received waste amount (ton/day) Collection waste amount x 7days/6days = (1)	Waste volume (m^3/day) (2)=(1)/(A)	Waste filling area (m^2) (3)=(2) / (B)	Covering soil (m^3/day) (4)=(3) x (C)	Total leveling volume (m^3/day) (5)=(2) + (4)	Soil conversion factor for excavated soil (ton/ m^3) (6)	Required volume of Waste + Soil (m^3/day) (7)=(2)+(4)x(6)	Equipment Capacity (ton) (8)	Workability (m^3/day) (9)	Required Number (10)=(7) / (9)
Al Ekaider DS	3,248	8,120	3,248	812	8,932	1.2	9,094	28	1,300	7
Al Huseyneyat DS	665	1,663	665	166	1,829	1.2	1,862	28	1,300	2
Al Badiah Al Shamaliyah DS	84	210	84	21	231	1.2	235	11	570	1
Al-Duleil DS	318	795	318	80	875	1.2	891	28	1,300	1
New Dair Aila DS	338	845	338	85	930	1.2	947	28	1,300	1

a.2.3 Excavator

Upon selection of equipment appropriate for the Project, the types and the quantity were decided based on the following figures.

Class (m^3)	Max excavation volume (m^3/hr)Note1
0.5	200
0.6	250
0.7	300
0.9	350
1.2	500
1.4	600

Note 1: Calculated by the project team based on "Building Construction Standard Productivity, Version 51" (2014, Construction Research Institute, Japan)

Original soil volume (m^3) (D)	Soil conversion factor for excavated soil (E)	Loose soil volume (m^3) (F)=(D)x(E)	Soil conversion factor for compacted soil (G)	Compacted soil volume (m^3) (H)=(F)x(G)
1.0	1.2	1.2	0.9	1.1

Table 2-30: The result of calculation for required quantity of excavator

Name of Disposal site	Received waste amount (ton/day) Collection waste amount x 7days/6days = (1)	Waste volume (m^3/day) (2)=(1)/(A)	Waste filling area (m^2) (3)=(2) / (B)	Covering soil (m^3/day) (4)=(3) x (C)	Total leveling volume m^3/day) (5)=(2) + (4)	Original soil Density (ton/day) (11)	Required volume of original soil (m^3/day) (12)=(4)/(11)	Equipment Capacity (m^3) (13)	Workability (m^3/day) (14)	Required Number (15)=(12) / (14)
Al Ekaider DS	3,248	8,120	3,248	812	8,932	1.0	812	0.7	300	3
Al Huseyneyat DS	665	1,663	665	166	1,829	1.0	166	0.5	200	1
Al Badiah Al Shamaliyah DS	84	210	84	21	231	1.0	21	0.5	200	1
Al-Duleil DS	318	795	318	80	875	1.0	80	0.5	200	1
New Dair Aila DS	338	845	338	85	930	1.0	85	0.5	200	1

a.2.4 Tipper

Upon selection of equipment appropriate for the Project, the types and the quantity were decided based on the following figures.

Allowable loading soil volume (m^3)	Allowable loading soil Weight (ton)	Trip/hour	Transport volume (m^3/hr) safety factor=1.2	Workability (m^3/day)
6	9.0	3	18.0/1.2=15.0	105
7	10.5	3	21.0/1.2=18.0	126
8	12.0	3	24.0/1.2=20.0	140
10	15.0	3	30.0/1.2=25.0	175

Note 1: Calculated by the project team based on "Building Construction Standard Productivity, Version 51" (2014, Construction Research Institute, Japan)

Soil volume(m^3) (I)	Soil apparent gravity (ton/ m^3 (J)	Soil Weight (ton) (K)=(I)x(J)
1.0	1.5	1.5

Table 2-31: The result of calculation for required quantity of tipper

Name of Disposal site	Received waste amount (ton/day) Collection waste amount x 7days/6days = (1)	Waste volume (m^3/day) (2)=(1)/(A)	Waste filling area (m^2) (3)=(2) / (B)	Covering soil (m^3/day) (4)=(3) x (C)	Total leveling volume (m3/day) (5)=(2) + (4)	Loose soil volume (m^3/ton) (16)	Required volume of Soil (m^3/day) (18)=(4)/(16)	Allowable loading volume (m^3) (17)	Workability (m^3/day) (19)	Required Number (20)=(4) / (19)
Al Ekaider DS	3,248	8,120	3,248	812	8,932	1.2	902	10	175	6
Al Huseyneyat DS	665	1,663	665	166	1,829	1.2	184	10	175	2
Al Badiah Al Shamaliyah DS	84	210	84	21	231	1.2	23	6	105	1
Al-Duleil DS	318	795	318	80	875	1.2	89	6	105	1
New Dair Aila DS	338	845	338	85	930	1.2	94	6	105	1

a.2.5 Summary on Equipment for Disposal Site (DS)

The quantity of equipment required for disposal sites (DS) is as follows:

Table 2-32: Total number of equipment required for disposal sites

Name of equipment	Bulldozers		Excavator		Tipper	
Specifications	28 tons	11 tons	0.5 m^3	0.7 m^3	6 m^3	10 m^3
DS02 Al Ekaider	7			3		6
DS05 Al Huseyneyat	2		1			2
DS06 Al Badiah Al Shamaliyah DS		1	1		1	
DS07 Al-Duleil	1		1		1	
DS09 New Dair Aila	1		1		1	
Total	11	1	4	3	3	6

b. Utilization of existing equipment

b.1 Equipment presumed to be operational in the target year

More than 10 years have passed since the manufacture of many of the construction machineries and vehicles that are currently in operation. Generally, eight (8) years is considered as the depreciation period for construction machinery and vehicles. Moreover, the Ministry of Environment of Japan has issued a notification to the prefectural departments in charge of waste management in the county that “the legal depreciation time for self-propelled operational machinery and equipment

provided for waste disposal works is now shortened to eight years (currently 17 years) under 'the Outline of the Tax Revision of JFY 2013.'" Considering these perspectives, the depreciation time under throject is determined as eight years since the manufacture of construction machinery and vehicles.

The table below indicates the equipment presumed to be operational in the target year of 2020.

Table 2-33: List of Equipment Presumed Operational in 2020

Equipment	Bulldozer		Tipper				excavator	Fuel		Waste compaction unit	Tractor	Tractor head	Water tanker				Wheel loader
Specification	31 ton	41 ton	10 m^3	6 m^3	7 m^3	8 m^3	1.5 m^3	2m^3	3000 liter	180 bar			unmentioned	4 m^3	8 m^3	9 m^3	
DS02 Al Ekaider DS	2		2								2						3
DS05 Al Huseyneyat DS		1	1														
DS06 Al Badiah Al Shamaliyah DS		1															1
DS07 Al-Duleil		1	1				1										
DS09 New Dair Alla DS																	
TS01 Aghwar Shamaliyah																	
TS02 Rabiet Al-Kura TS												1					
TS03 Ajloun																	
TS09 Al Shoneh Al Wsta TS																	
Total	2	3	4	0	0	0	1	0	0	0	2	1	0	0	0	0	4

b.2 Required quantity after subtracting the numbers of existing equipment

b.2.1 Disposal Site (DS)

The required quantity after subtracting the numbers of existing equipment for DS and the numbers of equipment to be procured under the General Grant Aid (to be handled by JICS) is indicated in the table below.

Table 2-34: Required Quantity for DS after Subtracting the Numbers of Existing Equipment

Name of Disposal site	Bulldozer 28 tons (Existing 31t+41t)			Bulldozer 11 tons			Excavator 0.5 m^3		
	Required	Existing	**Balance Required**	Required	Existing	**Balance Required**	Required	Existing	**Balance Required**
DS02 Al Ekaider DS	7	2 + 1 Note 1	**4**						
DS05 Al Huseyneyat DS	2	1	**1**				1	0	**1**

DS06 Al Badiah Al Shamaliyah DS	0	1	**0**	1	0	**0**[Note4]	1	0	**1**
DS07 Al-Duleil DS	1	1	**0**	0	0	**0**	1	0	**0**[Note4]
DS09 New Dair Aila DS	1	0	**1**				1	0	**1**

Name of Disposal site	Excavator 0.7 m^3			Tipper 6 m^3			Tipper 10 m^3		
	Required	Existing	**Balance Required**	Required	Existing	**Balance Required**	Required	Existing	**Balance Required**
DS02 Al Ekaider DS	3	0 + 1[Note2]	**2**				6	2 + 2[Note3]	**2**
DS05 Al Huseyneyat DS				0		**0**	2	1 + 2[Note3]	**0**
DS06 Al Badiah Al Shamaliyah DS				1	0	**1**			**0**
DS07 Al-Duleil DS	0	1	**0**	1	0	**0**[Note4]	0	1	**0**
DS09 New Dair Aila DS				1	0	**1**			**0**

Name of Disposal site	Tractor			Water Tanker 8000 Liter					
	Required	Existing	**Balance Required**	Required	Existing	**Balance Required**			
DS02 Al Ekaider DS	1	2	**0**	1	0	**1**			
DS05 Al Huseyneyat DS	1	0	**1**	1	0	**1**			
DS06 Al Badiah Al Shamaliyah DS	1	0	**1**	1	0	**1**			
DS07 Al-Duleil DS	1	0	**1**	1	0	**1**			
DS09 New Dair Aila DS	1	0	**1**	1	0	**1**			

Note 1: One (1) Bulldozer to be procured by JICS.

Note 2: One (1) excavator (1.4m3) to be procured by JICS.

Note 3: Two (2) Tipper (10m3) to be procured by JICS.

Note 4: The required number is zero (0) since equipment with higher performance than their requirement already exists.

b.2.2 Transfer Stations (TS)

The quantity of equipment required for transfer stations after subtracting the numbers of existing equipment is indicated in the table below.

Table 2-35: Required quantity for TS after subtracting the numbers of existing equipment

Name of Transfer Station	Waste Compaction Unit (Outdoor)			Waste Compaction Unit (Indoor)			Semitrailer 50 m^3		
	Required	Existing	**Balance Required**	Required	Existing	**Balance Required**	Required	Existing	**Balance Required**
TS01 Aghwar Shamaliyah TS	1	0	**1**[Note1]	-	-	**-**	5	0	**5**
TS02 Rabiet Al-Kura TS	1	0	**1**	-	-	**-**	6	0	**6**
TS03 Ajloun TS	1	0	**1**	-	-	**-**	5	0	**5**
TS09 Al Shoneh Al Wsta TS	1	0	**1**	-	-	**-**	3	0	**3**
TP01 Jerash TS	-	-	**-**	1	0	**1**	-	-	**-**

Name of Transfer Station	Tractor head for semitrailer (50 m^3)			Container 35 m^3			Arm-roll truck for 35 m^3 containers		
	Required	Existing	**Balance Required**	Required	Existing	Balance Required	Required	Existing	Balance Required

TS01 Aghwar Shamaliyah TS	5	0	**5**	-	-	**-**	-	-	**-**
TS02 Rabiet Al-Kura TS	6	1	**5**	-	-	**-**	-	-	**-**
TS03 Ajloun TS	5	0	**5**	-	-	**-**	-	-	**-**
TS09 Al Shoneh Al Wsta TS	3	0	**3**	-	-	**-**	-	-	**-**
TP01 Jerash TS	-	-	**-**	7	0	**7**	6	0	**6**

Name of Transfer Station	Tractor			Water tanker 8000 Liter			Compact wheel loader		
	Required	Existing	**Balance Required**	Required	Existing	**Balance Required**	Required	Existing	**Balance Required**
TS01 Aghwar Shamaliyah TS	1	0	**1**	1	0	**1**	1	0	**1**
TS02 Rabiet Al-Kura TS	1	0	**1**	1	0	**1**	1	0	**1**
TS03 Ajloun TS	1	0	**1**	1	0	**1**	1	0	**1**
TS09 Al Shoneh Al Wsta TS	1	0	**1**	1	0	**1**	1	0	**1**
TP01 Jerash TS	–	–	–	–	–	–	–	–	–

Note 1: TS01Aghwar TS does not have sufficient space for installing newly an outdoor waste compaction unit, and renovation work will be required if installing one. Therefore, it is exempted from the Project.

c. Procurement by other donors

According to the interview survey, no equipment to be procured overlaps with procurement by other donors.

d. Quantity of Equipment to be procured under the Project

Considering the above factors, the quantity of equipment to be procured under the Project is concluded as indicated in the table below.

Table 2-36: Quantity of Equipment to be Procured for Transfer Stations (TS)

Equipment Name	TS01 Aghwar Shamaliyah	TS02 Rabiet Al-Kura	TS03 Ajloun	TS09 Al Shoneh Al Wsta	TP03 Jerash	Total
Outdoor Hopper + Compactor	-	1	1	1	-	**3**
Tractor head	5	5	5	3	-	**18**
Semitrailer (50 m^3)	5	6	5	3	-	**19**
Indoor Hopper + Compactor	-	-	-	-	1	**1**
Arm-roll truck	-	-	-	-	6	**6**
Container (35 m^3)	-	-	-	-	7	**7**
Tractor	1	1	1	1	-	**4**
Sprayer	1	1	1	1	-	**4**
Skid steer loader (0.6 m3) Note 1	1	1	1	1	-	**4**
Snow removal blade	-	1	1	-	-	**2**
Wastewater collection truck (8 m^3)	-	-	1	-	1	**2**
Water tanker (8 m3)	1	1	1	1	-	**4**
Air compressor (30ltr)	1	1	1	1	-	**4**
Car washing machine (15ltr/min.)	1	1	1	1	-	**4**

Note 1: Regarding a small wheel loader, 0.6 m^3-class loader, which complies with the European emission regulations, this is not produced in Japan, and procurement from a third-country would be necessary if procured. Therefore, "small wheel loader" is hereby replaced with "skid steer loader". (Both can equally serve the purpose).

Table 2-37: Quantity of Equipment to be Procured for Disposal Site (DS)

Equipment Name	DS02 Al Ekaider	DS05 Al Huseyneyat	DS06 Al Badiah Al Shamaliyah	DS07 Al-Duleil	DS09 New Dair Alla	Total
Bulldozer (28 t)	4	1	-	-	1	**6**
Excavator (0.7 m^3)	2	-	-	-	-	**2**
Excavator (0.5 m^3)	-	1	1	-	1	**3**
Tipper (10 m^3)	2	-	1	-	1	**4**
Tractor	-	1	1	1	1	**4**
Sprayer	-	1	1	1	1	**4**
Skid steer loader (0.6 m^3) Note 1	1	1	-	-	-	**2**
Snow removal blade	1	1	-		-	**2**
Water tanker (8 m^3)	1	1	1	1	1	**5**
Air compressor (30l tr)	1	1	1	1	1	**5**
Car washing machine (15ltr/min.)	1	1	1	1	1	**5**

Note 1: Refer to Table 2-36

2-2-3 Implementation Plan

(1) Implementation Policy

1) Basic matters

The Project is to be implemented in accordance with the scheme of Japan's Grant Aid for a single-year. The Grant Aid is offered based on the Exchange of Notes (hereafter referred to as "E/N"), which is signed between the governments of Japan and Jordan, confirming the Project purpose, implementing organizations, conditions of granting the aid and its amount. Following the E/N, the Grant Agreement (hereafter referred to as "G/A") is concluded. This stipulates the conditions of payment, responsibilities of the government of Jordan, and the procurement conditions of the Project. The details concerning the procurement procedures under the Grant Aid are agreed upon between the Embassy of Japan and the Jordanian government upon the signing of E/A, and between JICA and the Jordanian government upon the signing of G/A. For the purposes of the Project, JICA is considered to be in a position to support proper implementation of the Project, and the goods and services are to be delivered in accordance with JICA's Grant Aid scheme.

2) Procurement method

The fund from the Grant Aid is, in principle, to be utilized to purchase goods made in Japan or the recipient country, and services supplied by the nationals of Japan or the recipient country. However, when JICA and the government of the recipient country recognize the necessity, goods or services from a third country (other than Japan and the recipient country) can be purchased. Nonetheless, the prime contractor, that is the consultants and procurement agents, required for implementation of the grant aid, is to be limited to "Japanese nationals".

The procurement agent is, in principle, selected through a competitive tender so as not to create inequality among tenderers eligible to procure the goods and the services. The tender document used for the tender is prepared by the consultant based on their discussion with the Jordanian government.

3) Lot divisions of equipment to be procured

The plan of lot division of the equipment to be procured is as follows:

Table 2-38: Lot division plan

Lot	Contents	Procurement country	Equipment to be included
Lot 1	Outdoor Hopper + Compactor and transportation vehicle	Third country (the manufacturer and its brand name to be named) Japan	・Outdoor Hopper + Compactor ・tractor head ・semi-trailer (50 m^3)
Lot 2	Indoor Hopper + compactor and transportation vehicle	Third country	・Indoor Hopper + compactor ・Arm-roll truck ・Container (35 m^3)
Lot 3	Other equipment	Japan Recipient country Third country	・Bulldozer ・Excavator ・Skid steer loader ・Snow remover blade ・Dump truck ・Waste-water collection truck ・Water tanker ・Tractor ・Sprayer ・Air compressor ・Car washing machine

4) Consultant

The consultant signs the consulting service contract for the tender and procurement management with the Jordanian government. The contents of the services to be provided in each stage of the Project are as follows:

a. Services before the tender

The consultant reviews the contents of the works conducted in the preparatory survey and the survey result under the detailed design service. After reviewing, they prepare a tender document and obtain approval from the government of Jordan to ensure the consistency of the work.

b. Services during the tender

The consultant carries out the following services during tender procedures.

① Preparing the tender document (mainly the specifications)

② Organizing a tender meeting

③ Responding to questions regarding the tender document and drafting amendments

④ Conducting the tender evaluation and preparing the tender evaluation table and evaluation report

⑤ Assisting contract negotiations

c. Services during the procurement management

The consultant receives the equipment shipped from their manufacturers and inspects if the

equipment complying with the required specifications and quantity have been delivered in the procurement management stage. The indoor and outdoor compaction units (hopper + compactor) — and especially the indoor compactor — needs to be installed within the building of a transfer station newly built by another donor (UNDP). Therefore, the consultant attends to and supervises the works of installation during the installation period (2 – 3 months). Regarding the equipment that require provision of initial guidance for operation, the consultant will attend the guidance when necessary to confirm the guidance is conducted efficiently.

5) Implementation system of the recipient country

The responsible institution on the Jordan side for the Poject is MOMA, and the implementing agencies are 8 JSCs and 1 municipality.

Table 2-39: Implementing organization of each facility

Type of facility	Name of facility	Implementation body
Transfer station	TS01 Aghwar Shamaliyah	Aghwar Shamaliyah JSC
	TS02 Rabiet Al-Kura	Rabiet Al- Kura JSC
	TS03 Ajloun	Ajloun JSC
	TS09 Al Shoneh Al Wsta	Al Shoneh Al Wsta Municipality
	TP03 Jerash	Irbid JSC
Disposal site	DS02 Al Ekaider	
	DS05 Al Huseyneyat	Mafraq JSC
	DS06 Al Badiah Al Shamaliyah	Al Badiah Al Shamaliyah JSC
	DS07 Al-Duleil	Zarqa JSC
	DS09 New Dair Alla	Al Shonen Al Wsta JSC

It is necessary to select a person in charge of the Project (on Jordan side), since it is essential to have close communication and discussion among the consultants, the procurement agent and the relevant Jordanian institutions to carry out the Project efficiently.

(2) Implementation Conditions

1) Coordination with UNDP

At TP03 Jerash, UNDP will build the facility of the transfer station by August 2018, and the Project will install the indoor compaction unit by August 2019. Needless to say, with regard to understanding the progress of the work by UNDP, it is important to ensure the quality of the facility being built by UNDP, in order to ensure the proper installation of the equipment. For this purpose, it is planned that the consultant carries out inspection of items that are important to the installation of the equipment, such as the structure of the building, foundation structure, and so on, in presence of the client (MOMA), and the manufacturer of the compactor, a few months before the installation.

If any defects (such as shapes or height of the concrete foundation being different from the design) were found during the inspection, MOMA instructs UNDP to carry out the necessary repair works.

GIZ has a plan to construct a small sorting facility, adjacent to the planned construction site of the Jerash transfer station. MOMA, along with UNDP, needs to confirm the following points with GIZ:

- Since the site for the construction of the transfer station (TS) is a steep slope, it is necessary to adjust the construction plan of each of the retaining walls and so on so as not to affect the land reclamation of the TS.
- It is necessary that GIZ 's sorting facility does not affect the construction of the transfer station of the Project.

2) Outdoor compaction unit

The installation period for the three outdoor compaction units (hopper + compactor) is planned as 1 month/ machine x 3 machines = 3 months, based on the hearing from manufactures during the preparatory survey. This is based on the judgement that simultaneous installation is not possible because simultaneously securing several supervising engineers required for installation is difficult.

3) Registration of vehicles

Among the procured equipment, the machinery requiring vehicle registration are registered after completing duty-free procedure in Zarqa Free Zone, and are transported to each destination. The procedure of vehicle registration and the cost incurred for it are to be borne by the recipient country. The time required for vehicle registration varies largely from one week at earliest up to a maximum of one month. The recipient country needs to take necessary actions promptly and properly to implement the Project as planned.

4) Procurement of equipment for Al Ekaider disposal site (DS)

As Japanese nationals are not allowed to enter the area where Al Ekaider final disposal site (DS) is located, according to the security instructions by JICA, the equipment to be used in the Al Ekaider DS will firstly be delivered to Al Huseyneyat DS and its inspection, initial operation guidance and handover will take place there. Subsequently, it will be transported to Al Ekaider DS by the Jordan side.

(3) Scopes of Works

1) Installation of equipment

Among the equipment to be procured, ones that require installation work are indoor compaction units (hopper + compactor), and their installation is conducted with the cost borne by the Japanese side. Moreover, “initial operation guidance” is conducted with the cost borne by the Japanese side under this Project, as described later.

2) Demarcation of procurement and installation of equipment

Demarcation between the Japanese side and the Jordan side of equipment procurement and installation is indicated in the table below.

Table 2-40: Demarcation between Japanese and Jordan side of Equipment Procurement and Installation

Contents of works	Japan	Jordan
1. Equipment		
Procurement of equipment	X	
Supplying spare parts (other than that are procured by Japanese side)		X
Securing the power source and fuel for running the equipment,		X
2. Securing the storing space of equipment		X
3. Transportation and customs-related works for equipment		
Transportation of each equipment to its planned destination	X	
Custom clearance	x	X
Obtaining tax exemption (import tax, value-added tax, etc.)		X
Obtaining import permits for the equipment		X
4. Issue of Banking Arrangement (B/A) and Authorization to Pay (A/P)		
Conclusion of B/A		X
Issue of A/P		X
Commissions incurred for the above-mentioned procedures		X
5. Obtaining permissions to entry and stay for the personnel relevant to the Project, and required cost		X
6. Obtaining any necessary permissions required for implementation of this project		X
7. Cost incurred for relevant works not included under the Grant Aid		X
8. Services related to Tender		
Preparation of tender document	X	
Consulting services related to tender and procurement management	X	
9. Inspection of delivered equipment		
Attending to installation of delivered equipment	X	
Conducting inspection of delivered equipment	X	
Attending to inspection of delivered equipment	X	X
Conducting initial operation guidance for the equipment	X	

(4) Consultant Supervision

1) Basic Policy

The consultant supervises the works of procurement agent so that the contract is executed appropriately and efficiently. The purpose of procurement management is to supervise that the equipment is delivered and installed in accordance with the specifications stipulated in the contract while securing the required quality. The consultant ensures that the quality, standards, and performance, etc., are in accordance with what are stipulated in the Contract. The consultant also manages the records of quality control data and photos, and storage of procurement documents.

2) Installation of Equipment and Operation Guidance

Among the equipment to be procured under the Project, installation is required for indoor and outdoor compaction units. The contents of the installation work are as written below, and these works can be conducted by the manufacturer.

Outdoor compaction unit (hopper + compactor): Assembling and installing the compactor and others, construction of foundation (concrete foundation, H-steel), removing the existing concrete parapet, building a control room (a small shed)

Indoor compaction unit (hopper + compactor): Assembling and installing the compactor and others

Although equipment similar to what is to be procured under the Project is already used in each JSC and municipality, manners of their operation differ depending on their manufacturers, and there is a risk of accidents caused from wrong manner of operation. Therefore, initial operation guidance of the procured equipment is conducted upon delivery of the equipment.

3) Dispatch of consultants

The equipment is procured under the responsibility of the procurement agent of the Project, while the consultant supervises the progress of procurement and installation by the procurement agent. For procurement management, the following consultants are dispatched to Jordan.

Table 2-41: Contents of consultant dispatches

consultant	Contents of works	Timing of dispatch
Procurement supervisor	Inspection after the initial operation guidance and handing over	When necessary
Stationed procurement supervisor	Attending to installation of equipment, inspecting consignment and number, conducting initial operation guidance, and inspection.	When necessary
Inspector	Inspecting the design drawn by the procurement agent in Japan, conducting inspection at manufacturer, inspection prior to shipping from manufacturer, pre-shipment inspection at the port, Inspection of malfunction before expiry of warranty	When necessary

(5) Procurement Plan

1) Procurement procedure

Most of the equipment planned under the Project are not manufactured in Jordan. When procuring in Japan or in a third country, it is important to ensure the supply of spare parts and after-services for future maintenance. The manufactures of the main equipment procured under the Project have agents in Jordan. It is also possible for those manufactures that do not have local agents to sign an agency agreement with local agents and to become able to provide maintenance services for the equipment made in Japan or in a third county. Therefore, the equipment to be procured shall be made in Japan or in a third country. The plan of procurement for each equipment is as shown in the table below.

Table 2-42: Procurement plan for equipment of transfer station

Name of equipment	Japan	Third country
Outdoor compaction unit		X (manufacture and its brand name to be named)
Tractor head	X	
Trailer (50 m^3)		X(manufacture and its brand name to be named)
Indoor compaction unit		X
Arm-roll truck		X
Container (35 m^3)		X
Skid steer loader (0.6 m^3)		X

Name of equipment	Japan	Third country
Snow removal blade		X
Sprayer	X (recipient country)	
Tractor		X
Waste water collection vehicle (8000 liter)	X	
Air compressor (30 liter)	X	
Car washing machine (15 liter/minute)	X	
Water tanker (8000 liter)	X	

Table 2-43: Procurement Plan of Equipment for Disposal site

Name of equipment	Japan	Third country
Bulldozer 28t	X	X
Excavator 0.5m^3	X	
Excavator 0.7m^3	X	
Dump truck 10m^3	X	
Sprayer	X (Recipient country)	
Tractor		X
Skid steer loader (0.6m^3)		X
Snow removal Blaze		X
Water tanker (8000 liter)	X	
Air compressor (30 liter)	X	
Car washing machine (15 liter/minute)	X	

2) Procurement Plan for spare parts and consumables for the procured equipment

One year after the provision of the equipment, the necessary spare parts are procured.

Table 2-44: Procurement Plan of spare parts and consumables for equipment of transfer stations

Name of equipment	Spare parts	consumables
Outdoor compaction unit	X	
Tractor head		
Semitrailer (50m^3)		
Indoor compaction unit		
Arm-roll truck		
Container (35m^3)		
Skid steer loader (0.6m^3)		
Snow removal blade		
Sprayer		
Tractor		

Name of equipment	Spare parts	consumables
Wastewater collection truck (8000 liter)	X	
Air compressor (30 liter)		
Car washing machine (15 liter/minute)		
Water tanker (8000 liter)	X	

Table 2-45: Procurement Plan for Spare Parts and Consumables (for Equipment of Disposal Site)

Name of equipment	Spare parts	consumables
Bulldozer 28t	X	
Excavator 0.5m^3	X	
Excavator 0.7m^3	X	
Damp truck 10m^3	X	
Sprayer		
Tractor		
Skid steer loader (0.6m^3)		
Snow removal blade		
Water tanker (8000 liter)	X	
Air compressor (30 liter)		
Car washing machine (15 liter/minute)		

(6) Plan of Initial Operation Guidance and Management Guidance

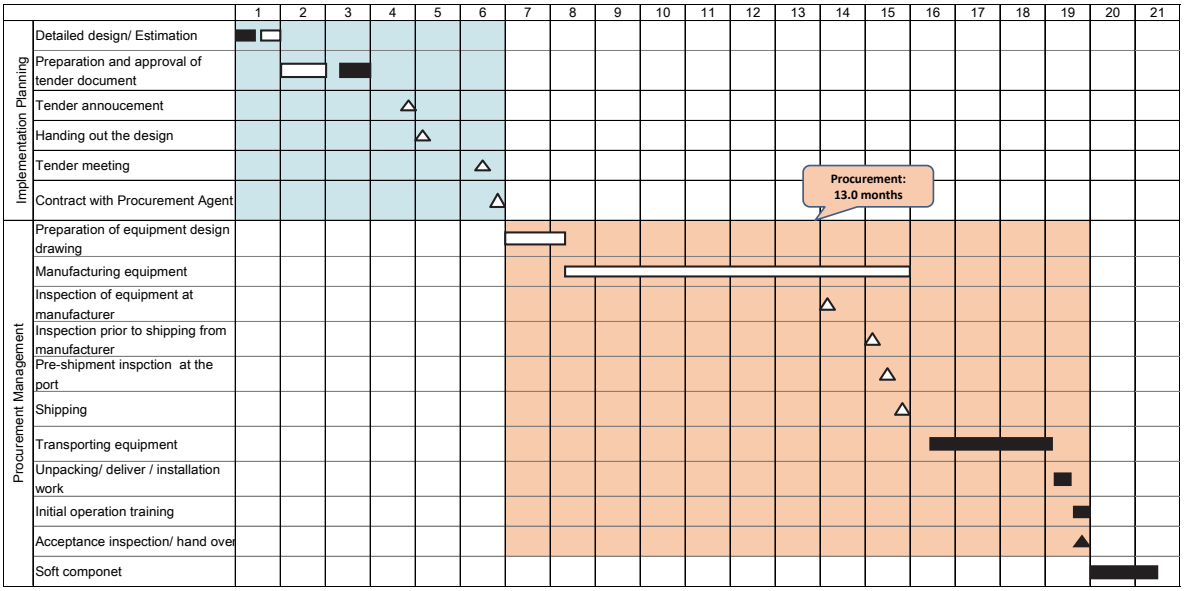
Equipment equivalent to many of the equipment to be procured in the Project are already used in the targeted sites. However, it is necessary to provide guidance for safe and appropriate operational skills because the equipment to be procured under the Project are made by different manufacturers, and the operators of the equipment have not received appropriate operational training. Therefore, initial operation guidance is provided by skilled engineers of the manufactures. The target trainees for the initial operational guidance are drivers, operators, and maintenance staff of the procured equipment. In the initial operation guidance, instruction on daily maintenance as well as the basic operation are included.

(7) Soft Component (Technical Assistance) Plan

Technical assistance is provided under the soft component, in order to support each JSC and municipality for implementation of the designated appropriate disposal treatment by properly operating and maintaining the procured equipment. The technical assistance includes the following:

- Instructions to review and revise the existing transportation plan and operation and maintenance plan for the targeted existing 4 intermediate facilities.
- Instructions to formulate the transportation plan and operation and maintenance plan for the new Jerash Transfer Station
- Instructions to review and revise the existing landfill plan for the 5 existing disposal sites and operation and maintenance plan for their equipment

(8) Implementation Schedule



2-3 Obligation of Recipient Country

2-3-1 General Obligations

For the implementation of this grant aid project, the following general obligations of the Jordan side, including necessary undertakings and the handling of VAT imposed on the locally procured items, have been confirmed as follows:

1) To conduct necessary measures including exemption in regard to the VAT, customs and other taxes or fees derived from the Project activities in order to smoothly carry out the Project.

2) To ensure prompt unloading, customs clearance at ports of disembarkation and internal transportation of products purchased under the grant aid.

3) To accord Japanese nationals, whose services may be required under the verified contracts, such facilities as may be necessary for their entry into Jordan and stay therein for the performance of their work.

4) To ensure that the equipment procured by the grant aid be maintained and used properly and effectively for the implementation of the Project, the necessary manpower be secured, and all the expenses of maintenance and operation necessary for project implementation be borne by the Jordan side except for those borne by the grant aid.

5) To ensure that the products procured by the grant aid not be re-exported from Jordan.

6) To ensure that the Government of Jordan or its designated authority should open an account by the name of the Government of Jordan in an authorized foreign exchange bank in Japan. The Government of Japan will execute the grant by making payments in Japanese yen to cover the obligations incurred by the Government of Jordan or its designated authority under verified contracts. The payments will be made when payment requests are presented by the bank to the Government of Japan under an Authorization to Pay (A/P) issued by the Government of Jordan or its designated authority. Authorization to Pay (A/P): the Government of Jordan will bear the cost of advising fee and commission for A/P to the bank with which the Banking Arrangement (B/A) is made.

2-3-2 Obligations Specifically Required for the Project

1) Cost for the manpower and fuel required for procured equipment

Cost for the employment and salaries of drivers and operators required for newly procured equipment and fuel.

2) Storage space for the procured equipment

3) Assignment of trainees to be trained in operation (of procured equipment)

4) Transportation of the procured equipment to the site where it will be utilized in case it is handed over to the Jordan side at a location besides the actual site of utilization

As persons engaging in JICA activities are not allowed to enter the area where Al Ekaider final disposal site (DS) is located, the equipment to be used in the Al Ekaider DS will firstly be delivered to Al Huseyneyat DS and its inspection, initial operation guidance and handover will take place there. Subsequently, it will be transported to Al Ekaider DS by the Jordan side.

Table 2-46: List of Equipment for Al Ekaider DS and Approximate Transportation Cost

No.	Description of equipment	Q'ty	Unit cost (USD)	Transportation cost (USD)
1	Bulldozer (28t)	4	2,500	10,000
2	Excavator (0.7m^3)	2	2,500	5,000
3	Tipper (10m^3)	2	2,500	5,000
4	Water tanker	1	2,500	2,500
5	Skid steer loader	1	2,500	2,500
6	Car washing machine	1	200	200
7	Air compressor	1	200	200
8	Snow removal blade	1	200	200
Total				25,600

5) Installation of compaction unit to existing transfer stations

MOMA shall execute the following measures in the installation of the additional compaction units to the three existing transfer stations (Rabiet Al-Kura, Ajloun and Al Shoneh Al-Wsta).

- ✓ To secure space for the operation rooms and the hoppers of the additional compaction units.
- ✓ To install electrical wiring to the operation rooms for the operation of compaction units.

Table 2-47: Approximate Cost of Electric Wiring

	Cost
Rabiet Al-Kura TS	2,000 JD
Ajloun TS	1,000 JD
Al Shoneh Al Wsta TS	4,000 JD
Total	7,000 JD

※Based on the information from each JSC

6) Installation of compaction unit at the Jerash transfer station

At the Jerash transfer station, the installation of equipment procured by MOMA with the grant of JICA, and its test operation will be carried out significantly later than facility construction by UNDP. Accordingly, MOMA takes the following measures.

- ✓ MOMA shall bear the responsibility of facility design of the transfer stations.
- ✓ MOMA shall comprehensively supervise the construction, equipment procurement and installation and test operation of the Jerash transfer station. The comprehensive supervision includes monitoring and control of the facility during the period from the completion of UNDP's facility construction to the commencement of equipment installation.
- ✓ MOMA shall comply with the confirmations understood by both JICA and UNDP in regard to the facility design in supervising facility construction.
- ✓ MOMA shall thoroughly understand the detailed design drawings and construction specifications, most of which will be prepared by UNDP contractors, and make sure that

equipment installation and test operation will be executed smoothly.

- ✓ MOMA shall provide necessary information for smooth implementation of the Japanese Grant Aid Project, such as the detailed design drawings, specifications of construction work and progress report of construction work by UNDP.
- ✓ MOMA shall make an agreement between MOMA and UNDP on the basic responsibilities of the Jerash transfer station.
- ✓ MOMA shall take the responsibility to deal with any troubles which are caused by facility construction and found during equipment installation and test operations, or even after the commencement of actual operations.

7) Registration of procured vehicles and equipment and the cost for registration

After the tax exemption procedure at Zarqa Free Zone, some of the procured vehicles and equipment should be registered before being delivered to their destination. The recipient country shall undertake vehicle registration and bear the cost for registration.

2-4 Project Operation Plan

2-4-1 Basic Policy

There is no need for the government of Jordan to establish any new organizations or facilities for this project, since the equipment to be procured under this project are all replacements of what have been and are being used currently.

2-4-2 Operation and Maintenance System

It is considered that JSC and municipalities, who will be the users involved in operation and maintenance of the procured equipment of this project, have sufficient capacities, since the equipment equivalent to the procured ones are being used by them currently.

The additional required cost for operation and maintenance of transfer stations and disposal sites are as indicated in Table 2-51 and Table 2-57. The current operation and maintenance systems of JSC and municipalities have not been found problematic for the equipment to be procured under the Project, since those equipment are equivalent to what they have been operating and maintaining so far.

2-5 Project Cost Estimation

2-5-1 Initial Cost Estimation

The cost to be borne by the Jordan side for the implementation of the Project is as estimated below, according to the estimate conditions indicated below.

Cost to be borne by the Jordan side

Cost to be borne by the Jordan side	39,812JD	(Approx. 6.5 million yen)
① Transportation to Al Ekaider DS	18,208JD	(Approx. 3.0 million yen)
② Electric wiring works at 3 transfer stations	7,000JD	(Approx. 1.1 million yen)

③ Banking Arrangement 14,604JD (Approx. 2.4 million yen))

Estimate Conditions

a. Time of estimation March 2017 (Heisei 29)

b. Exchange rate 1USD=115.63yen, 1EURO=123.08yen, 1JD＝162.58yen
(Average rate for December 2016 to February 2017)

c. Procurement time period Timing for detailed designing, and equipment procurement is as shown in the implementation plan.

d. Others: Estimation is to be done considering the accuracy of the Grant Aid of the Japanese Government.

2-5-2 Operation and Maintenance Cost

(1) Transfer Station (TS)

1) Operation and Maintenance Costs of Waste Transfer Equipment

The Preparatory Survey Team estimated the costs necessary for operation and maintenance (O&M costs) of the waste transfer equipment to be incurred in 2022 (the target year of the Project) based on operation plans prepared for the target transfer stations for the year.

The table below shows technical and price indicators used in the preparation of the operation plans and the estimation of the costs necessary for the O&M of the equipment. Most of these indicators were collected through field surveys conducted in the study area in February 2017.

Table 2-48: Technical and price indicators used in the preparation of the operation plans and the estimation of O&M costs of the waste transfer equipment

No.	Cost Estimation Factors	Unit	Values	Note
A	**General:**			
	Inflation rate	per cent	4.4%	Average value for the past 5 years (from 2011 to 2015), Central bank of Jordan
	Currency exchange rate	JD=JPY	163.09	JICA rate for Feb 2017
B	**For Compaction unit Operation:**			
1	Power consumption	kW	90	Value adopted from the technical specifications for Jerash TS
2	Electricity tariff	JD/kWh	0.094	Electricity tariff as of 20 Feb 2017
3	Duration of trailer loading	hours/trailer	1:00	JSC Questionnaire; trailer capacity=50 m^3
4	Duration of container loading	hours/container	0:40	Loading speed was considered same as trailer loading; Container capacity=35m3
5	Apparent specific gravity of waste after compression (trailer)	ton/m^3	0.46	
6	Apparent specific gravity of waste after compression (container)	ton/m^3	0.57	
7	Operator wage	JD/month	436	Adopted average salary of JSCs (Financial Reports of JSCs for 2015)
8	Compaction unit treatment capacity	ton/day	300	Adopted from the Equipment Plan
9	Price of compaction unit (outside)	JD	336,201	Results of the preliminary survey (54,832,000JPY)
10	Price of compaction unit (inside)	JD	937,287	Results of the preliminary survey (152,865,000JPY)
11	Estimation factor for monthly maintenance cost	per cent	0.2%	Share of maintenance cost in the unit price (Considered same as those for truck and trailer)
C	**For Waste Transfer:**			

No.	Cost Estimation Factors	Unit	Values	Note
10	Price of trailer truck	JD	62,210	Results of the preliminary survey (10,146,000JPY)
	Price of arm-roll truck	JD	109,103	Results of the preliminary survey (17,794,000JPY)
12	Price of trailer (50 m^3)	JD	101,874	Results of the preliminary survey (16,615,000JPY)
	Price of container (35 m^3)	JD	15,280	Results of the preliminary survey (2,492,000JPY)
14	Fuel consumption (truck)	km/liter	2	
15	Lubricant/Fuel consumption ratio	per cent	5.0%	Results of interview surveys with JSCs
16	Price of fuel	JD/liter	0.48	Market price in Jordan (as of 20 Feb 2017)
17	Price of lubricant	JD/liter	1.68	Market price of engine oil in Jordan as of 20 Feb 2017; 350 JD/barrel; 1 barrel=208 liter
18	Movement speed of trailer truck	km/hour	35	Results of the field survey
19	Movement speed of arm-roll truck	km/hour	35	Considered same with the trailer truck
20	Driver wage	JD/month	490	Average salary for trailer truck drivers (JSC interview result)
21	Vehicle registration fee	JD/unit/year	600	Results of the preliminary survey
22	Insurance	JD/unit/year	300	Results of the preliminary survey
23	Estimation factor for monthly maintenance cost	per cent	0.2%	25% of initial price for the utilization period of 11.5 years (Japan Construction Machinery and Construction Association, "Table of Depreciation for Construction Machineries", 2016 Edition)

Source: Preparatory survey team using the data locally collected.

The operation plans prepared for the transfer stations are compiled in the table below. The operation and maintenance costs estimated based on these plans are shown in Table 2-50.

Table 2-49: Operation plans prepared for the transfer stations for 2022

No.	Indicators	Unit	Transfer Stations				
			TS01_Aghwar Shamaliyah	TS02_Rabiet Al-Kura	TS03_Ajloun	TS09_Al Shoneh Al Wsta	TP03_Jerash
A	**Basic Indicators**						
1	Transport indicators:						
	DS of destination		Al Ekaider	Al Ekaider	Al Ekaider	New Dair Alla	Al Ekaider
	Distance	km	62	61	44	34	56
	Trip length	km/trip	124	122	88	68	112
2	Time indicators:						
	Working days per week	days	6	6	6	6	6
	Trailer/Container loading time	hour/trailer	1:00	1:00	1:00	1:00	0:40
	Movement time	hour/trip	3:32	3:29	2:30	1:56	3:12
	Trip time	hour/trip	4:32	4:29	3:30	2:56	3:52
	Shift work hours	hour/shift	8:00	9:00	8:00	8:00	8:00
4	Capacity Indicators:						
	Trailer capacity	m^3	50.0	50.0	50.0	50.0	35.0
	Amount per trip	ton/trip	23.0	23.0	23.0	23.0	20
	Conductable trips by 1 driver	trip/prsn/shift	1	2	2	2	2
B	**Plan of Operation**						
5	Volume of Work:						
	Waste to transfer	ton/day	78.0	302.0	302.0	91.0	298.0
	Number of trips	trips/day	4	14	14	4	15
6	Required Equipment:						
	Compaction unit	unit	1	1	1	1	1

	Trailer head/Arm-roll truck	unit	4	5	4	3	6
	Trailer/Container	unit	4	5	4	3	6
7	Labour:						
	Number of shifts	num	1	2	2	1	2
	Compaction unit operator	prsn	1	2	2	1	2
	Driver	prsn	4	7	7	2	8
8	Operation hours:						
	Facility operation hours	hours	8:00	18:00	16:00	8:00	16:00
	Total compaction unit operation hours	unit*hour	4:00	14:00	14:00	4:00	10:00

Source: Preparatory survey team using the data locally collected.

Table 2-50: O & M costs of waste transfer equipment in 2022

No.	Indicators	Unit	Transfer Stations				
			TS01_Aghwar Shamaliyah	TS02_Rabiet Al-Kura	TS03_Ajloun	TS09_Al Shoneh Al Wsta	TP03_Jerash
A	**Basic indicators:**						
1	Operation days in a week	days	6	6	6	6	6
2	Number of weeks in a year	weeks	52	52	52	52	52
3	Waste to transfer	ton/year	24,336.0	94,224.0	94,224.0	28,392.0	92,976.0
B	**Cost breakdowns:**						
1	Compaction unit operation cost:						
a	Electricity cost	JD/day	41.76	146.16	146.16	41.76	104.40
b	Maintenance cost	JD/day	27.79	27.79	27.79	27.79	77.51
c	Operator wage	JD/day	18.03	36.06	36.06	18.03	36.06
	Total compaction unit operation cost	**JD/day**	**87.58**	**210.01**	**210.01**	**87.58**	**217.97**
2	Transportation cost:						
a	Fuel cost	JD/day	143.84	495.32	357.28	78.88	487.20
b	Lubricants cost:	JD/day	27.04	89.44	64.48	14.56	87.36
c	Truck maintenance cost	JD/day	20.60	25.75	20.60	15.45	54.06
d	Trailer maintenance cost	JD/day	33.72	42.15	33.72	25.29	7.56
e	Drivers wages	JD/day	81.00	141.75	141.75	40.50	162.00
f	Other costs	JD/day	9.84	12.30	9.84	7.38	14.76
	Total transportation cost	**JD/day**	**316.04**	**806.71**	**627.67**	**182.06**	**812.94**
C	**Totals:**						
1	Daily operation cost	JD/day	403.62	1,016.72	837.68	269.64	1,030.91
2	Weekly operation cost	JD/week	2,421.72	6,100.32	5,026.08	1,617.84	6,185.46
3	Annual operation cost	JD/year	125,929.44	317,216.64	261,356.16	84,127.68	321,643.92
4	Unit cost	JD/ton	5.17	3.37	2.77	2.96	3.46

Source: Preparatory survey team using the data locally collected.

2) Estimation of Additional Budgets to be Allocated to the Transfer Stations in 2022

As the amounts of operational inputs (numbers of equipment and workers) to be used for daily operations of the target transfer stations increase after the implementation of the Project, the additional budgets that Ministry of Municipal Affairs (MOMA) will have to allocate in 2022 to the

facilities have been calculated as shown in Table 2-51.

The operation and maintenance costs required for the target transfer stations in 2017 and 2022 are calculated as 484,000 JD/year and 1,110,000 JD/year, respectively, as indicated in the table below. The cause of the increase is that the waste amount to be treated at the transfer stations will increase by three times to 1,073 tons/year in 2022 from 374 tons/year in 2017. MOMA will be required to allocate an additional 626,000 JD/year in 2022, while the budget allocated for the target JSC from MOMA increased by 47.9% in 2015.

Table 2-51: Estimation of additional budgets for operation and maintenance of the waste transfer equipment in 2022

No	Items		Unit	Transfer Stations									
				TS01_Aghwar Al Shamaliyah		TS02_Rabiet Al-Kura		TS03_Ajloun		TS09_Al Shoneh Al-Wsta		TP03_Jerash	
1	Estimation of additional inputs												
a	Inputs necessary for future daily operation (2022):												
	Trucks		num	4		5		4		3		6	
	Trailers		num	4		5		4		3		6	
	Drivers		prsn	4		7		7		2		8	
b	Inputs of current daily operations (2017):												
	Trucks		num	2		2		2		1		0	
	Trailers		num	2		2		2		1		0	
	Drivers		prsn	4		4		4		2		0	
c	Additional inputs:			**num**	**share**	**num**	**share**	**num**	**share**	**num**	**share**	**num**	**share**
	Trucks			2	50.0%	3	60.0%	2	50.0%	2	66.7%	6	100.0%
	Trailers			2	50.0%	3	60.0%	2	50.0%	2	66.7%	6	100.0%
	Drivers			0	0.0%	3	42.9%	3	42.9%	0	0.0%	8	100.0%
2	Daily transportation costs and additional operation costs			**Total**	**Additional**	**Total**	**Additional**	**Total**	**Additional**	**Total**	**Additional**	**Total**	**Additional**
	Fuel cost	Truck cost	JD/day	143.84	71.92	495.32	297.19	357.28	178.64	78.88	52.59	487.20	487.20
	Lubricants cost	Truck cost	JD/day	27.04	13.52	89.44	53.66	64.48	32.24	14.56	9.71	87.36	87.36
	Truck maintenance cost	Truck cost	JD/day	20.60	10.30	25.75	15.45	20.60	10.30	15.45	10.30	54.06	54.06
	Trailer maintenance cost	Trailer cost	JD/day	33.72	16.86	42.15	25.29	33.72	16.86	25.29	16.86	7.56	7.56
	Total labour cost	Driver cost	JD/day	81.00	0.00	141.75	60.75	141.75	60.75	40.50	0.00	162.00	162.00
	Total other cost	Truck cost	JD/day	9.84	4.92	12.30	7.38	9.84	4.92	7.38	4.92	14.76	14.76
	Total daily transportation and additional operation costs		**JD/day**	**316.04**	**117.52**	**806.71**	**459.72**	**627.67**	**303.71**	**182.06**	**94.38**	**812.94**	**812.94**
3	Compaction unit operation cost		JD/day	87.58	0.00	210.01	0.00	210.01	0.00	87.58	0.00	217.97	217.97
4	Additional budgets to be allocated to TSs												
	Daily amount		JD/day	117.52		459.72		303.71		94.38		1,030.91	
	Weekly amount		JD/week	705.12		2,758.32		1,822.26		566.28		6,185.46	
	Annual additional amount		JD/year	36,666		143,433		94,758		29,447		321,644	
5	Annual operation cost in 2022		JD/year	125,929		317,217		261,356		84,128		321,644	
	Annual operation cost in 2017		JD/year	89,263		173,784		166,599		54,681		0	

Annual Operation Cost in 2022: 1,110,274 Additional Cost in 2022: 625,947 Annual Operation Cost in 2017 484,327

(2) Final Disposal Sites (DS)

1) Operation and Maintenance Costs of Disposal Site Equipment

A similar method was applied in the estimation of costs necessary for operation and maintenance of the disposal site equipment in 2022.

Table 2-52 and Table 2-53 show technical specifications and unit prices, and depreciation indicators and treatment capacity of the equipment used in the preparation of waste disposal operation plans and the estimation of the O&M costs for the target disposal sites.

Table 2-52: Technical specifications and unit prices used in the preparation of the operation plans and estimation of the O&M costs (Disposal site equipment)

No.	Items	Unit	Values	Note
a	General			
1	Inflation rate	per cent	4.4%	Average value for the past 5 years (from 2011 to 2015), Central bank of Jordan
2	Currency exchange rate	JD=JPY	163.09	JICA rate for Feb 2017
b	Wages:			
3	Operator of heavy equipment	JD/day	20.40	510 JD/prsn/month; working days=25 days/month (Results of interview surveys with JSCs)
4	Driver of dump truck	JD/day	17.44	Adopted average salary of JSCs (Financial Reports of JSCs for 2015); 436 JD/prsn/month; working days=25 days/month
c	Consumption of fuel and lubricants:			
5	Bulldozer	liter/kWh	0.153	MAFF, "Cost estimation standard for land improvement project", Table-6: Fuel consumption per operational hour, 2016 (source: MAFF website: http://www.maff.go.jp/j/nousin/sekkei/h200331/, accessed on 25 Feb 2017)
6	Excavator	liter/kWh	0.153	
7	Dump truck	liter/kWh	0.085	
8	Lubricant/Fuel ratio	per cent	5.0%	Consumption of lubricants equals to 5% of fuel consumption (Results of interviews with JSCs)
d	Prices/Unit costs:			
9	Fuel	JD/liter	0.48	Market price in Jordan (surveyed on 20 Feb 2017)
10	Lubricant	JD/liter	1.68	Market price of engine oil (surveyed on 20 Feb 2017); 350 JD/barrel; 1 barrel=208 liter
11	Registration fee:			
	Bulldozer	JD/unit/year	600.000	Results of the preliminary survey
	Excavator	JD/unit/year	600.000	Results of the preliminary survey
	Dump truck	JD/unit/year	600.000	Results of the preliminary survey
12	Annual insurance:			
	Bulldozer	JD/unit/year	300.000	Results of the preliminary survey
	Excavator	JD/unit/year	300.000	Results of the preliminary survey
	Dump truck	JD/unit/year	300.000	Results of the preliminary survey

Source: Preparatory survey team using the data locally collected.

Table 2-53: Depreciation indicators and treatment capacity of disposal site equipment

1 Bulldozer

Equipment weight (ton)	Class (ton)	Engine power (kW)	Price (yen)*1	Price (JD)	Period of utilization (year)	Lifetime maintenance cost factor (%)	Daily maintenance cost (JD/day)	Max. leveling volume (m3/day)*2	Max. leveling volume (m3/hr)
10-12	11	78	11,100,000	68,059	12.5	25.0%	3.73	570	81
27-34	28	178	26,932,000	165,133	11.5	45.0%	17.70	1,300	186

Source: Japan Construction Machinery and Construction Association, "Table of Depreciation for Construction Machineries", 2016 Edition

Note: (1) Unit Price for 28t is the results of the preliminary survey; (2) Adopted from the Equipment Plan prepared for the Project.

2 Excavator

Backet capacity: Heap/Flat (m3)	Adopted bucket capacity (m3)	Engine power (kW)	Price (yen)*1	Price (JD)	Period of utilization (year)	Lifetime maintenance cost factor (%)	Daily maintenance cost (JD/day)	Max. excavation volume (m3/day)*2	Max. excavation volume (m3/hr)
0.6/0.5m3	0.5	74	11,089,000	67,992	9.0	35.0%	7.24	200	29
1.0/0.7m3	0.7	116	12,933,000	79,298	9.0	35.0%	8.45	300	43

Source: Japan Construction Machinery and Construction Association, "Table of Depreciation for Construction Machineries", 2016 Edition

Note: (1) Unit prices are the results of the preliminary survey; (2) Max excavation volumes are adopted from the Equipment Plan prepared for the project.

3 Dump truck

Payload (ton)	Amount of soil per trip (m3)*	Engine power (kW)	Standard price (yen)*1	Standard price (JD)	Period of utilization (year)	Lifetime maintenance cost factor (%)	Daily maintenance cost (JD/day)	Number of trips per hour*	Amount of soil per hour (m3/hr) Safety factor=1.2
9	6.0	165	8,770,000	53,773	10.0	45.0%	6.63	3	15.0
10.5	7.0	165	8,770,000	53,773	10.0	45.0%	6.63	3	18.0
12	8.0	179	9,630,000	59,046	10.0	45.0%	7.28	3	20.0
15	10.0	246	7,449,000	45,673	10.0	45.0%	5.63	3	25.0

Source: Japan Construction Machinery and Construction Association, "Table of Depreciation for Construction Machineries", 2016 Edition

Note: (1) Price for 10 m3 dump truck is the results of the preliminary survey, (2) Daily trips and Amount of soil per hour are adopted from the Equipment Plan.

Table 2-54 shows the waste disposal operation plans for the disposal sites prepared by the Survey Team for the year 2022. The indicators of the plans were estimated from the Waste Flow-2022 prepared by the Survey Team for the target area.

Based on these plans, the costs necessary for the operation and maintenance of the disposal site equipment in 2022 are estimated and the results are shown in Table 2-55.

Table 2-54: Waste disposal operation plans for 2022

No.	Indicators	Unit	Disposal Sites				
			Al Ekaider	Al Huseyneyat	Al Badiah Al Shamaliyah	Al-Duleil	New Dair Alla
1	Volume of Work:						
a	Waste to receive	ton/day	3239.0	663.0	84.0	317.0	337.0
b	Volume of waste	m3/day	8098.0	1658.0	210.0	793.0	843.0
c	Volume of soil:						
	Original	m^3/day	810.0	166.0	21.0	79.0	84.0
	Excavated	m^3/day	972.0	199.0	25.0	95.0	101.0
e	Levelling volume	m^3/day	9070.0	1857.0	235.0	888.0	944.0
2	Equipment Operation Hours:						
	Equipment operation hours	hour/unit/day	7:00	7:00	7:00	7:00	7:00
3	Equipment Plan:						
a	Equipment type:						
	Bulldozer	class=>	28 ton	28 ton	11 ton	28 ton	28 ton
	Excavator	bucket capacity=>	0.7 m^3	0.5 m^3	0.5 m^3	0.5 m^3	0.5 m^3
	Dump truck	payload=>	15 ton	15 ton	9 ton	9 ton	9 ton
b	Treatment capacity:						
	Bulldozer	m^3/unit/hour	186	186	81	186	186
	Excavator	m^3/unit/hour	43	29	29	29	29
	Dump truck	m^3/unit/hour	25	25	15	15	15
c	Number of required equipment						
	Bulldozer	unit/day	7	2	1	1	1
	Excavator	unit/day	3	1	1	1	1
	Dump truck	unit/day	6	2	1	1	1
4	Labour:						
	Bulldozer operator	prsn/day	7	2	1	1	1
	Excavator operator	prsn/day	3	1	1	1	1
	Dump truck driver	prsn/day	6	2	1	1	1
5	Equipment Operation Indicators:						
a	Daily operation hours:						
	Bulldozer	machine*hour/day	49	14	7	7	7
	Excavator	machine*hour/day	21	7	7	7	7
	Dump truck	machine*hour/day	42	14	7	7	7
b	Total engine power:						
	Bulldozer	kWh/day	8,722	2,492	546	1,246	1,246
	Excavator	kWh/day	2,436	518	518	518	518
	Dump truck	kWh/day	10,332	3,444	1,155	1,155	1,155

Source: Preparatory survey team using the data locally collected.

Table 2-55: O&M costs of disposal site equipment in 2022

No.	Indicators	Unit	Disposal Sites				
			Al Ekaider	Al Huseyneyat	Al Badiah Al Shamaliyah	Al-Duleil	New Dair Alla
A	**Basic indicators:**						
1	Number of weeks in a year	weeks	52	52	52	52	52
2	Annual amount of waste	ton/year	1,010,568	206,856	26,208	98,904	105,144
B	**Breakdowns of daily operation costs:**						
1	Wages	JD/day	383	119	72	72	72
2	Fuel costs	JD/day	1,499	437	152	214	214
3	Lubricant costs	JD/day	268	79	27	37	37
4	Equipment maintenance costs	JD/day	227	67	22	39	39
5	Vehicle registration costs	JD/day	26	8	6	6	6
6	Vehicle insurance costs	JD/day	13	5	3	3	3
C	**Totals:**						
1	Daily operation cost	JD/day	2,416	715	282	371	371
2	Weekly operation cost	JD/week	14,496	3,575	846	1,855	1,855
3	Annual operation cost	JD/year	753,792	185,900	43,992	96,460	96,460
4	Unit cost	JD/ton	0.75	0.90	1.68	0.98	0.92

Source: Preparatory survey team using the data locally collected.

2) Estimation of Additional Budgets to be Allocated to the Disposal Sites in 2022

As the amounts of operational inputs (numbers of equipment and workers) to be used for daily operations of the disposal sites increase after the implementation of the Project, the additional budgets that Ministry of Municipal Affairs (MOMA) will have to allocate in 2022 to the facilities have been calculated as shown in Table 2-57.

The operation and maintenance costs required for the equipment to be procured for the target disposal sites in 2017 and 2022 are calculated as 522,000 JD/year and 1,176,000 JD/year respectively as indicated in the table below. The cause of the increase is that the waste amount to be disposed at the transfer stations will be approximately doubled to 3,977 tons/year in 2022 from 2,211 ton/year in 2017. MOMA will be required to allocate an additional 654,000 JD/year in 2022.

The total income of the target eight JSCs was 6.78million JD in 2015 as indicated in the table below, and 90% of it is subsidized by MOMA. As described earlier, the additional operation and maintenance costs required for the equipment for the transfer stations and the equipment for the disposal sites to be procured under the Project will be 626,000 JD/year and 654,000 JD/year, respectively, and the total of these will be 1,280,000 JD/year. Since 90% of the budget of the JSCs in 2015 was subsidies from MOMA, the additional budget in 2020 can be allocated by increasing the subsidies from MOMA by 20% from 2015, which is considered possible.

The subsidies from MOMA to the eight target JSCs increased by about 50% when comparing 2014 to 2015. The allocation of an additional 1.28 million JD/year budget from MOMA, which is necessary for the operation and maintenance of equipment to be procured in the Project, was agreed to by MOMA and seems to be a non-issue. In addition, MOMA has stated that it will preferentially allocate financial support by the EU (€ 100 million in total) to the JSCs responsible for the operation and maintenance of the Project.

Table 2-56: Income of the target JSCs (2015, thousand JD)

JSC / Items	Aghwar Shamaliyah JSC JSC	Rabiet Al-Kura JSC	Ajloun JSC	Irbid JSC	Mmafraq JSC	Al Badiah Al Shamaliyah JSC	Zarqa JSC	Al Shoneh Al Wsta JSC	Target area total	
									JD	Revenue formation (%)
MOMA subsidies	440.5	142.7	378.1	3,396.5	621.5	201.3	574.8	294.0	6,049.4	89.5
Payment from municipalities	1.5	20.2	0.0	120.8	5.0	2.0	6.5	4.0	160.0	2.4
Payment from businesses	0.0	0.0	0.0	191.6	37.0	17.9	117.6	6.5	370.6	5.5
Other income	12.1	0.0	1.1	65.4	88.2	4.5	5.5	1.8	178.6	2.6
Total income	**454.1**	**162.9**	**379.2**	**3,774.3**	**751.7**	**225.7**	**704.4**	**306.3**	**6,758.6**	**100.0%**

Source: Financial report of each JSC

Table 2-57: Estimation of additional budgets for operation and maintenance of the disposal site equipment in 2022

	Indicators	Unit	DS02_Al Ekaider			DS05_Al Huseyneyat			DS06_Al Badiah Al Shamaliyah			DS07_Al Duleil			DS09_New Dair Alla		
			2022 input	2017 input	Additonal Input	2022 Input	2017 Input	Additonal Input	2022 Input	2017 Input	Additonal Input	2022 Input	2017 Input	Additonal Input	2022 Input	2017 Input	Additonal Input
			(1)	(2)	(3)=(1)-(2)	(1)	(2)	(3)=(1)-(2)	(1)	(2)	(3)=(1)-(2)	(1)	(2)	(3)=(1)-(2)	(1)	(2)	(3)=(1)-(2)
1	Amount of Operational Inputs:																
	Bulldozer	units	7	3	4	2	1	1	1	1	0	1	1	0	1	0	1
	Excavator	units	3	0	3	1	0	1	1	0	1	1	1	0	1	0	1
	Dump truck	units	6	3	3	2	1	1	1	1	0	1	1	0	1	1	0
	Bulldozer operator	prsn	7	3	4	2	1	1	1	1	0	1	1	0	1	0	1
	Excavator operator	prsn	3	0	3	1	0	1	1	0	1	1	1	0	1	0	1
	Dump truck driver	prsn	6	3	3	2	1	1	1	1	0	1	1	0	1	1	0
2	Operation Costs:																
	Wages	JD/day	383.0	140.9	242.1	119.0	47.0	72.0	72.0	47.0	25.0	72.0	72.0	0.0	72.0	22.0	50.0
	Fuel costs	JD/day	1,499.0	586.2	912.8	437.0	195.5	241.5	152.0	106.0	46.0	214.0	214.0	0.0	214.0	57.0	157.0
	Lubricant costs	JD/day	268.0	101.3	168.8	79.0	31.6	47.4	27.0	18.0	9.0	37.0	37.0	0.0	37.0	12.3	24.6
	Equipment maintenance costs	JD/day	227.0	87.0	140.0	67.0	29.0	38.0	22.0	13.0	9.0	39.0	39.0	0.0	39.0	8.0	31.0
	Vehicle registration costs	JD/day	26.0	9.7	16.3	8.0	3.0	5.0	6.0	4.0	2.0	6.0	6.0	0.0	6.0	2.0	4.0
	Vehicle insurance costs	JD/day	13.0	5.1	7.9	5.0	2.0	3.0	3.0	2.0	1.0	3.0	3.0	0.0	3.0	1.0	2.0
	Total	JD/day	2,416.0	930.2	1,487.9	715.0	308.1	406.9	282.0	190.0	92.0	371.0	371.0	0.0	371.0	102.3	268.6
3	Time indicators:																
	Weekly operation days	days/week			6			5			3			5			5
	Number of weeks	weeks/year			52			52			52			52			52
4	**Amount of Additional Budgets in 2022:**																
	Weekly amount	JD/week			8,927			2,035			276			0			1,343
	Monthly amount	JD/month			38,685			8,816			1,196			0			5,820
	Annual amount	JD/year			464,225			105,794			14,352			0			69,836
5	Annual Operation Cost in 2022	JD/year			753,792			185,900			43,992			96,460			96,460

Chapter 3 Project Evaluation

3-1 Preconditions

This project is for procurement of equipment and it will not require land acquisition, or obtainment of construction permits or Environmental Impact Assessments (EIA). Customs clearance, tax exemption procedure, and other obligations of the recipient country are described in 2-3.Obligation of Recipient Country

3-2 Necessary Inputs by Recipient Country

1) Assignment of Human Resources and Cost for Operation and Maintenance

New drivers and/or operators must be employed for the equipment additionally procured unlike the equipment for replacement. Similarly, extra budgetary resources must be allocated for operation and maintenance of additional equipment.

2) Coordination with Other Donors

In the target area of the Project, donor agencies are actively implementing aid projects for the solid waste management sector. As the Project only provides equipment, coordination with other donors' projects is highly important for its effective use.

3-3 Important Assumptions

1) No change in waste management policy of the Government of Jordan

The waste management policy of the government of Jordan is expressed in the National Solid Waste Management Strategy approved in September 2015. This policy should not be changed.

2) The municipalities and JSCs continue to provide waste management service

In the target area of the Project, the municipalities and the JSCs (Joint Services Councils) are responsible for solid waste management. Moreover, the municipalities are responsible for waste collection and transportation while the JSCs are responsible for the operation of transfer stations (except for Al Shoneh Al-Wsta transfer station) and final disposal sites. Such a management structure should not be changed.

3-4 Project Evaluation

3-4-1 Relevance

Based on the results of the survey, the relevance of the implementation of the Project by grant aid is high for the following reasons.

1) The beneficiaries of the Project are all the people living in the target area including the Syrian refugees and the socially vulnerable groups. This is a significantly large number of people.

The tables below show the number of municipalities, which are the users of the transfer stations and final disposal sites to be covered by the Project, and the number of people (population) who live in those municipalities and will enjoy the benefits of the Project as of 2022, the target year of the Project. Since all the waste to the five target transfer stations goes to any of the five target final disposal sites, the total beneficiary population is 3,560,822 (including 347,985 Syrian refugees), which is significantly large. Out of this number, the beneficiaries of both transfer stations and final disposal sites is 821,227 (including 27,307 Syrian refugees) and that of only final disposal sites is 2,739,595 (including 320,678 Syrian refugees).

Table 3-1: The Number of User Municipalities of Target Transfer Stations and the Number of Beneficiaries

Target Transfer Stations		Number of User Municipalities	Beneficiaries	Syrian refugees
TS01	Aghwar Shamaliyah TS	1	58,895	266
TS02	Rabiet Al-Kura TS	4	227,457	6,375
TS03	Ajloun TS	6	230,753	10,154
TS09	Al Shoneh Al-Wsta TS	2	69,101	1,335
TP03	Jerash TS	4	235,021	9,177
Total		**17**	**821,227**	**27,307**

Source: Preparatory survey team using the data locally collected.

Table 3-2: The Number of User Municipalities of Target Final Disposal Sites and the Number of Beneficiaries

Target Final Disposal Sites		Number of Users	Beneficiaries	Syrian refugees
DS02	Al Ekaider DS	18 Municipalities and 4 TS (13 Municipalities)	2,449,512	181,913
DS05	Al Huseyneyat DS	8 Municipalities	551,797	147,324
DS06	Al Badiah Al Shamaliyah DS	4 Municipalities	66,515	6,528
DS07	Al-Duleil DS	4 Municipalities	237,268	8,848
DS09	New Dair Alla DS	3 Municipalities and 1 TS (2 Municipalities)	255,730	3,372
Total		**52 Municipalities**	**3,560,822**	**347,985**

Source: Preparatory survey team using the data locally collected.

In the M/Ps of solid waste management for the northern and central regions, the waste collection rate is planned to be 100 % in 2024, and therefore the calculation above is based on this plan. The beneficiaries are all the citizens including the Syrian refugees and the poor. Since the Project improves the waste transfer and transportation capacity of the transfer stations, 17 municipalities, which are far from the final disposal sites, will be able to cut waste collection and transportation cost, and instead, allocate the budget to enhance their waste collection service even in the poor communities.

2) The Project will meet the pressing needs for the improvement of daily lives and living conditions.

According to the national census in 2015, Jordan's total population is 9,531,712, of which 30% or 2,918,125 people are non-Jordanians mostly consisting of refugees from Palestine, Iraq and Syria. Due to the outbreak of the Syrian crisis in March 2011, a number of Syrian refugees have entered Jordan. As of March 2017, the Syrian refugees registered at UNHCR (United Nations High Commissioner for Refugees) of Jordan total about 660,000 people. This is the third highest number of Syrian refugees accepted by a country, behind Turkey and Lebanon.

About 80% of Syrian refugees in Jordan live outside of camps as city-dwelling refugees. Most city-dwelling refugees stay in the capital and the northern area. With the increase of refugees, it has been getting difficult for those refugee hosting areas to provide social services such as education and healthcare. Also, due to the increase of waste amount together with the insufficient number and deterioration of waste collection vehicles, the capacity of waste collection, treatment and final disposal have become insufficient. This is causing illegal waste dumping, inappropriate waste treatment and open burning, and further leading to environmental problems and insanitary conditions.

The Project meets such urgent development needs for the improvement of daily lives and living

conditions.

3) The Project contributes to the accomplishment of mid-term and long-term developmental objectives of Jordan.

The next 10-year national policy is the Jordan National Vision and Strategy 2025, where the scenarios and performance target indicators of solid waste management are stated under the subject of environmental policy goals. The Project contributes to the achievement of Jordan National Vision and Strategy 2025, aiming to improve the collection of waste generated in the living environment and dispose of it in a proper manner.

Further, MOMA formulated the National Solid Waste Management Strategy (NSWMS), which was nationally approved in September 2015. The overall goal of NSWMS is to achieve a modern and integrated municipal solid waste management system that will be based on the 3Rs approach. The time frame, from the present to the target year of 2034, is divided into three terms, namely short-term, mid-term and long term, with objectives outlined for each term. It also sets out eleven policies under which necessary measures are proposed. The first policy "Serving the emergency MSWM needs of Jordanian societies due to the influx of refugees from the neighboring countries" encourages five short-term (2015-2019) actions. Action 2 "Procurement of final disposal equipment for the municipalities and JSCs" and Action 3 "Improvement and/or new construction of transfer stations" are fully fit with the components of the Project.

4) The Project is consistent with the policy direction of official assistance of the Government of Japan for Jordan.

Country development assistance policy for Jordan, formulated by the government of Japan in July 2017, states that the assistance to Jordan has two significant meanings: the contribution to the regional stability that Jordan has been playing an important role in and contribution to the friendly relationship between the two countries since the establishment of diplomatic ties. It also shows the basic assistance policy "Maintenance of Stability and Development of Industrial Basis" and three pillars of priority. Under one of the pillars, "Regional Stability", the rolling plan, annex to the country assistance policy, lists cooperation programs including a stability promotion program, with the following objective: "to contribute to Jordan's stability through the assistance to Syrian refugees and local communities hosting Syrian refugees".

Accordingly, the Project adequately complies with the official assistance policy directions of Japan for Jordan.

3-4-2 Effectiveness

(1) Quantitative Effect

1) Increase of the MSW transfer/ transportation amount and sanitary final disposal amount

The municipal solid waste (MSW) transfer/ transportation amount and sanitary final disposal amount are expected to increase through implementation of the Project as indicated in the table below.

Table 3-3: Increase of MSW transfer/ transportation amount and final disposal amount

Indicators	Reference Value Note 3 (2017)	Target Value Note4 (2022) 【3 years after the Project completion】
MSW transfer/ transportation amount Note 1 (ton/day)	374	1,073
Sanitary Final disposal amount Note 2 (ton/day)	2,211	3,977

Note 1: MSW transfer/ transportation amount: The reference value is the MSW transfer and transportation amount of the existing 4 transfer stations (TSs), and the target value includes the amount of Jerash new TS in addition to the existing 4 TSs. The MSW transfer/ transportation amount (indicator) will be measured by incoming MSW amount to the transfer stations.

Note 2: Sanitary final disposal amount: Both of the reference value and target one are the MSW sanitary disposal amount of the existing 5 final disposal sites (DSs). The MSW sanitary disposal amount of a DS is the incoming MSW amount to the DS and sanitary disposed (levelled, compacted and covered by soil) there.

Note 3: Reference value: The Project's target transfer stations and final disposal sites do not have corresponding data of the amount of incoming MSW to the facilities. Therefore, the reference value for the MSW transfer/ transportation amount has been estimated based on the result of questionnaire survey conducted with the 4 existing transfer stations by the Survey Team The reference value of the final disposal amount is a total of the estimated disposal amounts of Al Ekaider disposal site and Al Huseyneyat disposal site, which have been calculated similarly based on the result of the questionnaire survey with the two disposal sites where disposal is conducted in a sanitary manner as of February 2017.

Note 4: Target value: The target value is a total of the planned amounts of the facilities, and the target for transfer stations has been calculated with an assumption of 6 operating days a week, and the one for final disposal sites has been calculated with an assumption of 7 operating days a week.

2) Increase in Beneficiaries

a. Transfer Stations

The table below shows the transfer stations for which the Project procures equipment and the number of beneficiaries (population). Compared with the base year of 2017, the beneficiary population is estimated to increase by 456,420 by the target year.

Table 3-4: Increase of Beneficiaries of Transfer Stations after the Project

Target Transfer Stations		Beneficiaries (2017) Note 1	Beneficiaries (2022)	Increase of Beneficiaries after the Project
TS01	Aghwar Shamaliyah TS	91,082 Note 2	58,895	-32,187 Note 4
TS02	Rabiet Al-Kura TS	79,768 Note 3	227,457	147,689
TS03	Ajloun TS	143,875	230,753	86,878
TS09	Al Shoneh Al-Wsta TS	50,082	69,101	19,019
TP03	Jerash TS	0	235,021	235,021
Total		**364,807**	**821,227**	**456,420**

Source: Preparatory survey team using the locally collected data.

Note *1: Beneficiary population is considered to be 80% of the municipality population assuming that the waste collection service coverage is 80%.

Note *2: The current waste transfer capacity is assumed to be half of the waste that must be transferred. Accordingly, the beneficiary population is calculated to be 80**%**x50%=40% of the municipality population.

Note *3: The current waste transfer capacity is assumed to be 60% of the waste that must be transferred. Accordingly, the beneficiary population is calculated to be 80**%**x60%=48% of the municipality population.

Note *4: In 2017, five municipalities used TS01, but in 2022 only one municipality will use it according to the M/P.

b. Final Disposal Sites

The table below shows the final disposal sites for which the Project procures equipment and the number of beneficiaries (population). Compared with the base year of 2017, the beneficiary population is estimated to increase by 979,468 by the target year.

Table 3-5: Increase of Beneficiaries of Final Disposal Sites after the Project

Final Disposal Sites		Beneficiaries (2017) Note 1	Beneficiaries (2022)	Increase of Beneficiaries after the Project
DS02	Al Ekaider DS	1,840,767	2,449,512	608,745
DS05	Al Huseyneyat DS	405,914	551,797	145,883
DS06	Al Badiah Al Shamaliyah DS	42,822	66,515	23,693
DS07	Al-Duleil DS	171,962	237,268	65,306
DS09	New Dair Alla DS	119,890	255,730	135,840
合計		**2,581,354**	**3,560,822**	**979,468**

Source: Preparatory survey team using the locally collected data.

Note 1: Beneficiary population is considered to be 80% of the municipality population assuming that the waste collection service coverage is 80%.

3) Transportation Cost Reduction Effect using Transfer Stations

By comparing the cost for waste transportation from the municipalities to the final disposal sites (DS) at a distance of X km and the cost for waste transportation through the transfer stations (TS) with a total travel of Y+Z km, the cost reduction effect can be calculated. The result is shown below.

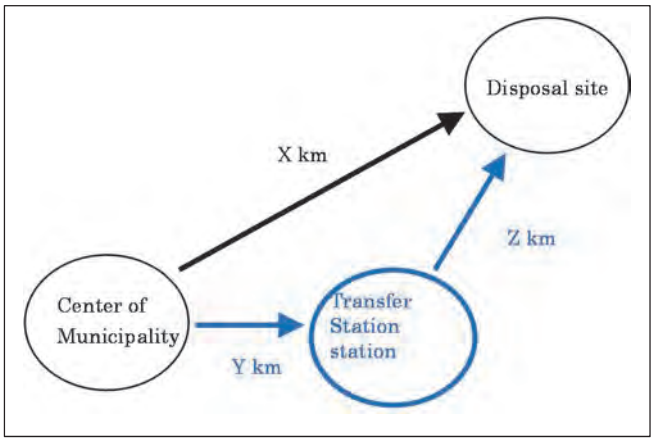


Table 3-6: Transportation Cost Reduction using Transfer Stations

TS01 Aghwar Al Sharmaliyah Transfer Station

No	Municipality	A. Distance from Municipality to DS X (km)	B. Distance from Municipality to TS Y (km)	C. Distance from TS to DS Z (km)	D. Cost for Transportation from Municipality to DS (JD/ton)	E. Cost for Transportation from Municipality to TS (JD/ton)	F. Cost for Transportation from TS to DS (JD/ton)	G. Amount of Incoming Waste (ton/day)	H. Transportation Cost Reduction (G x (D-(E+F)) JD/day)	Annual Cost Reduction
G1-02	Mo'az Bin Jabal	55.2	5.1	62	17.80	6.10	5.17	78.2	510.3	159,214

TS02Al-Kura Transfer Stations

No	Municipality	A. Distance from Municipality to DS X (km)	B. Distance from Municipality to TS Y (km)	C. Distance from TS to DS Z (km)	D. Cost for Transportation from Municipality to DS (JD/ton)	E. Cost for Transportation from Municipality to TS (JD/ton)	F. Cost for Transportation from TS to DS (JD/ton)	G. Amount of Incoming Waste (ton/day)	H. Transportation Cost Reduction (G x (D-(E+F)) JD/day)	
G1-04	Tabaket Fahil	67.6	14.5	61	21.00	8.50	3.37	58.3	532.5	
G1-07	Barkash	54.3	22.8	61	17.70	10.10	3.37	119.0	503.8	
G1-08	Deir Abi Said	52.5	7.5	61	17.60	6.70	3.37	63.0	474.6	
G1-09	Rabyet El Koora	44.4	11.8	61	16.00	8.10	3.37	61.8	280.2	
	Total							302.1	1791.1	558,823

TS03 Ajloun Transfer Station

No	Municipality	A. Distance from Municipality to DS X (km)	B. Distance from Municipality to TS Y (km)	C. Distance from TS to DS Z (km)	D. Cost for Transportation from Municipality to DS (JD/ton)	E. Cost for Transportation from Municipality to TS (JD/ton)	F. Cost for Transportation from TS to DS (JD/ton)	G. Amount of Incoming Waste (ton/day)	H. Transportation Cost Reduction (G x (D-(E+F)) JD/day)	
G2-01	Greater Ajloun	49.5	11.4	44	17.40	8.10	2.77	87.5	571.0	
G2-02	Junaid	37.4	5.5	44	15.10	6.70	2.77	46.7	262.7	
G2-03	Kafrangeh	55.5	17.4	44	18.70	9.40	2.77	57.2	373.3	
G2-04	Oyoon	41.6	6.4	44	16.80	7.20	2.77	32.7	223.2	
G2-05	Shafa	62.1	24.1	44	21.20	11.60	2.77	37.3	254.6	
	Total							261.4	1684.8	525,658

TS09 Al Shoneh Al Wsta Transfer Station

No	Municipality	A. Distance from Municipality to DS X (km)	B. Distance from Municipality to TS Y (km)	C. Distance from TS to DS Z (km)	D. Cost for Transportation from Municipality to DS (JD/ton)	E. Cost for Transportation from Municipality to TS (JD/ton)	F. Cost for Transportation from TS to DS (JD/ton)	G. Amount of Incoming Waste (ton/day)	H. Transportation Cost Reduction (G x (D-(E+F)) JD/day)	
G6-06	Al Shonen Al Wsta	32.4	2.5	34	12.70	5.70	2.96	84.0	339.1	
G6-09	Swaimah	53.9	22.8	34	23.20	13.20	2.96	7.0	49.3	
	Total							91.0	388.4	121,181

TP03 Jerash Transfer Station

No	Municipality	A. Distance from Municipality to DS X (km)	B. Distance from Municipality to TS Y (km)	C. Distance from TS to DS Z (km)	D. Cost for Transportation from Municipality to DS (JD/ton)	E. Cost for Transportation from Municipality to TS (JD/ton)	F. Cost for Transportation from TS to DS (JD/ton)	G. Amount of Incoming Waste (ton/day)	H. Transportation Cost Reduction (G x (D-(E+F)) JD/day)	
G3-01	Bab Amman	56.9	12.8	56	19.40	8.50	3.46	30.3	225.4	
G3-02	Burma	66.9	20.1	56	20.80	9.60	3.46	26.8	207.4	
G3-03	Greater Jerash	44.5	4.8	56	15.50	6.10	3.46	159.8	949.3	
G3-04	Me'raad	51.6	3.9	56	17.40	5.90	3.46	80.5	647.3	
G3-05	Nasim	35.1	14.5	56	13.00	8.50	3.46	40.8	42.5	
	Total							338.2	2071.9	646,433

The examination shown above is based on the following conditions.

- Transportation distance from the municipalities to the final disposal sites or transfer stations was given from the route searching function of Google Earth.
- Transportation distance from the transfer stations to the final disposal sites was also provided in the same manner.
- Waste transportation vehicles from the municipalities to the final disposal sites or transfer stations were assumed to have an average loading capacity of 10 m^3 or 4.6 tons.
- Waste transportation vehicles from transfer stations to final disposal sites were assumed to have a loading capacity of 23 tons in case of out-door type and 20 tons in case of in-door type.

These examinations can be summarized as shown in the table below. As a result of the Project, transportation costs can be reduced by 6,446 JD a day, or 2.01 million JD a year, in 2022.

Table 3-7: Transportation Cost Reduction using Transfer Stations (2022)

Target Transfer Stations		A. Amount of Waste Handled (ton/day)	B. Daily Transportation Cost Reduction (JD/day)	C. Annual Transportation Cost Reduction (JD/year)
TS01	Aghwar Shamaliyah TS	78	510	159,214
TS02	Rabiet Al-Kura TS	303	1,791	558,823
TS03	Ajloun TS	303	1,685	525,658
TS09	Al Shoneh Al Wsta TS	91	388	121,181
TP03	Jerash TS	298	2,072	646,433
Total		**1,073**	**6,446**	**2,011,309**

Note: Waste is collected six days per week. One year has 52 weeks.
Source: Preparatory survey team.

(2) Qualitative Effect

1) Transfer Stations

The following qualitative effects are expected through the equipment improvement at the transfer stations by the Project.

Table 3-8: Qualitative Effects to Transfer Stations by the Project

Target Transfer Stations		Qualitative Effects
TS01	Aghwar Shamaliyah TS	• The adjacent dumpsite, whose closure has been ordered, can be closed. • The closure of the adjacent dumpsite will improve the surrounding environment.
TS02	Rabiet Al-Kura TS	• There will be no need to dispose of waste at the adjacent dumpsite which has been closed. • The complete closure of the adjacent dumpsite will improve the surrounding environment. • The transfer station can be operated even in snow fall conditions in winter.
TS03	Ajloun TS	• Waste collection vehicles, which used to have to wait for waste unloading at the transfer station due to its insufficient operation capacity, will no longer waste time. • The user municipalities can improve their waste collection and transportation capacity and uncollected waste or illegally dumped waste will be reduced. • The transfer station can be operated even in snow fall conditions in winter.
TS09	Al Shoneh Al Wsta TS	• Waste collection vehicles, which used to have to wait for waste unloading at the transfer station due to its insufficient operation capacity, will no longer waste time. • The user municipalities can improve their waste collection and

		transportation capacity and uncollected waste or illegally dumped waste will be reduced.
TP03	Jerash TS	• The user municipalities can improve their waste collection and transportation capacity and uncollected waste or illegally dumped waste will be reduced.

Source: Preparatory survey team.

2) Final Disposal Sites

The following qualitative effects are expected through the equipment improvement at the transfer stations by the Project.

Table 3-9: Qualitative Effects to Final Disposal Sites by the Project

Target Final Disposal Sites		Qualitative Effects
DS02	Al Ekaider DS	• Since disposed waste will be adequately leveled and compacted, the lifetime of the final disposal sites can be extended. • Since soil cover operation will be properly conducted, negative effects to the surrounding area such as foul odor, littering and fire will be abated. • The final disposal site can be operated even in snow fall conditions in winter. • Washing the equipment for waste final disposal will deter degradation.
DS05	Al Huseyneyat DS	• Since disposed waste will be adequately leveled and compacted, the lifetime of the final disposal sites can be extended. • Since soil cover operation will be properly conducted, negative effects to the surrounding area such as foul odor, littering and fire will be abated. • The final disposal site can be operated even in snow fall conditions in winter. • Washing the equipment for waste final disposal will extend the service life of the equipment.
DS06	Al Badiah Al Shamaliyah DS	• Since soil cover operation will be properly conducted, negative effects to the surrounding area such as foul odor, littering and fire will be abated. • Washing the equipment for waste final disposal will extend the service life of the equipment.
DS07	Al-Duleil DS	• Spreading of insecticide will enable the control of pests. • Washing the equipment for waste final disposal will extend the service life of the equipment.
DS09	New Dair Alla DS	• Since disposed waste will be adequately leveled and compacted, the lifetime of the final disposal sites can be extended. • Since soil cover operation will be properly conducted, negative effects to the surrounding area such as foul odor, littering and fire will be abated. • Washing the equipment for waste final disposal will extend the service life of the equipment.

Source: Preparatory survey team.

[Appendices]

Contents of Appendices

A1 Members of Survey Team

(1) First Site Survey

JICA members : 10 February, 2017 ~ 21 February, 2017
Consultant members: 14 January, 2017 ~ 4 March, 2017

	Name	Assignment	Organization
1	Kazunao SHIBATA (Mr.)	Team Leader	Director, Environmental Management Team 2, Global Environment Department, Japan International Cooperation Agency (JICA)
2	Mitsuo YOSHIDA (Dr.)	Solid Waste Management Adivisor	Senior Advisor, Enviromemtal Management, JICA
3	Daichi BAN (Mr.)	Planning Management	Environmental Management Team 2, Global Environment Department, JICA
4	Susumu SHIMURA(Mr.)	Chief Consultant/ Solid Waste Management Planning 1	International Consulting Department, Kokusai Kogyo Co., Ltd. (KKC)
5	Hideo SATO (Mr.)	Deputy Chief Consultant/ Solid Waste Management Planning 2/ Procurement Planning / Cost Estimation/ Equipment Export and Import	International Consulting Department, KKC
6	Noriko OTSUKI (Ms.)	Legal System/Waste management Policy/Plan Analysis	International Consulting Department, KKC
7	Hiroshi FUJITA (Mr.)	Equipment Planning 1 (Waste Collection, Transportation and Transfer)	International Consulting Department, KKC
8	Tamotsu SUZUKI (Mr.)	Equipment Planning 2 (Waste Final Disposal)	International Consulting Department, KKC
9	BURNEEBAATAR Gantumur (Mr.)	Institutional System/Finance and Economy	International Consulting Department, KKC

(2) First Site Survey Additional 1

Consultant member: 10 April, 2017 ~ 19 April, 2017

	Name	Assignment	Organization
1	Susumu SHIMURA(Mr.)	Chief Consultant/ Solid Waste Management Planning 1	International Consulting Department, Kokusai Kogyo Co., Ltd. (KKC)

(3) First Site Survey Additional 2

Consultant member: 3 May, 2017 ~ 12 May, 2017

	Name	Assignment	Organization
1	Hideo SATO (Mr.)	Deputy Chief Consultant/ Solid Waste Management Planning 2/ Procurement Planning / Cost Estimation/ Equipment Export and Import	International Consulting Department, KKC

(4) Second Site Survey

JICA members: 18 August, 2017 ~ 26 August, 2017
Consultant members: 12 August, 2017 ~ 26 August, 2017

	Name	Assignment	Organization
1	Tsuyoshi YAMAMOTO	Team Leader	Deputy Direcotor, Envinronmental Management Team 2, Global Environment Department, Japan International Cooperation Agency (JICA)
2	Yuuma EGUCHI (Mr.)	Planning Management	Envinronmental Management Team 2, Global Environment Department, JICA
3	Susumu SHIMURA(Mr.)	Chief Consultant/ Solid Waste Management Planning 1	International Consulting Department, Kokusai Kogyo Co., Ltd. (KKC)
4	Hideo SATO (Mr.)	Deputy Chief Consultant/ Solid Waste Management Planning 2/ Procurement Planning / Cost Estimation/ Equipment Export and Import	International Consulting Department, KKC

A2 Survey Schedule

(1) First Site Survey

	Date	Day	JICA			Member of Consultants					
			Team Leader	Planning Management	SWM Advisor	Chief Consultant/ SWM Planning 1	Vice Chief Consultant/ SWM & Procurement Planning 2 & Cost Estimation	Legal System/ SWM Policy & Plan Analysis	Equipment Planning 1 (Collection & Transfer Station)	Equipment Planning 2 (Final Disposal Site)	Institutional System/ Finance & Economy
			Kazunao SHIBATA	Daichi BAN	Mitsuo YOSHIDA	Susumu SHIMURA	Hideo SATO	Noriko OTSUKI	Hiroshi FUJITA	Tamotsu SUZUKI	Gantumur Burneebaatar
1	14-Jan	Sat				Travelling (Tokyo → Amman)		Travelling (Osaka → Amman)		Travelling (Tokyo → Amman)	
2	15-Jan	Sun				Discussion of IC/R				Discussion of IC/R	
3	16-Jan	Mon				Meeting with Relevant Organization				Meeting with Relevant Organization	
4	17-Jan	Tue				Team Meeting				Team Meeting	
5	18-Jan	Wed				Data Compilation				Data Compilation	
6	19-Jan	Thu				Meeting with Relevant Organizations				Meeting with Relevant Organizations	
7	20-Jan	Fri				Field Survey		Legal System & SWM Policy Survey		Field Survey	
8	21-Jan	Sat				Data Compilation				Data Compilation	
9	22-Jan	Sun							Travelling (Tirana →Amman)		
10	23-Jan	Mon				Field Survey		Meeting with Donors	Field Survey on Equipment	Field Survey (Disposal sites)	Financial Survey
11	24-Jan	Tue									
12	25-Jan	Wed						Travelling (Amman → Osaka)			
13	26-Jan	Thu				Data Compilation			Data Compilation		
14	27-Jan	Fri				SWM Policy Study	Cost Estimation		Field Survey on Equipment	Field Survey (Tranfer stations)	Financial Survey
15	28-Jan	Sat					Equipment Market Survey		Equipment Market Survey		
16	29-Jan	Sun									
17	30-Jan	Mon				Data Compilation			Data Compilation		
18	31-Jan	Tue									
19	1-Feb	Wed									
20	2-Feb	Thu									
21	3-Feb	Fri									
22	4-Feb	Sat									
23	5-Feb	Sun									
24	6-Feb	Mon									
25	7-Feb	Tue									
26	8-Feb	Wed									
27	9-Feb	Thu									
28	10-Feb	Fri	Travelling（Tokyo→Amman）			Data Compilation			Data Compilation		
29	11-Feb	Sat			Travelling						
30	12-Feb	Sun	Discussion of Content of the Works (MOMA, UE, UNDP)								
31	13-Feb	Mon	Site Visits								
32	14-Feb	Tue	Consensus on Priority for Equipment Supply								
33	15-Feb	Wed	EU Workshop			EU Workshop	Market Survey				
34	16-Feb	Thu	Site Visits			Site Visits					
35	17-Feb	Fri	Compilation of Minutes of Discussions (M/D)			Data Compilation			Data Compilation		
36	18-Feb	Sat									
37	19-Feb	Sun	Signing of M/D			Signing of M/D					
38	20-Feb	Mon	Travelling（Amman → Tokyo）			Formulation of Basic Plan	Drafting Procurement Plan		Accompanying Chief Consultant	Examination of Equipment Plan	Field Survey (Disposal Site)
39	21-Feb	Tue								Drafting Procurement Plan	Estimation of O&M Cost
40	22-Feb	Wed				Team Meeting on Procurement Plan			Drafting Procurement Plan		
41	23-Feb	Thu							Team Meeting on Procurement Plan		
42	24-Feb	Fri				Data Compilation			(Amman→ Tirana)	Data Compilation	
43	25-Feb	Sat				Team Meeting				Team Meeting	
44	26-Feb	Sun				Formulation of Basic Plan	Drafting Procurement Plan			Travelling (Amman → Tokyo)	
45	27-Feb	Mon									
46	28-Feb	Tue				Financial Analysis Meeting on Procurement Plan					
47	1-Mar	Wed									
48	2-Mar	Thu				Explanation of Survey Results					
49	3-Mar	Fri									
50	4-Mar	Sat				Travelling (Amman → Tokyo)					

(2) First Site Survey Additional 1

	Date	Day	Member of Consultants
			Chief Consultant /SWM Planning 1
			Susumu SHIMURA
1	10-Apr	Mon	Travel (Tokyo→Amman)
2	11-Apr	Tue	Discussion with JICA
3	12-Apr	Wed	Discussion with UNDP
4	13-Apr	Thu	Discussion with MOMA, UNDP
5	14-Apr	Fri	Data compilation
6	15-Apr	Sat	Data compilation
7	16-Apr	Sun	Discussion with JICA
8	17-Apr	Mon	Discussion with UNDP, Field Survey
9	18-Apr	Tue	Discussion with JICA
10	19-Apr	Wed	Travel (Amman→Tokyo)

(3) First Site Survey Additional 2

	Date	Day	Member of Consultants
			Deputy Chief Consultant/ SWM Planning 2/ Procurement Planning / Cost Estimation/ Equipment
			Hideo SATO
1	3-May	Wed	Travel (Tokyo→Amman)
2	4-May	Thu	
3	5-May	Fri	Data compilation
4	6-May	Sat	Data compilation
5	7-May	Sun	Discussion with JICA, UNDP
6	8-May	Mon	Discussion with UNDP
7	9-May	Tue	Discussion with UNDP
8	10-May	Wed	Discussion with UNDP
9	11-May	Thu	Travel (Amman→Tokyo)
10	12-May	Fri	

(4) Second Site Survey

	Date	Day	JICA		Consultants	
			Team Leader	Planning Management	Chief Consultant /SWM Planning 1	Deputy Chief Consultant/ SWM Planning 2/ Procurement Planning / Cost Estimation/ Equipment Export & Import
			Tsuyoshi YAMAMOTO	Yuma EGUCHI	Susumu SHIMURA	Hideo SATO
1	12-Aug	Sat			Travel (Tokyo→Amman)	
2	13-Aug	Sun			Disc. On technical notes with UNDP	
3	14-Aug	Mon			Compilation of Data	
4	15-Aug	Tue			Discussion with JICA	
5	16-Aug	Wed			Preparation of Report	
6	17-Aug	Thu			Discussion with UNDP	
7	18-Aug	Fri	Travel (Tokyo→Amman)		Compilation of Data	
8	19-Aug	Sat			Compilation of Data	
9	20-Aug	Sun	Explanation of draft report and M/D			
10	21-Aug	Mon	Discussion on M/D			
11	22-Aug	Tue	Discussion on M/D, courtesy call to MOPIC, Disc. with UNDP		Discussion on M/D, Disc. w/ UNDP	
12	23-Aug	Wed	Site visits			Compilation of Data
13	24-Aug	Thu	Site visit, debriefing to EOJ		Site visit	
14	25-Aug	Fri	Travel (Amman→Tokyo)			
15	26-Aug	Sat				

A3 List of Parties Concerned in the Recipient Country

Name	Designation
【MOMA: Ministry of Municipal Affairs】	
Mr. Walid Muhyddin Al Masri	Minister of Municipal Affairs
Eng. Hussain Mhaidat	Director of local councils/ Chairman of the Technical Committee to follow up the implementation of the NS for MSWM
Dr. Mohamed CHERIF	Resident Technical Assistant
Mr. Basem Saaydeh	Local Governance Specialist (LGS)
【EU: European Union】	
Mr. Mauro GIOE	Water and Solid Waste Management
Mr. Ibrahim LAAFIA	First Counsellor, Head of Cooperation
【UNDP: United Nations Development Programme】	
Mr. Murad Al-Shishani	Project Officer
Mr. Ghimar Deeb	Technical Specialist
Mr. Salam F. Al-Twal	Senior Municipal Specialist
Mr. Botros Hijazeen	Civil Engineer , PMP, ACIArb
【AFD: Agence Française de Développement】	
Mr. Serge SNRECH	Director
Mr. Samuel Lefevre	Head of Mission
Mr. Alexandra Monteiro	Project Manager Division
【LDK】	
Mr. Constantinos Nicolopoulos	
【GIZ: German Technical Cooperation】	
Mr.Hanns-Andre Pitot	Project Advisor, Waste to (positive) Energy Wt(p)E
Mr. Ralf Senzel	Project Manager, Waste Management Portfolio
【UNHCR : United Nations High Commissioner for Refugees】	
Mr. Vincent Dupin	Senior Technical Officer
Ms. Eva Diaz Ugena	WASH Officer
Ms. Jill Lauren Hass	Zaatari WASH officer
【Aghwar Al Sharmaliyah JSC】	
Mr. Ayman Al Share	Financial manager
【Rabiet Al-Kura JSC】	
Eng. Ahmad Hattab	Head of JSC
【Ajloun JSC】	

Name	Designation
Mr. Issa Khassawneh	Head of JSC
【Irbid JSC】	
Eng. Qasem Bani Hani	Head of JSC
【Mafreq JSC】	
Moh'd Khair Al-Shraah	Head of JSC
Eng. Yaser Al Husban	Manager of Disposal Site
【Badiah Shamaliyah JSC(Northern Badia JSC)】	
Mr. Nayif Al Mashaqbeh	Head of JSC
【Zarqa JSC】	
Mr. Jamal Nuseir	Head of JSC
Eng. Naseem Haddad	Manager of JSC Zarqa
【Balqa JSC】	
Mr. Salim Al Hyari	Head of JSC
【Al-Shonen Al-Wsta JSC】	
Mr. Mahmod Al Nsour	Head of JSC
【Al-Shonen Al-Wsta Municipality】	
Mr. Ibrahim Al Idwan	Mayor of the Municipality
Mr. Mustafa Al Awaysha	Manager of Transfer Station
【Zarqa Municipality】	
Eng. Khaldoun Al-Khsawneh	Director of the Environmental Department
【Irbid Municipality】	
Eng. Reham Al-Jammal	Director of the Tenders Department in Irbid Municipality
【Al-Rusayfa Municipality】	
Eng. Ossama Haymmour	Director of the Environmental Department

A4 Minutes of Discussions

(1) Minutes of Discussions (19 February 2017)

Minutes of Discussions
on the Preparatory Survey
for the Project for Improvement of Waste Management Equipment
in Northern Region Hosting Syrian Refugees

Based on the several preliminary discussions between the Government of Hashemite Kingdom of Jordan (hereinafter referred to as "Jordan") and the Government of Japan (hereinafter referred to as "Japan"), Japan decided to conduct a Preparatory Survey for the Project for Improvement of Waste Management Equipment in Northern Region Hosting Syrian Refugees (hereinafter referred to as "the Project"), and entrusted the Preparatory Survey to Japan International Cooperation Agency (hereinafter referred to as "JICA").

JICA dispatched the Preparatory Survey Team for the Outline Design (hereinafter referred to as "the Team") of the Project to Jordan, headed by Kazunao Shibata, Director of Environmental Management Team 2, Environmental Management Group, Global Environment Department, JICA, from 15th January to 2nd March, 2017.

During the Preparatory Survey, the Team held a series of discussions with the authorities concerned of the Government of Jordan (hereinafter referred to as "Jordanian side). In the course of the discussions, both sides have confirmed the main items described in the attached sheets.

Amman, 19th February, 2017

柴田 和直

Mr. Kazunao Shibata
Leader, Preparatory Survey Team
Japan International Cooperation Agency
Japan

Mr. Walid Muhyddin Al Masri
Minister of Municipal Affairs
Hashemite Kingdom of Jordan

ATTACHMENT

1. Objective of the Project

   The objective of the Project is to enhance waste management in Northern Region hosting Syrian Refugees by/through preparation for necessary equipment for the operation of transfer stations and final disposal sites and transportation, thereby contributing to improve sanitation and hygiene of both Jordanian citizen and Syrian refugees.

2. Title of the Preparatory Survey

   Both sides confirmed the title of the Preparatory Survey as "the Preparatory Survey for the Project for Improvement of Waste Management Equipment in Northern Region Hosting Syrian Refugees."

3. Project site

   Both sides confirmed that the sites of the Project are in Northern and Central Regions of Jordan, which is shown in Annex 1.

4. Responsible authority for the Project

   Both sides confirmed the authorities responsible for the Project are as follows:

   4-1. The line agency is The Ministry of Municipal Affairs (hereinafter referred to as"MOMA"), which would be the agency to supervise the executing agencies. Its organization chart is shown in Annex 2.

   4-2. The Executing Agencies are Joint Service Councils and Municipalities in Northern and Central Regions (hereinafter referred to as "the Executing Agencies"). The Executing Agencies shall coordinate with all the relevant authorities to ensure smooth implementation of the Project and ensure that the undertakings for the Project shall be managed by relevant authorities properly and on time. The list of the Executing Agencies is shown in Annex 3. The definitive list of the Executing Agencies will be decided following the final scope of the Project.

5. Items requested by the Government of Jordan

   5-1. As a result of discussions, both sides confirmed that the list of the items requested by the Government of Jordan, as shown in Annex 4.

   5-2. JICA will assess the feasibility of the above requested items through the

survey and will report the findings to the Government of Japan. The final scope of the Project will be decided by the Government of Japan.

5-3. The Government of Jordan shall submit an official request with the abovementioned list to the Government of Japan through diplomatic channel by the end of March 2017.

6. Procedures and Basic Principles of Japanese Grant

6-1. The Jordanian side agreed that the procedures and basic principles of Japanese Grant as described in Annex 5 and 6 shall be applied to the Project.
As for the monitoring of the implementation of the Project, JICA requires Jordanian side to submit the Project Monitoring Report, the form of which is attached as Annex 7.

6-2. The Jordanian side agreed to take the necessary measures, as described in Annex 8, for smooth implementation of the Project. The contents of the Annex 8 will be elaborated and refined during the Preparatory Survey and be agreed in the mission dispatched for explanation of the Draft Preparatory Survey Report.
The contents of Annex 8 will be updated as the Preparatory Survey progresses, and eventually, will be used as an attachment to the Grant Agreement.

7. Schedule of the Survey

7-1. The Team will proceed with further survey in Jordan until 2nd March.

7-2. The Government of Jordan shall submit an official request to the Government of Japan by the end of March 2017.

7-3. JICA will prepare a draft Preparatory Survey Report in English and dispatch a mission to Jordan in order to explain its contents at the beginning of August 2017.

7-4. If the contents of the draft Preparatory Survey Report is accepted and the undertakings for the Project are fully agreed by the Jordanian side, JICA will finalize the Preparatory Survey Report and send it to Jordanian side around November 2017.

7-5. The above schedule is tentative and subject to change.

8. Environmental and Social Considerations

8-1. The Jordanian side confirmed to give due environmental and social considerations before and during implementation, and after completion of the

Project, in accordance with the JICA Guidelines for Environmental and Social Considerations (April, 2010).

8-2. The Project is categorized as "C" from the following considerations:

Not located in a sensitive area, nor has it sensitive characteristics, nor falls it into sensitive sectors under the Guidelines, and its potential adverse impacts on the environment are not likely to be significant.

9. Other Relevant Issues

9-1. Supervision over the coordination among donors

Both sides confirmed that there are several projects on solid waste management implemented or designed by bilateral and multilateral donors such as UNDP, EU, AFD, GIZ, etc. and MOMA shall supervise the coordination among them to avoid duplications with any other projects.

9-2. Collaboration with UNDP

The Team understood that Jerash Transfer Station which is to be constructed by UNDP is the first priority of Jordanian side, because the construction budget is not sufficient and the equipment will not be able to be procured. In response to the issue, both sides confirmed that at least the following conditions are necessary for the collaboration with UNDP to be possible:

- MOMA shall officially provide the engineering drawing and the specifications of the planed equipment of the transfer station to JICA;
- MOMA shall coordinate both the construction and the installation of the equipment;
- JICA has no liability in the entire design of the transfer station except the design of equipment to be provided by the Project;
- MOMA shall assure the quality of the building and take responsibility to resolve any deficiencies which might become obstacles for the installation and operation of the equipment provided by the Project.

JICA will continue to study the possibility of this collaboration in close coordination with MOMA and UNDP.

9-3. Master Plans on Waste Management in Central and Northern Regions of Jordan

Both sides confirmed that the target sites in the list of Annex 4 were selected based on MOMA's priorities and will not be closed in near future. MOMA will reflect this selection into its ongoing master plan study in Northern and Central Regions to assure consistency between the master plan and the

Project.

9-4. Priority of the Project components

Both sides agreed the criteria for equipment prioritization, as shown in Annex 9. Based on the criteria, JICA will finalize the project component under the budget constraint.

9-5. Tax Exemption

Both sides confirmed that import tax, customs duties, internal taxes and other fiscal levies which may be imposed in Jordan with respect to the purchase of the products and the services should be exempted. MOMA shall take necessary measures for tax exemption. If tax exemption is not provided by related Ministry, MOMA shall conduct budgetary provision on import tax, customs duties, internal taxes and other fiscal levies.

9-6. Safety and Security

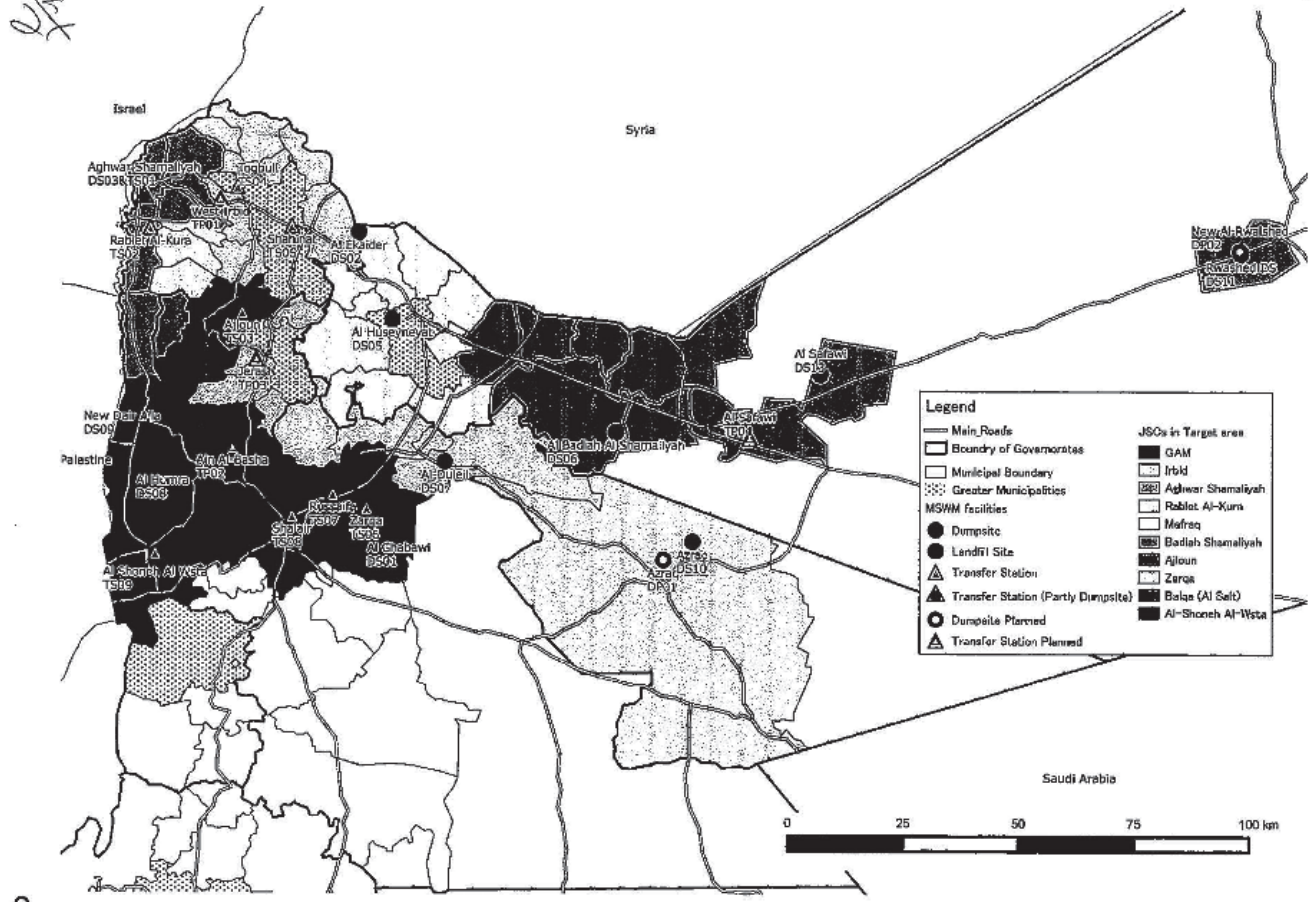
Jordanian side agreed to take measures to secure the safety of members of the Team over the survey period in accordance with due arrangement.

9-7. Operation and Maintenance of Equipment

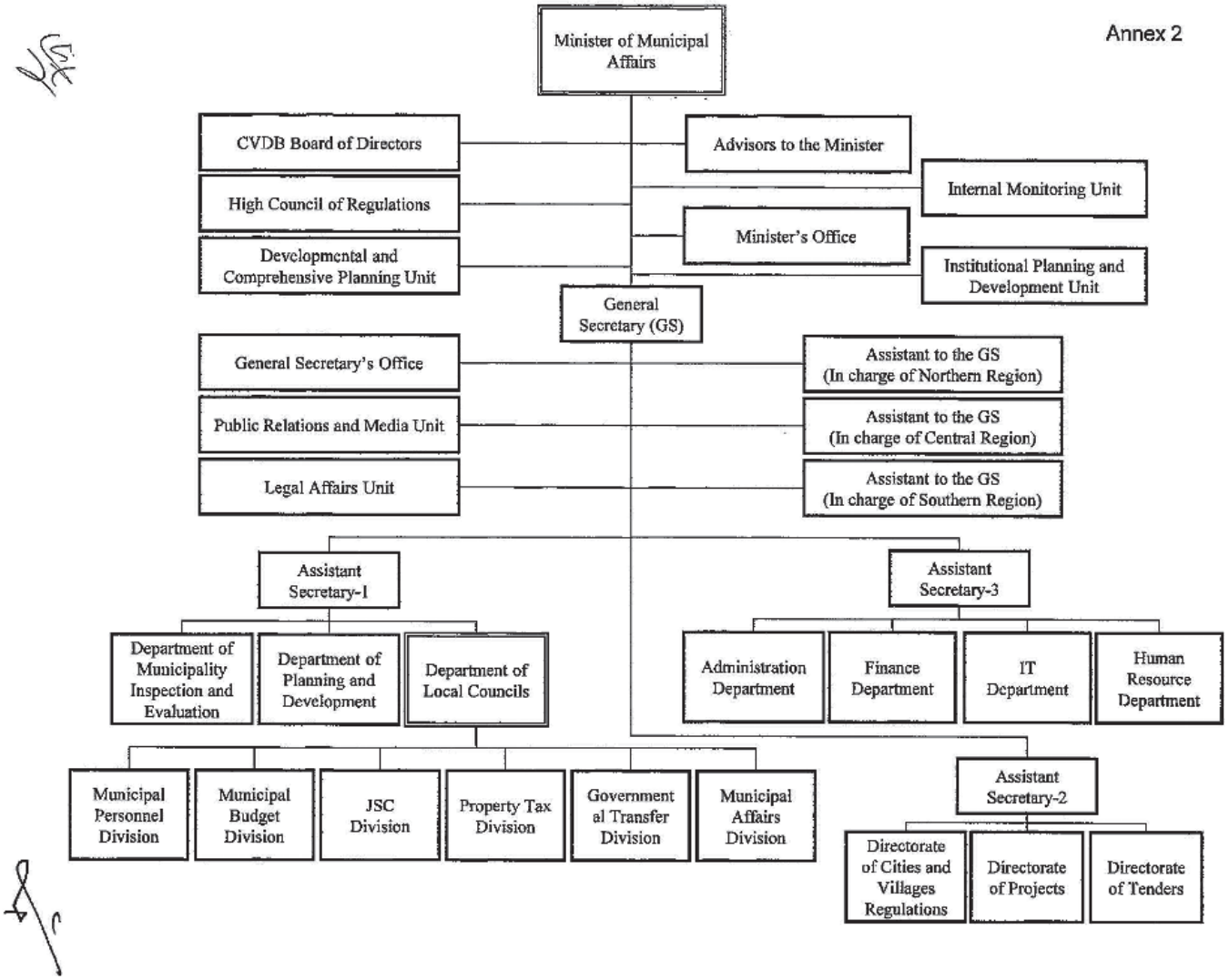
The budget necessary for the Project, in addition to those described in Annex 8, such as operation and maintenance will be assessed in the Survey. Jordanian side assures that appropriate cost will be secured in accordance with due arrangement.

Annex 1. Project Site
Annex 2. Organization Chart
Annex 3. Tentative Executing Agencies List
Annex 4. Tentative Equipment List
Annex 5. Japanese Grant
Annex 6. Flow Chart of Japanese Grant Procedures
Annex 7. Project Monitoring Report (template)
Annex 8. Major Undertakings to be taken by the Government of Jordan
Annex 9. Criteria for Equipment Prioritization

Annex 1


Israel
Syria
Saudi Arabia
Palestine
Aghwar Shamaliyah DS038
Togbull TS01
West Irbid TP01
Rabiet Al-Kura TS02
Ajloun TS03
Al Husseyniyeh DS05
New Baq'a DS09
Ain Al Basha TP02
Al Hamra DS08
Al Buqeia DS07
Rosefa TS07
Zarqa TS15
Al Shabawi DS01
Al Shoneh Al Wsta TS19
Al Badiah Al Shamaliyah DS06
Al Safawi DS15
Al-Dawi TP04
New Al-Rwaished DP02
Azraq DS10
Azraq DP01
Legend
Main Roads
Boundry of Governorates
Municipal Boundary
Greater Municipalities
MSWM facilities
Dumpsite
Landfil Site
Transfer Station
Transfer Station (Partly Dumpsite)
Dumpsite Planned
Transfer Station Planned
JSCs in Target area
GAM
Irbid
Aghwar Shamaliyah
Rabiet Al-Kura
Mafraq
Badiah Shamaliyah
Ajloun
Zarqa
Balqa (Al Salt)
Al-Shoneh Al-Wsta
0
25
50
75
100 km

Annex 2


Minister of Municipal Affairs
CVDB Board of Directors
High Council of Regulations
Developmental and Comprehensive Planning Unit
Advisors to the Minister
Internal Monitoring Unit
Minister's Office
Institutional Planning and Development Unit
General Secretary (GS)
General Secretary's Office
Public Relations and Media Unit
Legal Affairs Unit
Assistant to the GS (In charge of Northern Region)
Assistant to the GS (In charge of Central Region)
Assistant to the GS (In charge of Southern Region)
Assistant Secretary-1
Department of Municipality Inspection and Evaluation
Department of Planning and Development
Department of Local Councils
Municipal Personnel Division
Municipal Budget Division
JSC Division
Property Tax Division
Government al Transfer Division
Municipal Affairs Division
Assistant Secretary-3
Administration Department
Finance Department
IT Department
Human Resource Department
Assistant Secretary-2
Directorate of Cities and Villages Regulations
Directorate of Projects
Directorate of Tenders

Annex 3

Tentative Executing Agencies List

Joint Service Council

- Aghwar Shamaliyah JSC
- Ajloun JSC
- Al Badiah Al Shamaliyah JSC
- Al-Shonen Al Wsta JSC
- Rabiet Al- Kura JSC
- Irbid JSC
- Mafraq JSC
- Zarqa JSC

Municipality

- Central Shuna Municipality

Annex 4

Tentative Equipment List

Transfer Station

Name of transfer station	Aghwar	Al-Kura	Ajloun	Shoneh Al Wsta	Jerash	Total
Operational Organization	Aghwar Shamaliyah JSC	Rabiet Al- Kura JSC	Ajloun JSC	Central Shuna Municipality	Irbid JSC	
Outdoor Hopper+Compactor		1	1	1		3
Truck head	2	3	2	2		9
Trailer (50m3)	3	4	3	3		13
Indoor Hopper+Compactor					1	1
Armroll truck					3	3
Container (35m3)					10	10
Snow removal dozer			2			2
Truck with salt spreader			2			2
Wastewater collection Vehicles			1			1
Pick-up			1		1	2
Farm tractor with sprinkler		1		1		2
Small loader	1		1			2
Weighbridge	1	1	1	1		4
Bus		1			1	2
Air Compressor					1	1

Disposal Site

Name of disposal site	Al Ekaider	Al Huseyneyat	Al Badiah Al Shamaliyah	Al Duleil	New Dair Alla	Total
Operational Organization	Irbid JSC	Mafraq JSC	Al Badiah Al Shamaliyah JSC	Zarqa JSC	Al-Shonen Al Wsta JSC	
Bulldozer 32t	6	1		1	1	9
Bulldozer 11t			1			1
Excavator	2	1	1	1		5
Farm tractor with sprinkler		1	1	1	1	4
Landfill Compactor	1	1		1		3
Wheel Loader	2	2		1	1	6
Txtile incinerator	1					1
Tipper for DS	4	2	1	2	2	11
Snow removal dozer	4	3				7
Truck with salt spreader	4	3				7
Bus	1		1		1	3
Wastewater collection Vehicles	1					1
Pick-up					1	1
Water tanker	1			1	1	3
Skip loader with container	1					1
Air compressor	1					1
Weighbridge			1	1	1	3
Fuel tanker			1	1	1	3
Low body trailer			1			1
Truck head for low body trailer			1			1
Solar generator			1			1

Annex 5

JAPANESE GRANT

The Japanese Grant is non-reimbursable fund provided to a recipient country (hereinafter referred to as "the Recipient") to purchase the products and/or services (engineering services and transportation of the products, etc.) for its economic and social development in accordance with the relevant laws and regulations of Japan. Followings are the basic features of the project grants operated by JICA (hereinafter referred to as "Project Grants").

1. Procedures of Project Grants

Project Grants are conducted through following procedures (See "PROCEDURES OF JAPANESE GRANT" for details):

(1) Preparation
- The Preparatory Survey (hereinafter referred to as "the Survey") conducted by JICA

(2) Appraisal
-Appraisal by the government of Japan (hereinafter referred to as "GOJ") and JICA, and Approval by the Japanese Cabinet

(3) Implementation

Exchange of Notes
-The Notes exchanged between the GOJ and the government of the Recipient

Grant Agreement (hereinafter referred to as "the G/A")
-Agreement concluded between JICA and the Recipient

Banking Arrangement (hereinafter referred to as "the B/A")
-Opening of bank account by the Recipient in a bank in Japan (hereinafter referred to as "the Bank") to receive the grant

Construction works/procurement
-Implementation of the project (hereinafter referred to as "the Project") on the basis of the G/A

(4) Ex-post Monitoring and Evaluation
-Monitoring and evaluation at post-implementation stage

2. Preparatory Survey

(1) Contents of the Survey

The aim of the Survey is to provide basic documents necessary for the appraisal of the the Project made by the GOJ and JICA. The contents of the Survey are as follows:

- Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of

relevant agencies of the Recipient necessary for the implementation of the Project.

- Evaluation of the feasibility of the Project to be implemented under the Japanese Grant from a technical, financial, social and economic point of view.
- Confirmation of items agreed between both parties concerning the basic concept of the Project.
- Preparation of an outline design of the Project.
- Estimation of costs of the Project.
- Confirmation of Environmental and Social Considerations

The contents of the original request by the Recipient are not necessarily approved in their initial form. The Outline Design of the Project is confirmed based on the guidelines of the Japanese Grant.

JICA requests the Recipient to take measures necessary to achieve its self-reliance in the implementation of the Project. Such measures must be guaranteed even though they may fall outside of the jurisdiction of the executing agency of the Project. Therefore, the contents of the Project are confirmed by all relevant organizations of the Recipient based on the Minutes of Discussions.

(2) Selection of Consultants

For smooth implementation of the Survey, JICA contracts with (a) consulting firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms.

(3) Result of the Survey

JICA reviews the report on the results of the Survey and recommends the GOJ to appraise the implementation of the Project after confirming the feasibility of the Project.

3. Basic Principles of Project Grants

(1) Implementation Stage

1) The E/N and the G/A

After the Project is approved by the Cabinet of Japan, the Exchange of Notes (hereinafter referred to as "the E/N") will be singed between the GOJ and the Government of the Recipient to make a pledge for assistance, which is followed by the conclusion of the G/A between JICA and the Recipient to define the necessary articles, in accordance with the E/N, to implement the Project, such as conditions of disbursement, responsibilities of the Recipient, and procurement conditions. The terms and conditions generally applicable to the Japanese Grant are stipulated in the "General Terms and Conditions for Japanese Grant (January 2016)."

2) Banking Arrangements (B/A) (See "Financial Flow of Japanese Grant (A/P Type)" for details)

a) The Recipient shall open an account or shall cause its designated authority to open an account under the name of the Recipient in the Bank, in principle. JICA will disburse the Japanese Grant in Japanese yen for the Recipient to cover the obligations incurred by the Recipient under the verified contracts.

b) The Japanese Grant will be disbursed when payment requests are submitted by the Bank to JICA under an Authorization to Pay (A/P) issued by the Recipient.

3) Procurement Procedure

The products and/or services necessary for the implementation of the Project shall be procured in accordance with JICA's procurement guidelines as stipulated in the G/A.

4) Selection of Consultants

In order to maintain technical consistency, the consulting firm(s) which conducted the Survey will be recommended by JICA to the Recipient to continue to work on the Project's implementation after the E/N and G/A.

5) Eligible Source Country

In using the Japanese Grant disbursed by JICA for the purchase of products and/or services, the eligible source countries of such products and/or services shall be Japan and/or the Recipient. The Japanese Grant may be used for the purchase of the products and/or services of a third country as eligible, if necessary, taking into account the quality, competitiveness and economic rationality of products and/or services necessary for achieving the objective of the Project. However, the prime contractors, namely, constructing and procurement firms, and the prime consulting firm, which enter into contracts with the Recipient, are limited to "Japanese nationals", in principle.

6) Contracts and Concurrence by JICA

The Recipient will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be concurred by JICA in order to be verified as eligible for using the Japanese Grant.

7) Monitoring

The Recipient is required to take their initiative to carefully monitor the progress of the Project in order to ensure its smooth implementation as part of their responsibility in the G/A, and to regularly report to JICA about its status by using the Project Monitoring Report (PMR).

8) Safety Measures

The Recipient must ensure that the safety is highly observed during the implementation of the Project.

9) Construction Quality Control Meeting

Construction Quality Control Meeting (hereinafter referred to as the "Meeting") will be held for quality assurance and smooth implementation of the Works at each stage of the Works. The member of the Meeting will be composed by the

Recipient (or executing agency), the Consultant, the Contractor and JICA. The functions of the Meeting are as followings:

a) Sharing information on the objective, concept and conditions of design from the Contractor, before start of construction.

b) Discussing the issues affecting the Works such as modification of the design, test, inspection, safety control and the Client's obligation, during of construction.

(2) Ex-post Monitoring and Evaluation Stage

1) After the project completion, JICA will continue to keep in close contact with the Recipient in order to monitor that the outputs of the Project is used and maintained properly to attain its expected outcomes.

2) In principle, JICA will conduct ex-post evaluation of the Project after three years from the completion. It is required for the Recipient to furnish any necessary information as JICA may reasonably request.

(3) Others

1) Environmental and Social Considerations

The Recipient shall carefully consider environmental and social impacts by the Project and must comply with the environmental regulations of the Recipient and JICA Guidelines for Environmental and Social Considerations (April, 2010).

2) Major Undertakings to Be Taken by the Government of the Recipient

For the smooth and proper implementation of the Project, the Recipient is required to undertake necessary measures including land acquisition, and bear an advising commission of the A/P and payment commissions paid to the Bank as agreed with the GOJ and/or JICA. The Government of the Recipient shall ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the Recipient with respect to the purchase of the Products and/or the Services be exempted or be borne by its designated authority without using the Grant and its accrued interest, since the grant fund comes from the Japanese taxpayers.

3) Proper Use

The Recipient is required to maintain and use properly and effectively the products and/or services under the Project (including the facilities constructed and the equipment purchased), to assign staff necessary for this operation and maintenance and to bear all the expenses other than those covered by the Japanese Grant.

Annex 5

4) Export and Re-export

The products purchased under the Japanese Grant should not be exported or re-exported from the Recipient.

PROCEDURES OF JAPANESE GRANT

Stage	Procedures	Remarks	Recipient Government	Japanese Government	JICA	Consultants	Contractors	Agent Bank
Official Request	Request for grants through diplomatic channel	Request shall be submitted before appraisal stage.	x	x				
1. Preparation	(1) Preparatory Survey Preparation of outline design and cost estimate		x		x	x		
2. Appraisal	(2)Preparatory Survey Explanation of draft outline design, including cost estimate, undertakings, etc.		x		x	x		
	(3)Agreement on conditions for implementation	Conditions will be explained with the draft notes (E/N) and Grant Agreement (G/A) which will be signed before approval by Japanese government.	x	x (E/N)	x (G/A)			
	(4) Approval by the Japanese cabinet			x				
3. Implementation	(5) Exchange of Notes (E/N)		x	x				
	(6) Signing of Grant Agreement (G/A)		x		x			
	(7) Banking Arrangement (B/A)	Need to be informed to JICA	x					x
	(8) Contracting with consultant and issuance of Authorization to Pay (A/P)	Concurrence by JICA is required	x			x		x
	(9) Detail design (D/D)		x			x		
	(10) Preparation of bidding documents	Concurrence by JICA is required	x			x		
	(11) Bidding	Concurrence by JICA is required	x			x	x	
	(12) Contracting with contractor/supplier and issuance of A/P	Concurrence by JICA is required	x				x	x
	(13) Construction works/procurement	Concurrence by JICA is required for major modification of design and amendment of contracts.	x			x	x	
	(14) Completion certificate		x			x	x	
4. Ex-post monitoring & evaluation	(15) Ex-post monitoring	To be implemented generally after 1, 3, 10 years of completion, subject to change	x		x			
	(16) Ex-post evaluation	To be implemented basically after 3 years of completion	x		x			

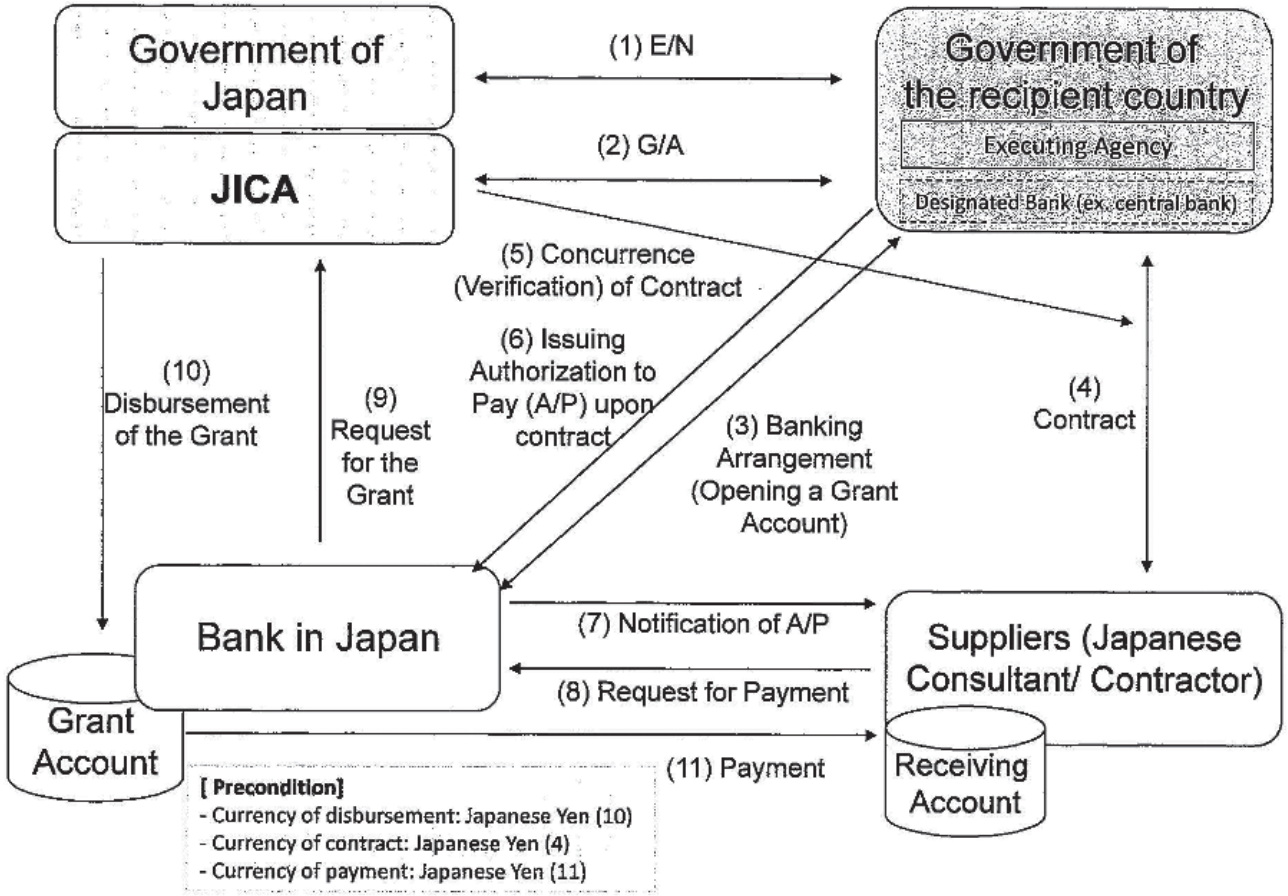
notes:

1. Project Monitoring Report and Report for Project Completion shall be submitted to JICA as agreed in the G/A.

2. Concurrence by JICA is required for allocation of grant for remaining amount and/or contingencies as agreed in the G/A.

Annex 6

Financial Flow of Japanese Grant (A/P Type)



Annex 7
G/A NO. XXXXXXX
PMR prepared on DD/MM/YY

Project Monitoring Report
on
Project Name
Grant Agreement No. XXXXXXX
20XX, Month

Organizational Information

Signer of the G/A (Recipient)	Person in Charge	(Designation)
	Contacts	Address: Phone/FAX: Email:
Executing Agency	Person in Charge	(Designation)
	Contacts	Address: Phone/FAX: Email:
Line Ministry	Person in Charge	(Designation)
	Contacts	Address: Phone/FAX: Email:

General Information:

Project Title	
E/N	Signed date: Duration:
G/A	Signed date: Duration:
Source of Finance	Government of Japan: Not exceeding JPY _____ mil. Government of (_____): _____

1: Project Description

1-1 Project Objective

1-2 Project Rationale

- Higher-level objectives to which the project contributes (national/regional/sectoral policies and strategies)
- Situation of the target groups to which the project addresses

1-3 Indicators for measurement of "Effectiveness"

Quantitative indicators to measure the attainment of project objectives		
Indicators	Original (Yr)	Target (Yr)
Qualitative indicators to measure the attainment of project objectives		

2: Details of the Project

2-1 Location

Components	Original *(proposed in the outline design)*	Actual
1.		

2-2 Scope of the work

Components	Original* *(proposed in the outline design)*	Actual*
1.		

Reasons for modification of scope (if any).

(PMR)

2-3 Implementation Schedule

Items	Original		Actual
	(proposed in the outline design)	*(at the time of signing the Grant Agreement)*	

Reasons for any changes of the schedule, and their effects on the project (if any)

2-4 Obligations by the Recipient

2-4-1 Progress of Specific Obligations
See Attachment 2.

2-4-2 Activities
See Attachment 3.

2-4-3 Report on RD
See Attachment 11.

2-5 Project Cost

2-5-1 Cost borne by the Grant(Confidential until the Bidding)

Components			Cost (Million Yen)	
	Original *(proposed in the outline design)*	Actual *(in case of any modification)*	Original[1),2)] *(proposed in the outline design)*	Actual
	1.			
Total				

Note: 1) Date of estimation:
2) Exchange rate: 1 US Dollar = Yen

2-5-2 Cost borne by the Recipient

Components			Cost (1,000 Taka)	
	Original *(proposed in the outline design)*	Actual *(in case of any modification)*	Original[1),2)] *(proposed in the outline design)*	Actual
	1.			

Note: 1) Date of estimation:
2) Exchange rate: 1 US Dollar =

Reasons for the remarkable gaps between the original and actual cost, and the countermeasures (if any)

(PMR)

2-6 Executing Agency

- Organization's role, financial position, capacity, cost recovery etc,
- Organization Chart including the unit in charge of the implementation and number of employees.

Original *(at the time of outline design)* name: role: financial situation: institutional and organizational arrangement (organogram): human resources (number and ability of staff):
Actual *(PMR)*

2-7 Environmental and Social Impacts

- The results of environmental monitoring based on Attachment 5 (in accordance with Schedule 4 of the Grant Agreement).
- The results of social monitoring based on in Attachment 5 (in accordance with Schedule 4 of the Grant Agreement).
- Disclosed information related to results of environmental and social monitoring to local stakeholders (whenever applicable).

3: Operation and Maintenance (O&M)

3-1 Physical Arrangement

- Plan for O&M (number and skills of the staff in the responsible division or section, availability of manuals and guidelines, availability of spareparts, etc.)

Original *(at the time of outline design)*
Actual *(PMR)*

3-2 Budgetary Arrangement

- Required O&M cost and actual budget allocation for O&M

Original *(at the time of outline design)*

Actual *(PMR)*

4: Potential Risks and Mitigation Measures

- Potential risks which may affect the project implementation, attainment of objectives, sustainability
- Mitigation measures corresponding to the potential risks

Assessment of Potential Risks *(at the time of outline design)*

Potential Risks	Assessment
1. (Description of Risk)	Probability: High/Moderate/Low
	Impact: High/Moderate/Low
	Analysis of Probability and Impact:
	Mitigation Measures:
	Action required during the implementation stage:
	Contingency Plan (if applicable):
2. (Description of Risk)	Probability: High/Moderate/Low
	Impact: High/Moderate/Low
	Analysis of Probability and Impact:
	Mitigation Measures:
	Action required during the implementation stage:
	Contingency Plan (if applicable):
3. (Description of Risk)	Probability: High/Moderate/Low
	Impact: High/Moderate/Low
	Analysis of Probability and Impact:
	Mitigation Measures:
	Action required during the implementation stage:

	Contingency Plan (if applicable):
Actual Situation and Countermeasures	
(PMR)	

5: Evaluation and Monitoring Plan (after the work completion)

5-1 Overall evaluation

Please describe your overall evaluation on the project.

5-2 Lessons Learnt and Recommendations

Please raise any lessons learned from the project experience, which might be valuable for the future assistance or similar type of projects, as well as any recommendations, which might be beneficial for better realization of the project effect, impact and assurance of sustainability.

5-3 Monitoring Plan of the Indicators for Post-Evaluation

Please describe monitoring methods, section(s)/department(s) in charge of monitoring, frequency, the term to monitor the indicators stipulated in 1-3.

Attachment

1. Project Location Map
2. Specific obligations of the Recipient which will not be funded with the Grant
3. Monthly Report submitted by the Consultant

Appendix - Photocopy of Contractor's Progress Report (if any)
- Consultant Member List
- Contractor's Main Staff List

4. Check list for the Contract (including Record of Amendment of the Contract/ Agreement and Schedule of Payment)
5. Environmental Monitoring Form / Social Monitoring Form
6. Monitoring sheet on price of specified materials (Quarterly)
7. Report on Proportion of Procurement (Recipient Country, Japan and Third Countries) (PMR (final)only)
8. Pictures (by JPEG style by CD-R) (PMR (final)only)
9. Equipment List (PMR (final)only)
10. Drawing (PMR (final)only)
11. Report on RD (After project)

Attachment 6

Monitoring sheet on price of specified materials

1. Initial Conditions (Confirmed)

	Items of Specified Materials	Initial Volume A	Initial Unit Price (¥) B	Initial total Price C=A×B	1% of Contract Price D	Condition of payment	
						Price (Decreased) E=C−D	Price (Increased) F=C+D
1	Item 1	●●t	●	●	●	●	●
2	Item 2	●●t	●	●	●		
3	Item 3						
4	Item 4						
5	Item 5						

2. Monitoring of the Unit Price of Specified Materials

(1) Method of Monitoring : ●●

(2) Result of the Monitoring Survey on Unit Price for each specified materials

	Items of Specified Materials	1st ●month, 2015	2nd ●month, 2015	3rd ●month, 2015	4th	5th	6th
1	Item 1						
2	Item 2						
3	Item 3						
4	Item 4						
5	Item 5						

(3) Summary of Discussion with Contractor (if necessary)

-
-
-

Attachment 7

Report on Proportion of Procurement (Recipient Country, Japan and Third Countries)
(Actual Expenditure by Construction and Equipment each)

		Domestic Procurement (Recipient Country) A	Foreign Procurement (Japan) B	Foreign Procurement (Third Countries) C	Total D
Construction Cost		(A/D%)	(B/D%)	(C/D%)	
	Direct Construction Cost	(A/D%)	(B/D%)	(C/D%)	
	others	(A/D%)	(B/D%)	(C/D%)	
Equipment Cost		(A/D%)	(B/D%)	(C/D%)	
Design and Supervision Cost		(A/D%)	(B/D%)	(C/D%)	
Total		(A/D%)	(B/D%)	(C/D%)	

Annex 8

Major Undertakings to be taken by the Government of Jordan

1. Specific obligations of the Government of Jordan which will not be funded with the Grant

(1) Before the Tender

NO	Items	Deadline	In charge	Estimated Cost
1	To submit an official request to the Government of Japan through a diplomatic channel	before the end of March, 2017	MOMA	
2	To open Bank Account (Banking Arrangement (B/A))	within 1 month after G/A	MOMA	FOC
3	To bear the following commissions paid to the Japanese bank for banking services based upon the B/A			
	1) Advising commission of A/P for consultancy agreement	within 1 month after the singing of the contract	MOMA	4000JPY
	2) Payment commission to Consultant for A/P	every payment	MOMA	500USD+ α (TBD)
4	To supervise the construction of the transfer station in Jerash by UNDP		MOMA	TBC
5	To submit Project Monitoring Report (with the result of Detail Design)	before preparation of bidding documents		

Annex 8

(2) During the Project Implementation

NO	Items	Deadline	In charge	Estimated Cost
1	To bear the following commissions to a bank of Japan for the banking services based upon the B/A			
	1) Advising commission of A/P	within 1 month after the singing of the contract	MOMA	4000JPY
	2) Payment commission for A/P	every payment	MOMA	20,000 USD+α (TBD)
2	To ensure prompt unloading and customs clearance at the port of disembarkation in recipient country and to assist internal transportation of the products	During the Project		
	1) Tax exemption and customs clearance of the products at the port of disembarkation		MOMA	TBC
	2) Internal transportation from the port of disembarkation to the project site		MOMA	TBC
3	To accord Japanese nationals and/or physical persons of third countries whose services may be required in connection with the supply of the products and the services such facilities as may be necessary for their entry into the country of the Recipient and stay therein for the performance of their work	During the Project	MOMA	
4	To ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the country of the Recipient with respect to the purchase of the products and/or the services will be exempted.	During the Project	MOMA	
5	To bear all the expenses, other than those to be borne by the Grant Aid, necessary for construction of the facilities as well as for the transportation and installation of the equipment	During the Project	MOMA / JSC / LGUs	TBC
6	To assure the quality of the building and take responsibility to resolve any deficiencies which might become obstacles for the installation and operation of the equipment provided by the Project.	before the installation of equipment	MOMA	
7	To coordinate both the construction and the installation of the equipment of the transfer station in Jerash		MOMA	
8	1) To submit Project Monitoring Report after each work under the contract(s) such as shipping, hand over, installation and operational training	within one month after completion of each work	MOMA	
	2) To submit Project Monitoring Report (final)	within one month after signing of Certificate of Completion for the works under the contract(s)	MOMA	
9	To submit a report concerning completion of the Project	within six months after completion of the Project	MOMA	

(3) After the Project

NO	Items	Deadline	In charge	Estimated Cost
1	To maintain and use properly and effectively the equipment provided under the Grant Aid 1) Allocation of maintenance cost 2) Operation and maintenance structure 3) Routine check/Periodic inspection	After completion of the Project	MOMA/ JSC/ LGUs	TBD

2. Other obligations of the Government of Jordan funded with the Grant

NO	Items
1	To provide equipment
	1) To ensure prompt unloading and customs clearance at the port of embarkation in recipient country
	a) Marine/ Air transportation of the products from Japan to the recipient country
	c) Marine/ land transportation of the products from a third country to the recipient country
	b) Internal transportation from the port of disembarkation to the project site
	2) To provide equipment with installation and commissioning
2	To implement detailed design, tender support and supervision (Consulting Service)

* The Amount is provisional. This is subject to the approval of the Government of Japan.

Annex 9

Criteria for Equipment Prioritization

1) Basic Understanding

Priority will be rated for each facility. The existing policies and plans of SWM of Jordan (especially National SWM Improvement Strategy and its derivative plans, if any) will be reviewed and respected in facility prioritization.

How to rate priority will be different for transfer stations and final disposal sites. They are rated as follows.

2) Transfer Stations

a. Quantitative Indicators

- Cost reduction effect, which will be the most important rationale of transfer stations.
- Gap between demand and supply: difference between the planned waste transfer amount (demand) and the current waste transfer capacity (supply)

b. Qualitative Indicators

- Urgency: in such a case where the municipalities which have been using the final disposal sites in the Jordan Valley area need to use other remote disposal sites. This can happen when the disposal sites must be closed.
- Environmental Necessity: environmental deterioration caused by uncollected waste and/or illegal dumps as a result of inadequate waste collection and transportation capacity of the municipalities using the transfer stations.
- Capacity: Capacities to operate and maintain equipment and financial capacity
- Others: such as possible suspension of waste transfer operation because of whether condition (heavy snow).

3) Final Disposal Sites

a. Quantitative Indicators

- Gap between demand and supply: difference between the planned waste disposal amount (demand) and the current waste disposal capacity (supply).

b. Qualitative Indicators

- Urgency: in such a case where inappropriate site operation due to inadequate equipment has been leading opposition campaign by communities living nearby.
- Environmental Necessity: Inadequate equipment may have been seriously affecting the surrounding environment by offensive order, littering and/or smokes.
- Capacity: Capacities to operate and maintain equipment and financial capacity

(2) Technical Note (14 August 2017)

Technical Note
regarding the Collaboration on the Construction of Jerash Transfer Station

Based on the several preliminary discussions between the Government of Hashemite Kingdom of Jordan (hereinafter referred to as "Jordan") and the Government of Japan (hereinafter referred to as "Japan"), Japan decided to conduct a Preparatory Survey for the Project for Improvement of Waste Management Equipment in Northern Region Hosting Syrian Refugees (hereinafter referred to as "the Japanese Grant Aid Project"), and entrusted the Preparatory Survey to Japan International Cooperation Agency (hereinafter referred to as "JICA").

JICA dispatched the Preparatory Survey Team to Jordan, headed by Kazunao Shibata, Director of Environmental Management Team 2, Environmental Management Group, Global Environment Department, JICA, from 15th January to 2nd March, 2017.

Following a request from Jordan and United Nations Development Programme (hereinafter referred to as "UNDP"), and based on the result of Preparatory Survey, UNDP and JICA (hereinafter referred to as "both sides") discussed the collaboration on the construction of Jerash Transfer Station. In the course of the discussions, both sides have confirmed the main items described in the following documents.

Amman, 14 August, 2017

Mr. Tsutomu Kobayashi	Mr. Anders Pederson
Chief Representative	UN Resident Coordinator
Japan International Cooperation Agency (JICA)	UNDP Resident Representative
Jordan Office	Jordan

1

1. Objectives of Technical Note

For the development of Jerash transfer station, UNDP shall be responsible for its plan, design and facility construction while the Japanese Grant Aid Project shall be responsible for equipment procurement, its installation, test operation and operation training based on the UNDP's plan and that all these works will be supervised by Ministry of Municipal Affairs (hereinafter referred to as "MOMA").

According to the time schedule expected as of August 2017 (See Figure 1), however, equipment installation will only take place one year after the completion of UNDP's facility construction because of the difference in period of fund availability of both projects.

In developing transfer stations or any facilities that requires large-scale equipment with installation, it is a typical practice to carry out facility construction and equipment installation simultaneously to allow overall coordination.

The objectives of this Technical Note is to clarify the plan, design and schedule of the development of Jerash transfer station as well as the responsibilities of UNDP and the Japanese Grant Aid Project in order to ensure smooth project implementation and the proper start-up of Jerash transfer station by Irbid JSC. Based on this Technical Note, JICA will confirm with MOMA its responsibilities for the Japanese Grant Aid Project in late August 2017. If necessary, any matters in the Technical Note shall be discussed by the three parties (MOMA, UNDP and JICA) and maybe be amended through mutual agreement. After the approval of Japanese Cabinet and the signing of a Grant Agreement between MOMA and JICA, MOMA will take the responsibility of the implementation of the Japanese Grant Aid Project.

2. Responsibilities of MOMA, UNDP and the Japanese Grant Aid project

For the development of Jerash transfer station, both sides have confirmed the basic responsibilities of MOMA, UNDP and the Japanese Grant Aid Project as follows:

2.1. Responsibilities of MOMA

Both sides have a common understanding that MOMA has the primary responsibility for the plan, construction, operation and management of Jerash transfer station, as follows:

(1) Supervision of design and facility construction by UNDP;
(2) Monitoring, maintenance and control of the facility during the approximately one-year period from the completion of UNDP's facility construction to facility handover;
(3) Supervision of detailed design, procurement and installation of equipment by the Japanese Grant Aid Project;
(4) Provision of necessary support to Irbid JSC for facility operation and maintenance after the Japanese Grant Aid Project's equipment installation and test operation.

2.2. Responsibilities of UNDP

UNDP has responsibility for the following for the development of Jerash transfer station:

(1) Plan formulation, design drawing and facility construction;
(2) Defect liability in regard to the plan, design and construction of the transfer station;
(3) In other words, resolution of troubles whose causes are attributed to the plan, design and/or construction of the transfer station.

2.3. Responsibilities of the Japanese Grant Aid Project

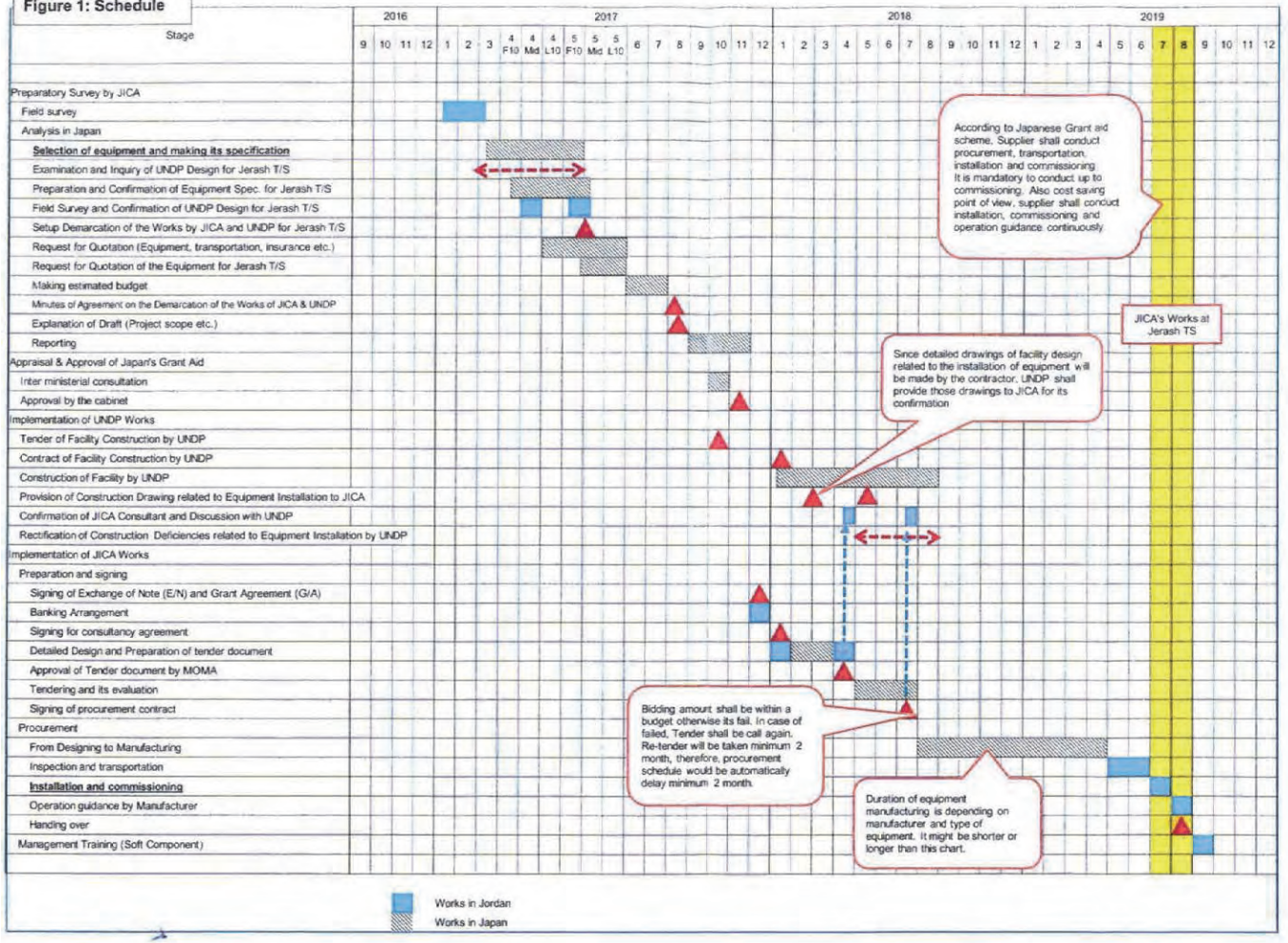
The Japanese Grant Aid Project has responsibility for the following for the development of Jerash transfer station:

(1) Detailed design, procurement and installation of equipment in conformity to the plan and design by UNDP;
(2) Resolution of troubles whose causes are attributed to the procurement and/or installation of equipment not in conformity to the plan and design by UNDP;
(3) Test operation and operation training of equipment that is procured and installed by the Japanese Grant Aid Project.

3. Schedule of Development of Jerash Transfer Station

Both sides have confirmed the planned schedule of facility construction by UNDP and equipment procurement and installation by the Japanese Grant Aid Project of Jerash transfer station as shown in the Figure below.

Figure 1: Schedule



4. Plan and Design of Jerash Transfer Station

It is indispensable to coordinate facility construction and equipment procurement and installation for smooth and proper operation of Jerash transfer station. JICA and UNDP, therefore, have confirmed the plan and design of the transfer station made by UNDP as described below.

4.1. Layout Plan

The following issues on the layout plan were confirmed:

4.1.1. On-site Road

The width of the on-site road should be at least 4.0 meters to secure smooth traffic of transfer vehicles and armroll trucks even at the section indicated by A-A in Figure 2.

4.1.2. Provision of Utilities

The following utilities will be provided as shown in the Figure 2:

- Water supply system;
- Wastewater collection and storage system for compaction unit as shown in cross-section B-B;
- Electric line and manholes; and
- Rain water drainage system.

4.2. Compaction Unit Plan

The following issues on the compaction unit plan were confirmed:

- **The compaction unit building** is constructed by UNDP as shown in Figure 3: Cross Section and Figure 4: Plan.
- For **installation of the Hopper**, the open space of 4.0m (width) x 4.2m (length) is provided as part of the facility construction of UNDP as shown in Figure 4
- **Foundation of the compaction unit** is constructed as part of the facility construction of UNDP as shown in Figure 3 and 4.
- **The electric line** is provided as part of the facility construction of UNDP as shown in Figure 4.
- **Wastewater** from the compaction unit is collected and stored as shown in Figures 3 and 4. Those waste water collection and storage system are provided as part of the facility construction of UNDP.
- **The control room with steps** is provided as part of the facility construction of UNDP as shown in Figure 3 and 4. The size of the room is about 3.5 (width) x 3.5 (length) x 2.5 (height).

4.3. Traversing System Plan

The following issues on the traversing system plan were confirmed:

- **Foundation of the traversing system** is constructed as part of the facility construction of UNDP as shown in Figure 4.
- **The barrier curb** to stop the armroll trucks so as not to damage the traversing system is constructed by UNDP as shown in Figure 4.
- **The electric line** for the traversing system is installed by the equipment supplier.
- **The pit for the weighing system** is provided as part of the facility construction of UNDP as shown in Figures 3 and 5.

4.4. Other Issues

In addition to the above the following issues were confirmed:

- Detailed design of the facility will be made by the facility construction contractor according to UNDP. **Detailed drawings** of the above mentioned plans shall be provided by the UNDP as soon as the drawings are made. Those drawings shall follows the issues confirmed as above.
- According to the UNDP plan, **water and washing machine** to wash the hopper and compaction unit are provided by Irbid JSC.

Figure 2: Layout Plan

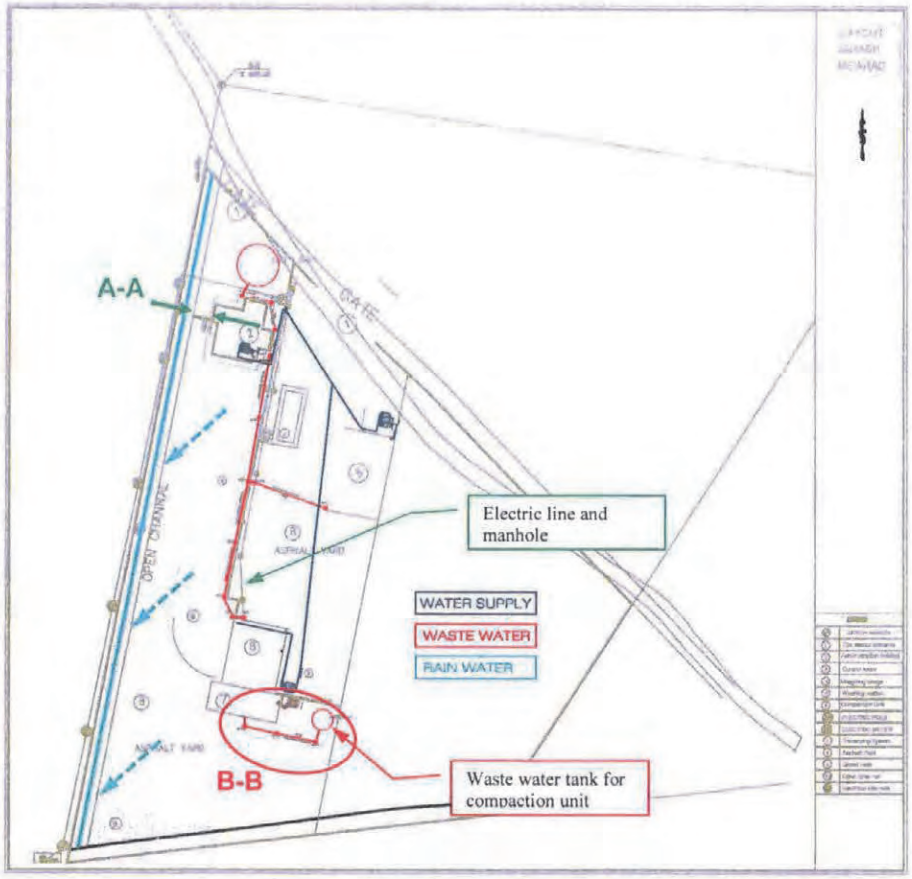


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Figure 3: Cross Section of Compaction Unit Building

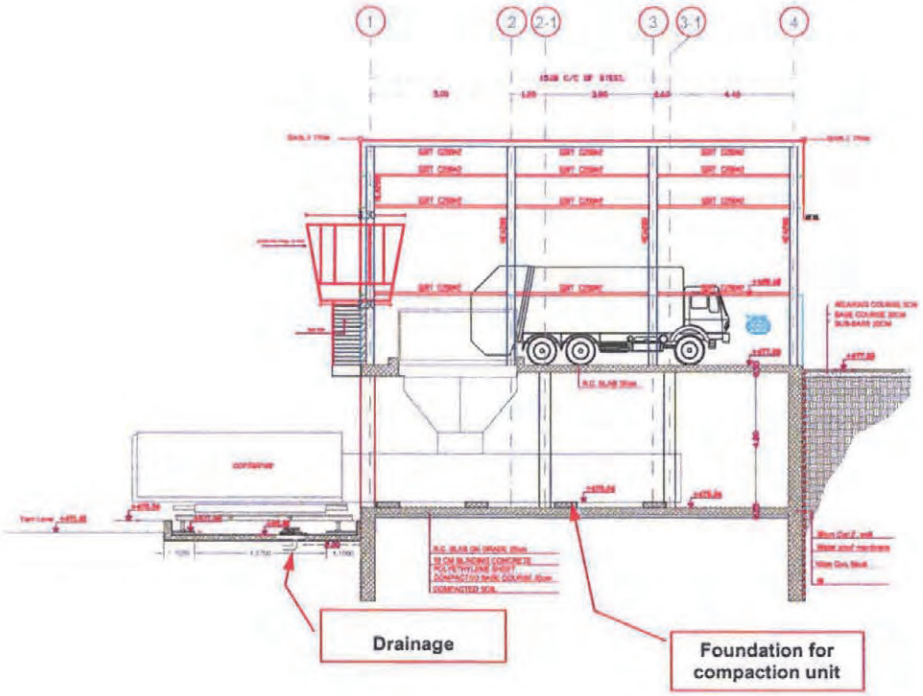


Figure 4: Plan of Compaction Unit Building

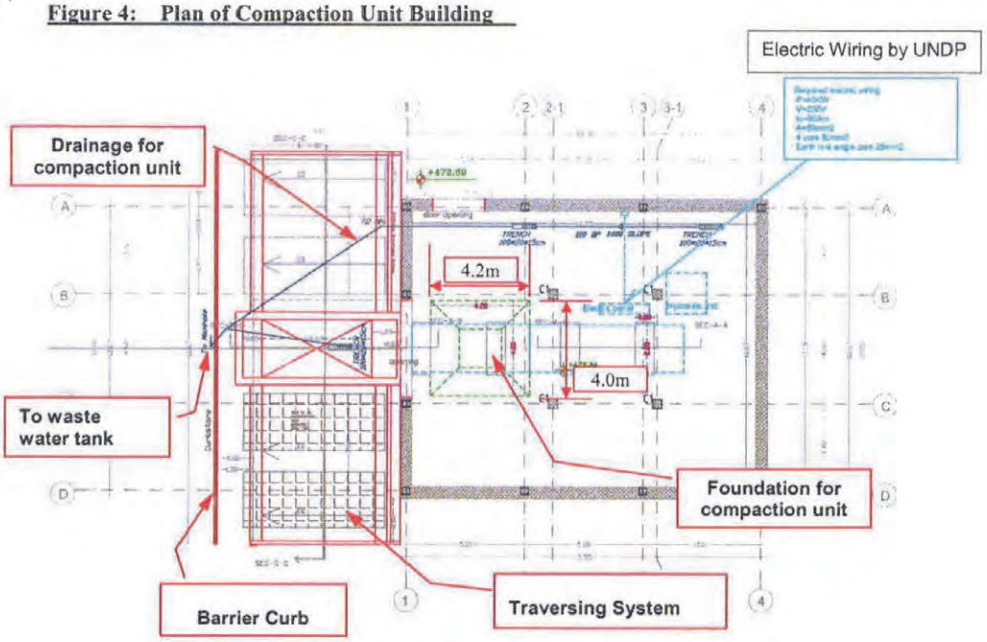
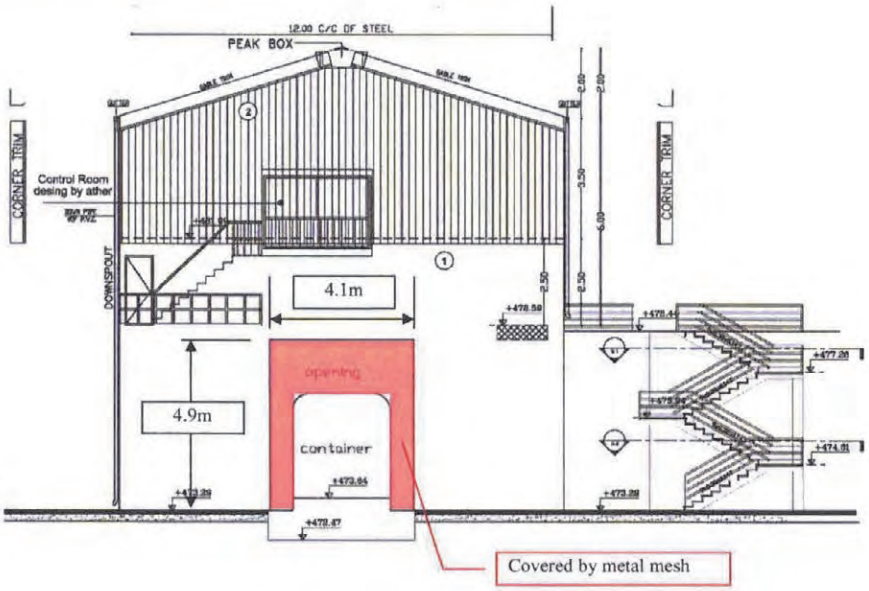


Figure 5: Side View of Compaction Unit Building



9

(3) Minutes of Discussions (28 August 2017)

Minutes of Discussions
on the Preparatory Survey for the Project for
Improvement of Waste Management Equipment in Northern Region Hosting Syrian Refugees
(Explanation on Draft Preparatory Survey Report)

With reference to the minutes of discussions signed between the Ministry of Municipal Affairs (hereinafter referred to as "MOMA") and the Japan International Cooperation Agency (hereinafter referred to as "JICA") on 19th February, 2017 and in response to the request from the Government of Hashemite Kingdom of Jordan (hereinafter referred to as "Jordan") dated 21st March 2017, JICA dispatched the Preparatory Survey Team (hereinafter referred to as "the Team") for the explanation of Draft Preparatory Survey Report (hereinafter referred to as "the Draft Report") for the Project for Improvement of Waste Management Equipment in Northern Region Hosting Syrian Refugees (hereinafter referred to as "the Project"), headed by Mr. Tsuyoshi Yamamoto, Deputy Director of Environmental Management Team 2, Environmental Management Group, Global Environment Department, JICA from 20th to 25th August, 2017.

As a result of the discussions, both sides agreed on the main items described in the attached sheets.

Amman, 28 August, 2017

山本 剛川

Mr. Tsuyoshi Yamamoto
Leader
Preparatory Survey Team
Japan International Cooperation Agency
Japan

Mr. Walid Muhyddin Al Masri
Minister of Municipal Affairs
Hashemite Kingdom of Jordan

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ATTACHMENT

1. Objective of the Project

   The objective of the Project is to enhance waste management in Northern Region hosting Syrian Refugees by/through preparation for necessary equipment for the operation of transfer stations and final disposal sites and transportation, thereby contributing to improve sanitation and hygiene of both Jordanian citizen and Syrian refugees.

2. Title of the Preparatory Survey

   Both sides confirmed the title of the Preparatory Survey as "the Preparatory Survey for the Project for Improvement of Waste Management Equipment in Northern Region Hosting Syrian Refugees."

3. Project Site

   Both sides confirmed that the sites of the Project are located in Northern Region of Jordan as shown in Annex 1 .

4. Equipment List

   Both sides confirmed the list of equipment to be provided by the Project as shown in Annex 2.

5. Responsible Authority for the Project

   Both sides confirmed that the authorities responsible for the Project are as follows:

   5-1. The line agency is MOMA. MOMA shall be responsible for supervising the executing agencies on behalf of the Government of Jordan. Its organization chart is shown in Annex 3.

   5-2. The Executing Agencies are Joint Service Councils (hereinafter referred to as "JSC") and Municipality in Northern Region (hereinafter referred to as "the Executing Agencies"). The Executing Agencies shall coordinate with all the relevant authorities to ensure smooth implementation of the Project and ensure that the undertakings for the Project shall be managed by relevant authorities properly and on time. The list of the Executing Agencies is shown in Annex 4.

6. Contents of the Draft Report

   After the explanation of the contents of the Draft Report by the Team, the Jordanian side agreed to its contents.

7. Cost Estimate

Both sides confirmed that the cost estimate described in the Draft Report is provisional and will be examined further by the Government of Japan for its approval.

8. Confidentiality of the Cost Estimate and Technical Specifications

Both sides confirmed that the cost estimate and technical specifications in the Draft Report should never be duplicated or disclosed to any third parties until all the contracts under the Project are concluded.

9. Procedures and Basic Principles of Japanese Grant

The Jordanian side agreed that the procedures and basic principles of Japanese Grant as described in Annex 5 shall be applied to the Project. In addition, the Jordanian side agreed to take necessary measures according to the procedures.

10. Timeline for the Project Implementation

The Team explained to the Jordanian side that the expected timeline for the project implementation is as attached in Annex 6.

11. Expected Outcomes and Indicators

Both sides agreed that key indicators for expected outcomes are as follows. The Jordanian side will be responsible for the achievement of agreed key indicators targeted in year 2022 and shall monitor the progress based on those indicators.

[Quantitative indicators]

Indicator	Reference Value*3 (2017)	Target Value (2022) (3 years after completion of the Project)
Transfer and Transportation Amount*1 (ton/day)	374	1,073
Sanitary Disposal Amount*2 (ton/day)	2,211	3,977

Note:

*1: The reference value is the municipal solid waste (MSW) transfer and transportation amount of the existing 4 transfer stations (TSs) and the target value includes the amount of Jerash TS in addition to existing 4 TSs. Transfer and Transportation amount

(indicator) shall be measured by incoming MSW amount to the TS.
*2: Both of the reference value and target one are the MSW sanitary disposal amount of the existing 5 final disposal sites (DSs). The MSW sanitary disposal amount of a DS is the incoming MSW amount to the DS and sanitary disposed (levelled, compacted and covered by soil) there.
*3: Estimated by the JICA Preparatory Survey Team based on the interview survey to the existing TSs and DSs.

[Qualitative indicator]

- Adverse impacts (odor, scattering waste, fire, etc.) of the final disposal sites in the Northern Region will be mitigated, and sanitary condition and living environment of the region will be improved.
- Living environment of the refugees in the Region will be improved by providing them with sufficient MSW collection service.

12. Technical Assistance ("Soft Component" of the Project)

Considering the sustainable operation and maintenance of the products and services granted through the Project, a technical assistance is planned under the Project. The Jordanian side confirmed to deploy necessary number of counterparts who are appropriate and competent in terms of its purpose of the technical assistance as described in the Draft Report.

13. Undertakings of the Project

Both sides confirmed the undertakings of the Project as described in Annex 7. With regard to exemption of customs duties, internal taxes and other fiscal levies as stipulated in (2) No.5 of Annex 7, both sides confirmed that such customs duties, internal taxes and other fiscal levies include VAT, commercial tax, income tax and corporate tax, which shall be clarified in the bid documents by MOMA during the implementation stage of the Project.

The Jordanian side assured to take the necessary measures and coordination including allocation of the necessary budget which is preconditions of implementation of the Project. It is further agreed that the costs are indicative, i.e. at Outline Design level. More accurate costs will be calculated at the Detailed Design stage.

Both sides also confirmed that the Annex 7 will be used as an attachment of G/A.

14. Monitoring during the Implementation

The Project will be monitored by MOMA and reported to JICA by using the form

of Project Monitoring Report (PMR) attached as Annex 8. The timing of submission of the PMR is described in Annex 7.

15. Project Completion

Both sides confirmed that the project completes when all the facilities constructed and equipment procured by the grant are in operation. The completion of the Project will be reported to JICA promptly, but in any event not later than six months after completion of the Project.

16. Ex-Post Evaluation

JICA will conduct ex-post evaluation after three (3) years from the project completion, in principle, with respect to five evaluation criteria (Relevance, Effectiveness, Efficiency, Impact and Sustainability). The result of the evaluation will be publicized. The Jordanian side is required to provide necessary support for the data collection.

17. Items and measures to be considered for the smooth implementation of the Project

Both sides confirmed the items and measures to be considered for the smooth implementation of the Project as follows:

17-1. Tax Exemption

Both sides confirmed that import tax, customs duties, internal taxes and other fiscal levies which may be imposed in Jordan with respect to the purchase of the products and the services should be exempted. MOMA shall take necessary measures for tax exemption. If tax exemption is not provided by related Ministry, MOMA shall conduct budgetary provision on import tax, customs duties, internal taxes and other fiscal levies.

17-2. Allocation of Qualified Personnel

Both sides confirmed that the Jordanian Side shall allocate a necessary number of qualified personnel for the smooth implementation of the Project and utilization of equipment.

17-2. Signers of official documents related to the Project

In order to assure the project implementation schedule, the Jordanian side agreed to inform to JICA Jordan Office the signers for Exchange of Notes (E/N), Grant Agreement (G/A), and Banking Arrangement (B/A) for the Project until 15th of September 2017.

18. Schedule of the Study

JICA will finalize the Preparatory Survey Report based on the confirmed items. The report will be sent to the Jordanian side around November 2017.

19. Environmental and Social Considerations

The Team explained that 'JICA Guidelines for Environmental and Social Considerations (April 2010)' (hereinafter referred to as "the Guidelines") is applicable for the Project. The Project is categorized as C because the Project is likely to have minimal adverse impact on the environment under the Guidelines.

20. Other Relevant issues

20-1. Disclosure of Information

Both sides confirmed that the Preparatory Survey Report from which project cost is excluded will be disclosed to the public after completion of the Preparatory Survey. The comprehensive report including the project cost will be disclosed to the public after all the contracts under the Project are concluded.

20-2. Collaboration with UNDP on the Construction of Jerash Transfer Station

Following a request from the Jordanian side and United Nations Development Programme (hereinafter referred to as "UNDP"), and based on the result of Preparatory Survey, MOMA, UNDP and JICA discussed the collaboration on the construction of Jerash Transfer Station. UNDP and JICA confirmed the design, responsibilities and implementation schedule, which is necessary in order to realize the collaboration smoothly and signed the Technical Note preliminarily, as shown in Annex 9. MOMA confirmed the contents of Technical Note. In the course of the discussions, MOMA and JICA confirmed the basic responsibilities of MOMA and UNDP as follows.

20-2-1. Responsibilities of MOMA

MOMA has the primary responsibility for the plan, construction, operation and management of Jerash transfer station, as follows:

(1) Supervision of design and facility construction by UNDP;
(2) Monitoring, maintenance and control of the facility during the approximately one-year period from the completion of UNDP's facility construction to facility handover;
(3) Supervision of detailed design, procurement, installation and test operation of equipment by the Project;

(4) Provision of necessary support to Irbid JSC for facility operation and maintenance after the Project's equipment installation and test operation.
(5) Provision of necessary information for smooth implementation of the Project, such as the detailed design drawings, specifications of construction work and progress report of construction work by UNDP.

20-2-2. Responsibilities of UNDP

UNDP has responsibility for the following for the development of Jerash transfer station:

(1) Plan formulation, design drawing and facility construction;
(2) Defect liability in regard to the plan, design and construction of the transfer station;
(3) In other words, resolution of troubles whose causes are attributed to the plan, design and/or construction of the transfer station.

20-2-3. Responsibilities of MOMA funded with Japanese Grant

MOMA funded with Japanese Grant has responsibility for the following for the development of Jerash transfer station:

(1) Detailed design, procurement and installation of equipment in conformity to the plan and design of UNDP;
(2) Confirmation of troubles whose causes are attributed to the procurement and/or installation of equipment not in conformity to the plan and design of UNDP;
(3) Test operation and operation training of equipment that is procured and installed by the Project.

In addition, both sides confirmed that MOMA will make the agreement in writing between UNDP on the basic responsibilities as mentioned above until the beginninng of November, 2017.

20-3. Master Plans on Waste Management in Central and Northern Regions of Jordan

Both sides confirmed that MOMA approved the master plans on waste management in central and northern regions of Jordan and reflected project sites in the list of Annex 1 into its ongoing master plan study to assure consistency between the master plan and the Project.

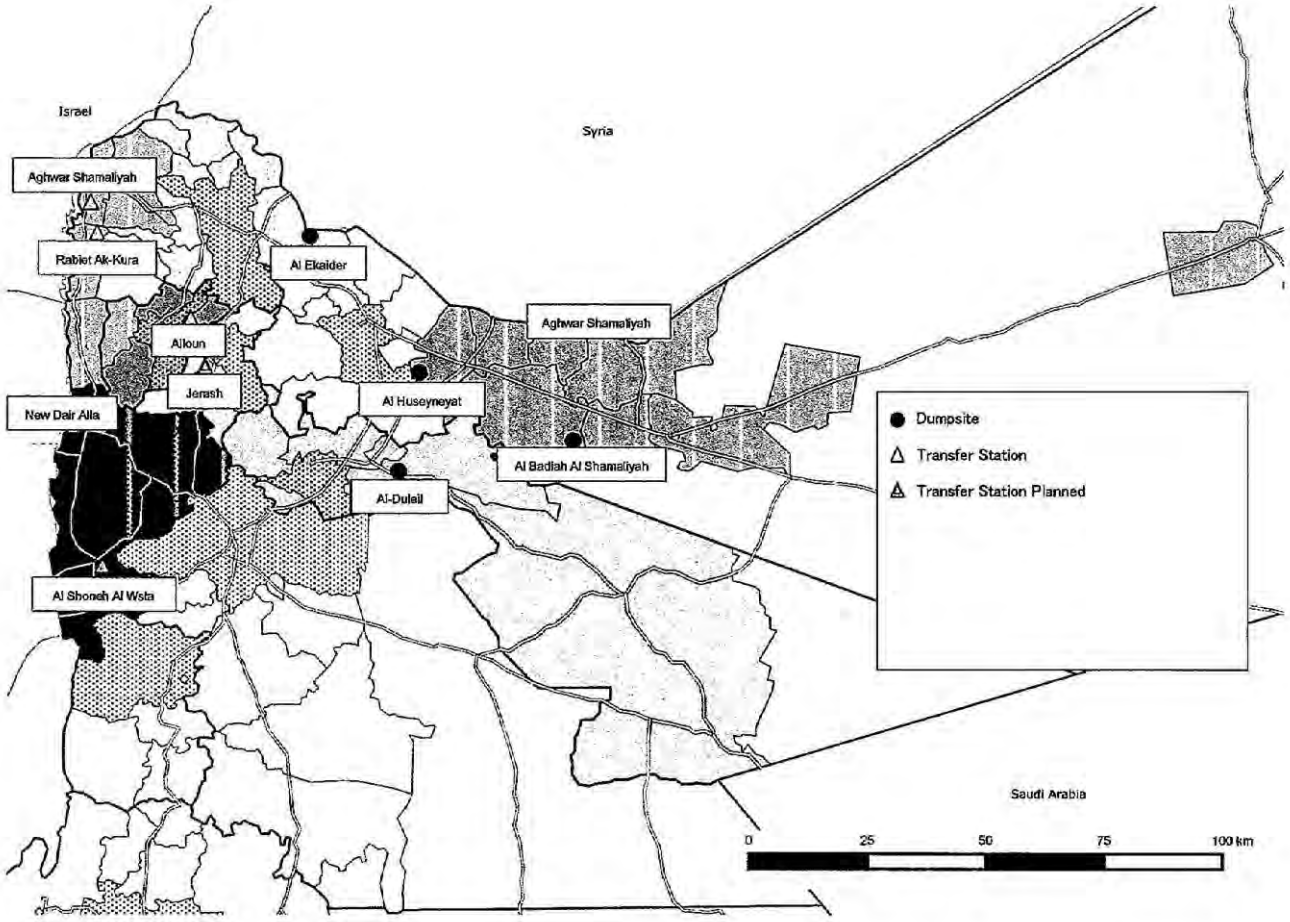
20-4. Operation and Maintenance

French Development Agency (AFD) set up Project Implementation Unit (PIU) financed by EU. Both sides confirmed that PIU will support MOMA's responsibilities mentioned in 20-2-1. In addition, the Jordanian side explained that

financial assistance by EU will be distributed preferentially to JSC, which is in charge of operation and maintenance of the Project.

Annex 1 Project Site
Annex 2 Equipment List
Annex 3 Organization Chart
Annex 4 Executing Agencies List
Annex 5 Japanese Grant
Annex 6 Project Implementation Schedule
Annex 7 Major Undertakings to be taken by the Government of Jordan
Annex 8 Project Monitoring Report (template)
Annex 9 Technical note signed on 14th August, 2017 between UNDP and JICA

Annex 1


Israel
Syria
Aghwar Shamaliyah
Rabiet Ak-Kura
Al Ekaider
Alloun
Jerash
New Dair Alla
Al Huseyneyat
Aghwar Shamaliyah
Al Badiah Al Shamaliyah
Al-Dulail
Al Shoneh Al Wsta
Dumpsite
Transfer Station
Transfer Station Planned
Saudi Arabia
0
25
50
75
100 km

Annex 2

Equipment List

Quantity of Equipment to be Procured for Transfer Stations (TS)

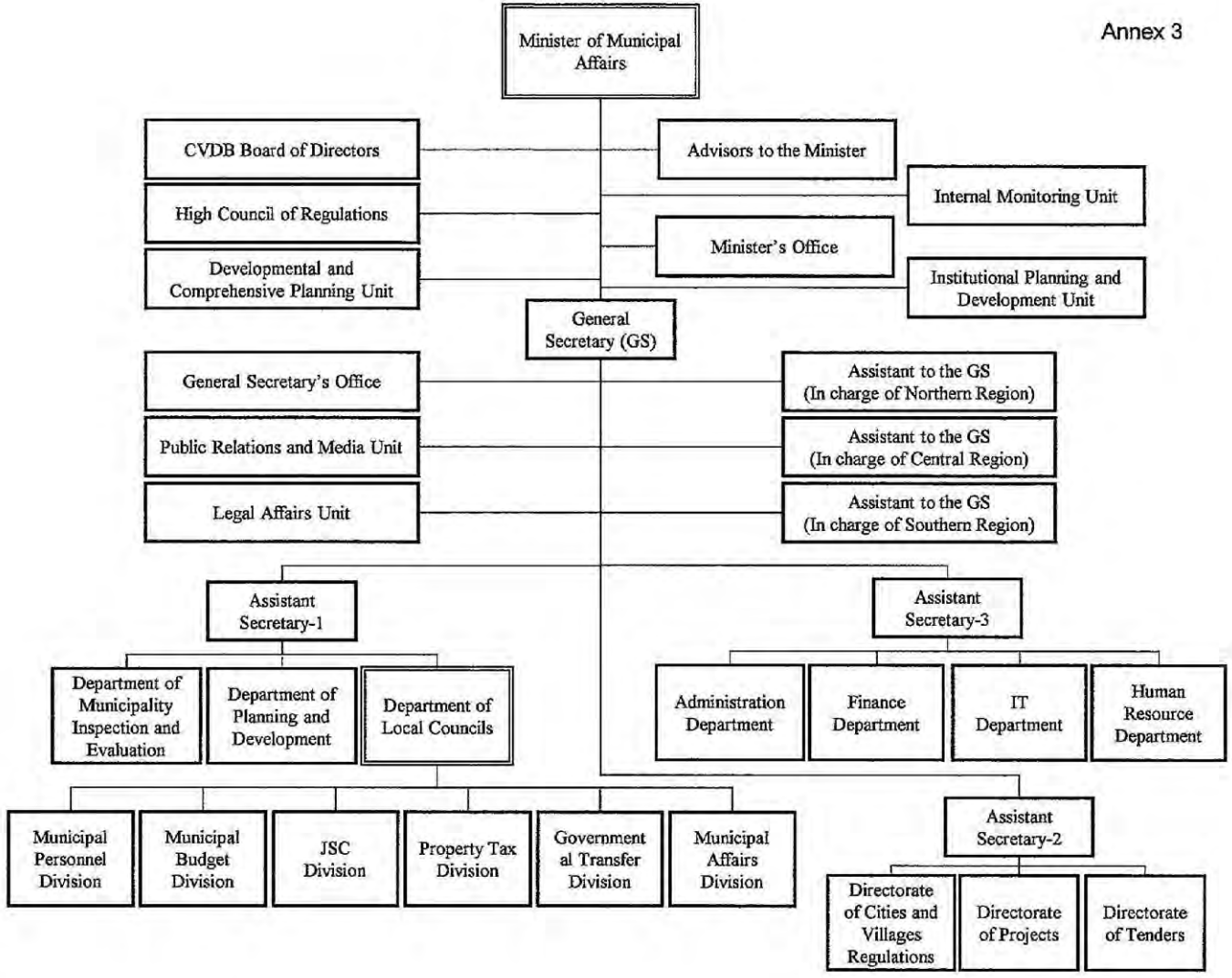
Equipment Name	Aghwar Shamaliyah	Rabiet Al-Kura	Ajloun	Al Shoneh Al Wsta	Jerash	Total
Outdoor Hopper + Compactor		1	1	1		**3**
Tractor head	5	5	5	3		**18**
Semitrailer (50m^3)	5	6	5	3		**19**
Indoor Hopper + Compactor					1	**1**
Armroll truck					6	**6**
Container (35m^3)					7	**7**
Snow removal blade		1	1			**2**
Sprayer	1	1	1	1		**4**
Tractor	1	1	1	1		**4**
Wastewater collection truck (8m^3)			1		1	**2**
Skid steer loader (0.6m^3)	1	1	1	1		**4**
Air compressor (30ltr)	1	1	1	1		**4**
Car washing machine (15ltr/min.)	1	1	1	1		**4**
Water tanker (8m^3)	1	1	1	1		**4**

Note 1: Regarding a small wheel loader, 0.6m^3-class loader which complies with the European emission regulations is not produced in Japan, and procurement from a third-country would be necessary if procured. Therefore, "compact wheel loader" is hereby replaced with "skid steer loader". (Both can equally serve the purpose).

Quantity of Equipment to be Procured for Disposal Site (DS)

Equipment Name	Al Ekaider	Al Huseyneyat	Al Badiah Al Shamaliyah	Al-Duleil	New Dair Alla	Total
Bulldozer (28t)	4	1			1	**6**
Excavator (0.5m^3)		1	1		1	**3**
Excavator (0.7m^3)	2					**2**
Tipper (10m^3)	2		1		1	**4**
Sprayer		1	1	1	1	**4**
Tractor		1	1	1	1	**4**
Skid steer loader (0.6m^3)	1	1				**2**
Snow removal blade	1	1				**2**
Water tanker (8m^3)	1	1	1	1	1	**5**
Air compressor (30ltr)	1	1	1	1	1	**5**
Car washing machine (15ltr/min.)	1	1	1	1	1	**5**

Annex 3


Minister of Municipal Affairs
CVDB Board of Directors
High Council of Regulations
Developmental and Comprehensive Planning Unit
Advisors to the Minister
Internal Monitoring Unit
Minister's Office
Institutional Planning and Development Unit
General Secretary (GS)
General Secretary's Office
Public Relations and Media Unit
Legal Affairs Unit
Assistant to the GS (In charge of Northern Region)
Assistant to the GS (In charge of Central Region)
Assistant to the GS (In charge of Southern Region)
Assistant Secretary-1
Department of Municipality Inspection and Evaluation
Department of Planning and Development
Department of Local Councils
Municipal Personnel Division
Municipal Budget Division
JSC Division
Property Tax Division
Governmental Transfer Division
Municipal Affairs Division
Assistant Secretary-3
Administration Department
Finance Department
IT Department
Human Resource Department
Assistant Secretary-2
Directorate of Cities and Villages Regulations
Directorate of Projects
Directorate of Tenders

Annex 4

Executing Agencies List

Joint Service Council

- Aghwar Shamaliyah JSC
- Ajloun JSC
- Al Badiah Al Shamaliyah JSC
- Al Shonen Al Wsta JSC
- Rabiet Al- Kura JSC
- Irbid JSC
- Mafraq JSC
- Zarqa JSC

Municipality

- Al Shoneh Al Wsta Municipality

JAPANESE GRANT

The Japanese Grant is non-reimbursable fund provided to a recipient country (hereinafter referred to as "the Recipient") to purchase the products and/or services (engineering services and transportation of the products, etc.) for its economic and social development in accordance with the relevant laws and regulations of Japan. Followings are the basic features of the project grants operated by JICA (hereinafter referred to as "Project Grants").

1. Procedures of Project Grants

Project Grants are conducted through following procedures (See "PROCEDURES OF JAPANESE GRANT" for details):

(1) Preparation

- The Preparatory Survey (hereinafter referred to as "the Survey") conducted by JICA

(2) Appraisal

-Appraisal by the government of Japan (hereinafter referred to as "GOJ") and JICA, and Approval by the Japanese Cabinet

(3) Implementation

Exchange of Notes

-The Notes exchanged between the GOJ and the government of the Recipient

Grant Agreement (hereinafter referred to as "the G/A")

-Agreement concluded between JICA and the Recipient

Banking Arrangement (hereinafter referred to as "the B/A")

-Opening of bank account by the Recipient in a bank in Japan (hereinafter referred to as "the Bank") to receive the grant

Construction works/procurement

-Implementation of the project (hereinafter referred to as "the Project") on the basis of the G/A

(4) Ex-post Monitoring and Evaluation

-Monitoring and evaluation at post-implementation stage

2. Preparatory Survey

(1) Contents of the Survey

The aim of the Survey is to provide basic documents necessary for the appraisal of the the Project made by the GOJ and JICA. The contents of the Survey are as follows:

- Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of

relevant agencies of the Recipient necessary for the implementation of the Project.

- Evaluation of the feasibility of the Project to be implemented under the Japanese Grant from a technical, financial, social and economic point of view.
- Confirmation of items agreed between both parties concerning the basic concept of the Project.
- Preparation of an outline design of the Project.
- Estimation of costs of the Project.
- Confirmation of Environmental and Social Considerations

The contents of the original request by the Recipient are not necessarily approved in their initial form. The Outline Design of the Project is confirmed based on the guidelines of the Japanese Grant.

JICA requests the Recipient to take measures necessary to achieve its self-reliance in the implementation of the Project. Such measures must be guaranteed even though they may fall outside of the jurisdiction of the executing agency of the Project. Therefore, the contents of the Project are confirmed by all relevant organizations of the Recipient based on the Minutes of Discussions.

(2) Selection of Consultants

For smooth implementation of the Survey, JICA contracts with (a) consulting firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms.

(3) Result of the Survey

JICA reviews the report on the results of the Survey and recommends the GOJ to appraise the implementation of the Project after confirming the feasibility of the Project.

3. Basic Principles of Project Grants

(1) Implementation Stage

1) The E/N and the G/A

After the Project is approved by the Cabinet of Japan, the Exchange of Notes (hereinafter referred to as "the E/N") will be singed between the GOJ and the Government of the Recipient to make a pledge for assistance, which is followed by the conclusion of the G/A between JICA and the Recipient to define the necessary articles, in accordance with the E/N, to implement the Project, such as conditions of disbursement, responsibilities of the Recipient, and procurement conditions. The terms and conditions generally applicable to the Japanese Grant are stipulated in the "General Terms and Conditions for Japanese Grant (January 2016)."

2) Banking Arrangements (B/A) (See "Financial Flow of Japanese Grant (A/P Type)" for details)

a) The Recipient shall open an account or shall cause its designated authority to open an account under the name of the Recipient in the Bank, in principle. JICA will disburse the Japanese Grant in Japanese yen for the Recipient to cover the obligations incurred by the Recipient under the verified contracts.

b) The Japanese Grant will be disbursed when payment requests are submitted by the Bank to JICA under an Authorization to Pay (A/P) issued by the Recipient.

3) Procurement Procedure

The products and/or services necessary for the implementation of the Project shall be procured in accordance with JICA's procurement guidelines as stipulated in the G/A.

4) Selection of Consultants

In order to maintain technical consistency, the consulting firm(s) which conducted the Survey will be recommended by JICA to the Recipient to continue to work on the Project's implementation after the E/N and G/A.

5) Eligible Source Country

In using the Japanese Grant disbursed by JICA for the purchase of products and/or services, the eligible source countries of such products and/or services shall be Japan and/or the Recipient. The Japanese Grant may be used for the purchase of the products and/or services of a third country as eligible, if necessary, taking into account the quality, competitiveness and economic rationality of products and/or services necessary for achieving the objective of the Project. However, the prime contractors, namely, constructing and procurement firms, and the prime consulting firm, which enter into contracts with the Recipient, are limited to "Japanese nationals", in principle.

6) Contracts and Concurrence by JICA

The Recipient will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be concurred by JICA in order to be verified as eligible for using the Japanese Grant.

7) Monitoring

The Recipient is required to take their initiative to carefully monitor the progress of the Project in order to ensure its smooth implementation as part of their responsibility in the G/A, and to regularly report to JICA about its status by using the Project Monitoring Report (PMR).

8) Safety Measures

The Recipient must ensure that the safety is highly observed during the implementation of the Project.

9) Construction Quality Control Meeting

Construction Quality Control Meeting (hereinafter referred to as the "Meeting") will be held for quality assurance and smooth implementation of the Works at each stage of the Works. The member of the Meeting will be composed by the

Recipient (or executing agency), the Consultant, the Contractor and JICA. The functions of the Meeting are as followings:

a) Sharing information on the objective, concept and conditions of design from the Contractor, before start of construction.

b) Discussing the issues affecting the Works such as modification of the design, test, inspection, safety control and the Client's obligation, during of construction.

(2) Ex-post Monitoring and Evaluation Stage

1) After the project completion, JICA will continue to keep in close contact with the Recipient in order to monitor that the outputs of the Project is used and maintained properly to attain its expected outcomes.

2) In principle, JICA will conduct ex-post evaluation of the Project after three years from the completion. It is required for the Recipient to furnish any necessary information as JICA may reasonably request.

(3) Others

1) Environmental and Social Considerations

The Recipient shall carefully consider environmental and social impacts by the Project and must comply with the environmental regulations of the Recipient and JICA Guidelines for Environmental and Social Considerations (April, 2010).

2) Major Undertakings to Be Taken by the Government of the Recipient

For the smooth and proper implementation of the Project, the Recipient is required to undertake necessary measures including land acquisition, and bear an advising commission of the A/P and payment commissions paid to the Bank as agreed with the GOJ and/or JICA. The Government of the Recipient shall ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the Recipient with respect to the purchase of the Products and/or the Services be exempted or be borne by its designated authority without using the Grant and its accrued interest, since the grant fund comes from the Japanese taxpayers.

3) Proper Use

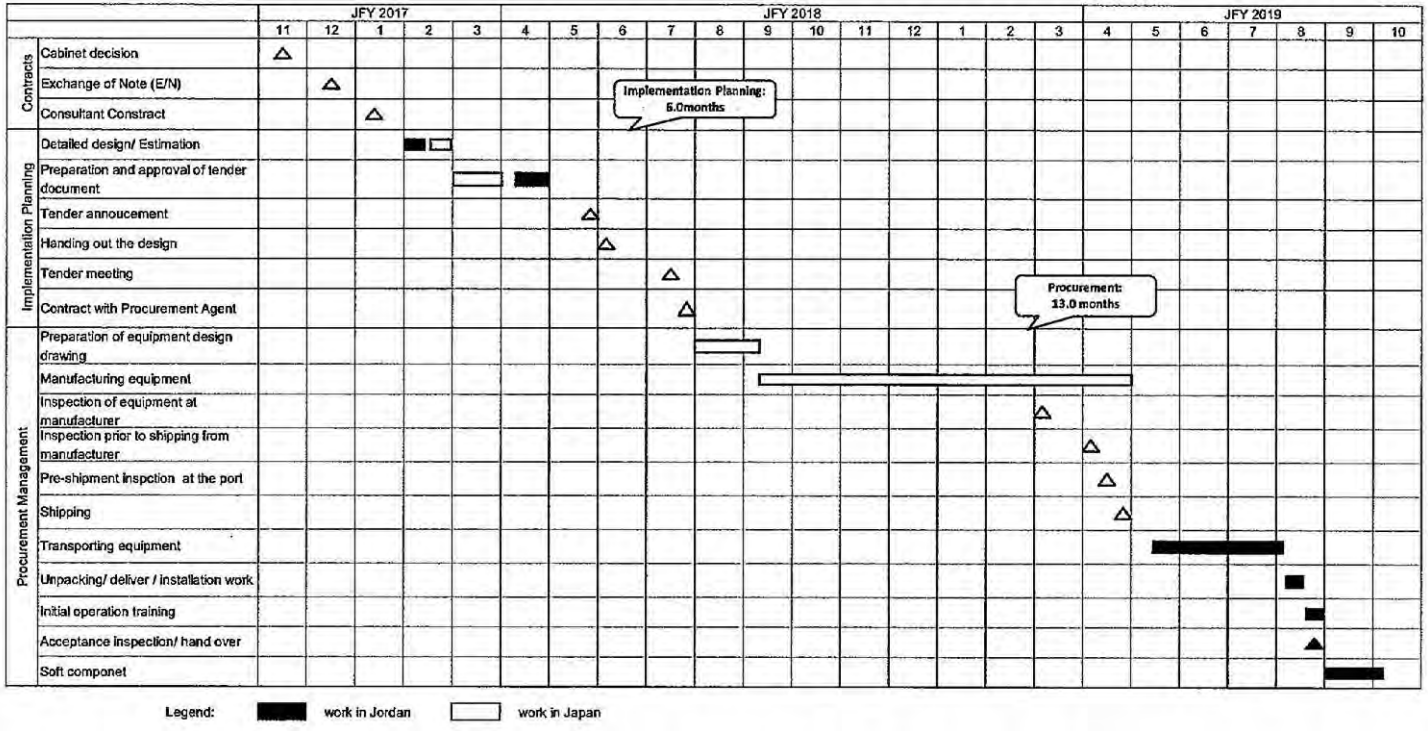
The Recipient is required to maintain and use properly and effectively the products and/or services under the Project (including the facilities constructed and the equipment purchased), to assign staff necessary for this operation and maintenance and to bear all the expenses other than those covered by the Japanese Grant.

4) Export and Re-export

The products purchased under the Japanese Grant should not be exported or re-exported from the Recipient.

Annex 6

Project Implementation Schedule



Annex 7

Major Undertakings to be taken by the Government of Jordan

1. Specific obligations of the Government of Jordan which will not be funded with the Grant

(1) Before the Tender

NO	Items	Deadline	In charge	Estimated Cost
1	To open a bank account (Banking Arrangement (B/A))	Within 1 month after G/A	MOMA	
2	To issue Authorization to Pay (A/P) to a bank in Japan (the Agent Bank) for the payment to the consultant	Within 1 month after the singing of the contract	MOMA	
3	To bear the following commissions paid to the Japanese bank for banking services based upon the B/A			
	1) Advising commission of A/P	Within 1 month after the singing of the contract	MOMA	25JD
	2) Payment commission for A/P	Every payment	MOMA	355JD+α
4	1)To supervise the construction of the transfer station in Jerash by UNDP 2) To bear the responsibility of facility design and equipment design 3) To comply with the confirmations understood by both JICA and UNDP in regard to the facility design in supervising facility construction 4) To thoroughly understand the detailed design drawings and construction specifications, most of which will be prepared by UNDP contractors, in order to make sure that equipment installation and test operation will be executed smoothly 5) To Provide necessary information for smooth implementation of the Japanese Grant Aid Project, such as the detailed design drawings, specifications of construction work and progress report of construction work by UNDP	During the Project	MOMA	
5	To make the agreement between MOMA and UNDP on the basic responsibilities of Jerash transfer station	Before the approval of Japanese Cabinet	MOMA	
6	To submit Project Monitoring Report (with the result of Detail Design)	Before preparation of bidding documents		

(B/A: Banking Arrangement, A/P: Authorization to Pay, MOMA: Ministry of Municipal Affairs)

(2) During the Project Implementation

NO	Items	Deadline	In charge	Estimated Cost
1	To issue Authorization to Pay (A/P) to a bank in Japan (the Agent Bank) for the payment to the Supplier(s)			

2	To bear the following commissions to a bank of Japan for the banking services based upon the B/A			
	1) Advising commission of A/P	Within 1 month after the singing of the contract(s)	MOMA	25JD
	2) Payment commission for A/P	Every payment	MOMA	14,200JD+α
3	To ensure prompt unloading and customs clearance at the port(s) of disembarkation in recipient country and to assist the Supplier(s) with internal transportation therein	During the Project	MOMA	
4	To accord Japanese physical persons and/or physical persons of third countries whose services may be required in connection with the supply of the products and the services such facilities as may be necessary for their entry into the country of the Recipient and stay therein for the performance of their work	During the Project	MOPIC MOI MOMA	
5	To ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the country of the Recipient with respect to the purchase of the products and/or the services be exempted or be borne by the designated authority without using the Grant	During the Project	MOPIC MOF MOMA	
6	To bear all the expenses, other than those to be borne by the Grant Aid, necessary for construction of the facilities	During the Project	MOMA / JSC / ASAWM	
7	To assure the quality of the building and take responsibility to resolve any deficiencies which might become obstacles for the installation and operation of the equipment provided by the Project	Before the installation of equipment	MOMA	
8	To coordinate both the construction and the installation of the equipment of the transfer station in Jerash		MOMA	
9	1) To submit Project Monitoring Report after each work under the contract(s) such as shipping, hand over, installation and operational training	Within one month after completion of each work	MOMA	
	2) To submit Project Monitoring Report (final)	Within one month after signing of Certificate of Completion for the works under the contract(s)	MOMA	
10	To submit a report concerning completion of the Project	Within six months after completion of the Project	MOMA	
11	To ensure storage space for the procured equipment	Before arrival of equipment	MOMA/ JSC/ ASAWM	
12	To ensure assignment of trainees to be trained in operation of procured equipment	Before the initial training	MOMA/ JSC/ ASAWM	
13	To transport the procured equipment to the site(s) where it will be utilized in case where it is handed over to the Jordan side at a location besides the actual site(s) of utilization	After arrival of equipment at Huseyneyat DS	MOMA	18,207 JD
14	Installation of compaction unit to existing transfer stations (Rabiet Al-Kura, Ajloun and Al Shoneh Al-Wsta)			
	1) To secure space for the operation rooms and the hoppers of the	Before the	MOMA/	

	additional compaction units	installation of equipment	JSC/ ASAWM	
	2) To install electrical wiring to the operation rooms for the operation of compaction units			7,000 JD
15	Installation of compaction unit at Jerash transfer station 1) To comprehensively supervise the construction, equipment procurement and installation and test operation of Jerash transfer station. Comprehensive supervision includes monitoring and control of the facility during the period from the completion of UNDP's facility construction to the commencement of equipment installation 2) To take the responsibility to deal with any troubles which are caused by facility construction and found during equipment installation and test operation, or even after the commencement of actual operation 3) To employ 12 operators for waste transferring and transporting work in Jerash transfer station	During the Project	MOMA	
16	To register procured vehicles and equipment	During the Project	MOMA	

(B/A: Banking Arrangement, A/P: Authorization to Pay, MOMA: Ministry of Municipal Affairs, MOPIC: Ministry of Planning and International Cooperation, MOF; Ministry of Finance, MOI: Ministry of Interior, JSC: Joint Services Council, ASAWM: Al Shoneh Al Wsta Municipality)

(3) After the Project

NO	Items	Deadline	In charge	Estimated Cost
1	To maintain and use properly and effectively the equipment provided under the Grant Aid 1) Allocation of maintenance cost 2) Operation and maintenance structure 3) Routine check/Periodic inspection	After completion of the Project	MOMA/ JSC/ ASAWM	(5 TSs) 57,000 JD/year (5 DSs) 75,000 JD/year
2	To bear cost for the manpower and fuel required for procured equipment	Before the initial training	MOMA/ JSC/ ASAWM	(5 TSs) 501,000 JD/year (5 DSs) 579,000 JD/year
3	To bear electrical charges for Jerash TS	After completion of the Project	MOMA/ JSC	33,000 JD/year
4	To provide necessary support to related JSCs and Municipality for facility operation and maintenance after the Japanese Grant Aid Project's equipment installation and test operation	After completion of the Project	MOMA	
5	To instruct JSCs and ASAWM of the TS that they should instruct municipalities of the TS not bring the construction waste to the TS in order to avoid the trouble of the compaction unit.	After completion of the Project	MOMA	

(B/A: Banking Arrangement, A/P: Authorization to Pay, MOMA: Ministry of Municipal Affairs, JSC: Joint Services Council, ASAWM: Al Shoneh Al Wsta Municipality)

Project Monitoring Report
on
Project Name
Grant Agreement No. XXXXXXX
20XX, Month

Organizational Information

Signer of the G/A (Recipient)	Person in Charge (Designation) Contacts Address: Phone/FAX: Email:
Executing Agency	Person in Charge (Designation) Contacts Address: Phone/FAX: Email:
Line Ministry	Person in Charge (Designation) Contacts Address: Phone/FAX: Email:

General Information:

Project Title	
E/N	Signed date: Duration:
G/A	Signed date: Duration:
Source of Finance	Government of Japan: Not exceeding JPY _____ mil. Government of (_____): _____

1: Project Description

1-1 Project Objective

1-2 Project Rationale

- Higher-level objectives to which the project contributes (national/regional/sectoral policies and strategies)
- Situation of the target groups to which the project addresses

1-3 Indicators for measurement of "Effectiveness"

Quantitative indicators to measure the attainment of project objectives		
Indicators	Original (Yr)	Target (Yr)
Qualitative indicators to measure the attainment of project objectives		

2: Details of the Project

2-1 Location

Components	Original *(proposed in the outline design)*	Actual
1.		

2-2 Scope of the work

Components	Original* *(proposed in the outline design)*	Actual*
1.		

Reasons for modification of scope (if any).

(PMR)

2-3 Implementation Schedule

Items	Original		Actual
	(proposed in the outline design)	*(at the time of signing the Grant Agreement)*	

Reasons for any changes of the schedule, and their effects on the project (if any)

2-4 Obligations by the Recipient

2-4-1 Progress of Specific Obligations

See Attachment 2.

2-4-2 Activities

See Attachment 3.

2-4-3 Report on RD

See Attachment 11.

2-5 Project Cost

2-5-1 Cost borne by the Grant(Confidential until the Bidding)

Components			Cost (Million Yen)	
	Original *(proposed in the outline design)*	Actual *(in case of any modification)*	Original[1),2)] *(proposed in the outline design)*	Actual
	1.			
Total				

Note: 1) Date of estimation:
2) Exchange rate: 1 US Dollar = Yen

2-5-2 Cost borne by the Recipient

Components			Cost (1,000 Taka)	
	Original *(proposed in the outline design)*	Actual *(in case of any modification)*	Original[1),2)] *(proposed in the outline design)*	Actual
	1.			

Note: 1) Date of estimation:
2) Exchange rate: 1 US Dollar =

Reasons for the remarkable gaps between the original and actual cost, and the countermeasures (if any)

(PMR)

2-6 Executing Agency

- Organization's role, financial position, capacity, cost recovery etc,
- Organization Chart including the unit in charge of the implementation and number of employees.

Original *(at the time of outline design)* name: role: financial situation: institutional and organizational arrangement (organogram): human resources (number and ability of staff):
Actual *(PMR)*

2-7 Environmental and Social Impacts

- The results of environmental monitoring based on Attachment 5 (in accordance with Schedule 4 of the Grant Agreement).
- The results of social monitoring based on in Attachment 5 (in accordance with Schedule 4 of the Grant Agreement).
- Disclosed information related to results of environmental and social monitoring to local stakeholders (whenever applicable).

3: Operation and Maintenance (O&M)

3-1 Physical Arrangement

- Plan for O&M (number and skills of the staff in the responsible division or section, availability of manuals and guidelines, availability of spareparts, etc.)

Original *(at the time of outline design)*
Actual *(PMR)*

3-2 Budgetary Arrangement

- Required O&M cost and actual budget allocation for O&M

Original *(at the time of outline design)*

Actual *(PMR)*

4: Potential Risks and Mitigation Measures

- Potential risks which may affect the project implementation, attainment of objectives, sustainability
- Mitigation measures corresponding to the potential risks

Assessment of Potential Risks *(at the time of outline design)*

Potential Risks	Assessment
1. (Description of Risk)	Probability: High/Moderate/Low
	Impact: High/Moderate/Low
	Analysis of Probability and Impact:
	Mitigation Measures:
	Action required during the implementation stage:
	Contingency Plan (if applicable):
2. (Description of Risk)	Probability: High/Moderate/Low
	Impact: High/Moderate/Low
	Analysis of Probability and Impact:
	Mitigation Measures:
	Action required during the implementation stage:
	Contingency Plan (if applicable):
3. (Description of Risk)	Probability: High/Moderate/Low
	Impact: High/Moderate/Low
	Analysis of Probability and Impact:
	Mitigation Measures:
	Action required during the implementation stage:

	Contingency Plan (if applicable):
Actual Situation and Countermeasures	
(PMR)	

5: Evaluation and Monitoring Plan (after the work completion)

5-1 Overall evaluation

Please describe your overall evaluation on the project.

5-2 Lessons Learnt and Recommendations

Please raise any lessons learned from the project experience, which might be valuable for the future assistance or similar type of projects, as well as any recommendations, which might be beneficial for better realization of the project effect, impact and assurance of sustainability.

5-3 Monitoring Plan of the Indicators for Post-Evaluation

Please describe monitoring methods, section(s)/department(s) in charge of monitoring, frequency, the term to monitor the indicators stipulated in 1-3.

Attachment

1. Project Location Map
2. Specific obligations of the Recipient which will not be funded with the Grant
3. Monthly Report submitted by the Consultant

Appendix - Photocopy of Contractor's Progress Report (if any)
- Consultant Member List
- Contractor's Main Staff List

4. Check list for the Contract (including Record of Amendment of the Contract/Agreement and Schedule of Payment)
5. Environmental Monitoring Form / Social Monitoring Form
6. Monitoring sheet on price of specified materials (Quarterly)
7. Report on Proportion of Procurement (Recipient Country, Japan and Third Countries) (PMR (final)only)
8. Pictures (by JPEG style by CD-R) (PMR (final)only)
9. Equipment List (PMR (final)only)
10. Drawing (PMR (final)only)
11. Report on RD (After project)

Attachment 6

Monitoring sheet on price of specified materials

1. Initial Conditions (Confirmed)

	Items of Specified Materials	Initial Volume A	Initial Unit Price (¥) B	Initial total Price C=A×B	1% of Contract Price D	Condition of payment	
						Price (Decreased) E=C−D	Price (Increased) F=C+D
1	Item 1	●●t	●	●	●	●	●
2	Item 2	●●t	●	●	●		
3	Item 3						
4	Item 4						
5	Item 5						

2. Monitoring of the Unit Price of Specified Materials

(1) Method of Monitoring : ●●

(2) Result of the Monitoring Survey on Unit Price for each specified materials

	Items of Specified Materials	1st ●month, 2015	2nd ●month, 2015	3rd ●month, 2015	4th	5th	6th
1	Item 1						
2	Item 2						
3	Item 3						
4	Item 4						
5	Item 5						

(3) Summary of Discussion with Contractor (if necessary)

-

-

-

Attachment 7

Report on Proportion of Procurement (Recipient Country, Japan and Third Countries)
(Actual Expenditure by Construction and Equipment each)

	Domestic Procurement (Recipient Country) A	Foreign Procurement (Japan) B	Foreign Procurement (Third Countries) C	Total D
Construction Cost	(A/D%)	(B/D%)	(C/D%)	
Direct Construction Cost	(A/D%)	(B/D%)	(C/D%)	
others	(A/D%)	(B/D%)	(C/D%)	
Equipment Cost	(A/D%)	(B/D%)	(C/D%)	
Design and Supervision Cost	(A/D%)	(B/D%)	(C/D%)	
Total	(A/D%)	(B/D%)	(C/D%)	

Technical Note
regarding the Collaboration on the Construction of Jerash Transfer Station

Based on the several preliminary discussions between the Government of Hashemite Kingdom of Jordan (hereinafter referred to as "Jordan") and the Government of Japan (hereinafter referred to as "Japan"), Japan decided to conduct a Preparatory Survey for the Project for Improvement of Waste Management Equipment in Northern Region Hosting Syrian Refugees (hereinafter referred to as "the Japanese Grant Aid Project"), and entrusted the Preparatory Survey to Japan International Cooperation Agency (hereinafter referred to as "JICA").

JICA dispatched the Preparatory Survey Team to Jordan, headed by Kazunao Shibata, Director of Environmental Management Team 2, Environmental Management Group, Global Environment Department, JICA, from 15th January to 2nd March, 2017.

Following a request from Jordan and United Nations Development Programme (hereinafter referred to as "UNDP"), and based on the result of Preparatory Survey, UNDP and JICA (hereinafter referred to as "both sides") discussed the collaboration on the construction of Jerash Transfer Station. In the course of the discussions, both sides have confirmed the main items described in the following documents.

Amman, 14 August, 2017

Mr. Tsutomu Kobayashi	Mr. Anders Pederson
Chief Representative	UN Resident Coordinator
Japan International Cooperation Agency (JICA)	UNDP Resident Representative
Jordan Office	Jordan

1. Objectives of Technical Note

For the development of Jerash transfer station, UNDP shall be responsible for its plan, design and facility construction while the Japanese Grant Aid Project shall be responsible for equipment procurement, its installation, test operation and operation training based on the UNDP's plan and that all these works will be supervised by Ministry of Municipal Affairs (hereinafter referred to as "MOMA").

According to the time schedule expected as of August 2017 (See Figure 1), however, equipment installation will only take place one year after the completion of UNDP's facility construction because of the difference in period of fund availability of both projects.

In developing transfer stations or any facilities that requires large-scale equipment with installation, it is a typical practice to carry out facility construction and equipment installation simultaneously to allow overall coordination.

The objectives of this Technical Note is to clarify the plan, design and schedule of the development of Jerash transfer station as well as the responsibilities of UNDP and the Japanese Grant Aid Project in order to ensure smooth project implementation and the proper start-up of Jerash transfer station by Irbid JSC. Based on this Technical Note, JICA will confirm with MOMA its responsibilities for the Japanese Grant Aid Project in late August 2017. If necessary, any matters in the Technical Note shall be discussed by the three parties (MOMA, UNDP and JICA) and maybe be amended through mutual agreement. After the approval of Japanese Cabinet and the signing of a Grant Agreement between MOMA and JICA, MOMA will take the responsibility of the implementation of the Japanese Grant Aid Project.

2. Responsibilities of MOMA, UNDP and the Japanese Grant Aid project

For the development of Jerash transfer station, both sides have confirmed the basic responsibilities of MOMA, UNDP and the Japanese Grant Aid Project as follows:

2.1. Responsibilities of MOMA

Both sides have a common understanding that MOMA has the primary responsibility for the plan, construction, operation and management of Jerash transfer station, as follows:

(1) Supervision of design and facility construction by UNDP;
(2) Monitoring, maintenance and control of the facility during the approximately one-year period from the completion of UNDP's facility construction to facility handover;
(3) Supervision of detailed design, procurement and installation of equipment by the Japanese Grant Aid Project;
(4) Provision of necessary support to Irbid JSC for facility operation and maintenance after the Japanese Grant Aid Project's equipment installation and test operation.

2.2. Responsibilities of UNDP

UNDP has responsibility for the following for the development of Jerash transfer station:

(1) Plan formulation, design drawing and facility construction;
(2) Defect liability in regard to the plan, design and construction of the transfer station;
(3) In other words, resolution of troubles whose causes are attributed to the plan, design and/or construction of the transfer station.

2.3. Responsibilities of the Japanese Grant Aid Project

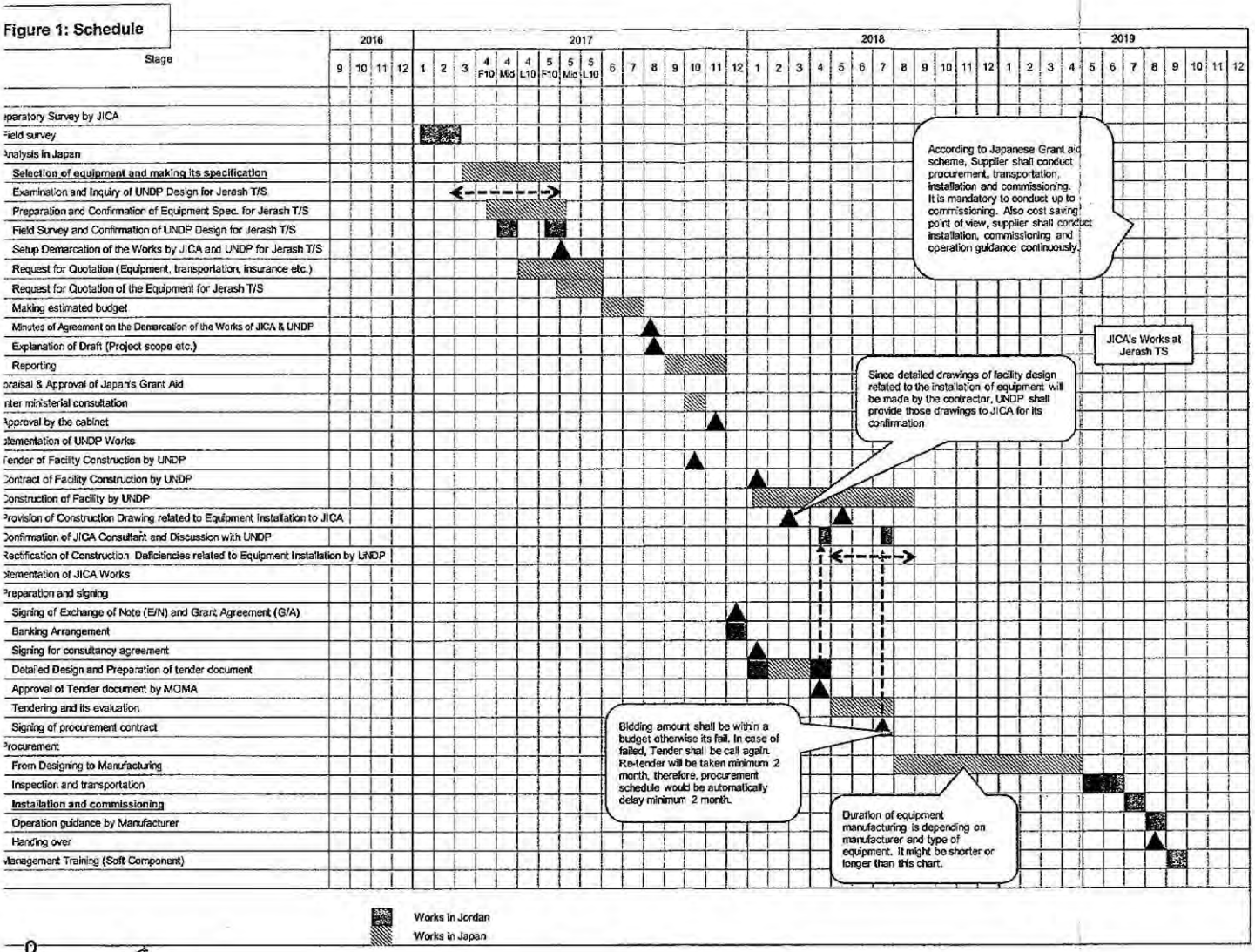
The Japanese Grant Aid Project has responsibility for the following for the development of Jerash transfer station:

(1) Detailed design, procurement and installation of equipment in conformity to the plan and design by UNDP;
(2) Resolution of troubles whose causes are attributed to the procurement and/or installation of equipment not in conformity to the plan and design by UNDP;
(3) Test operation and operation training of equipment that is procured and installed by the Japanese Grant Aid Project.

3. Schedule of Development of Jerash Transfer Station

Both sides have confirmed the planned schedule of facility construction by UNDP and equipment procurement and installation by the Japanese Grant Aid Project of Jerash transfer station as shown in the Figure below.

Figure 1: Schedule



4. Plan and Design of Jerash Transfer Station

It is indispensable to coordinate facility construction and equipment procurement and installation for smooth and proper operation of Jerash transfer station. JICA and UNDP, therefore, have confirmed the plan and design of the transfer station made by UNDP as described below.

4.1. Layout Plan

The following issues on the layout plan were confirmed:

4.1.1. On-site Road

The width of the on-site road should be at least 4.0 meters to secure smooth traffic of transfer vehicles and armroll trucks even at the section indicated by A-A in Figure 2.

4.1.2. Provision of Utilities

The following utilities will be provided as shown in the Figure 2:

- Water supply system;
- Wastewater collection and storage system for compaction unit as shown in cross-section B-B;
- Electric line and manholes; and
- Rain water drainage system.

4.2. Compaction Unit Plan

The following issues on the compaction unit plan were confirmed:

- **The compaction unit building** is constructed by UNDP as shown in Figure 3: Cross Section and Figure 4: Plan.
- For **installation of the Hopper**, the open space of 4.0m (width) x 4.2m (length) is provided as part of the facility construction of UNDP as shown in Figure 4
- **Foundation of the compaction unit** is constructed as part of the facility construction of UNDP as shown in Figure 3 and 4.
- **The electric line** is provided as part of the facility construction of UNDP as shown in Figure 4.
- **Wastewater** from the compaction unit is collected and stored as shown in Figures 3 and 4. Those waste water collection and storage system are provided as part of the facility construction of UNDP.
- **The control room with steps** is provided as part of the facility construction of UNDP as shown in Figure 3 and 4. The size of the room is about 3.5 (width) x 3.5 (length) x 2.5 (height).

4.3. Traversing System Plan

The following issues on the traversing system plan were confirmed:

- **Foundation of the traversing system** is constructed as part of the facility construction of UNDP as shown in Figure 4.
- **The barrier curb** to stop the armroll trucks so as not to damage the traversing system is constructed by UNDP as shown in Figure 4.
- **The electric line** for the traversing system is installed by the equipment supplier.
- **The pit for the weighing system** is provided as part of the facility construction of UNDP as shown in Figures 3 and 5.

4.4. Other Issues

In addition to the above the following issues were confirmed:

- Detailed design of the facility will be made by the facility construction contractor according to UNDP. **Detailed drawings** of the above mentioned plans shall be provided by the UNDP as soon as the drawings are made. Those drawings shall follows the issues confirmed as above.
- According to the UNDP plan, **water and washing machine** to wash the hopper and compaction unit are provided by Irbid JSC.

Figure 2: Layout Plan

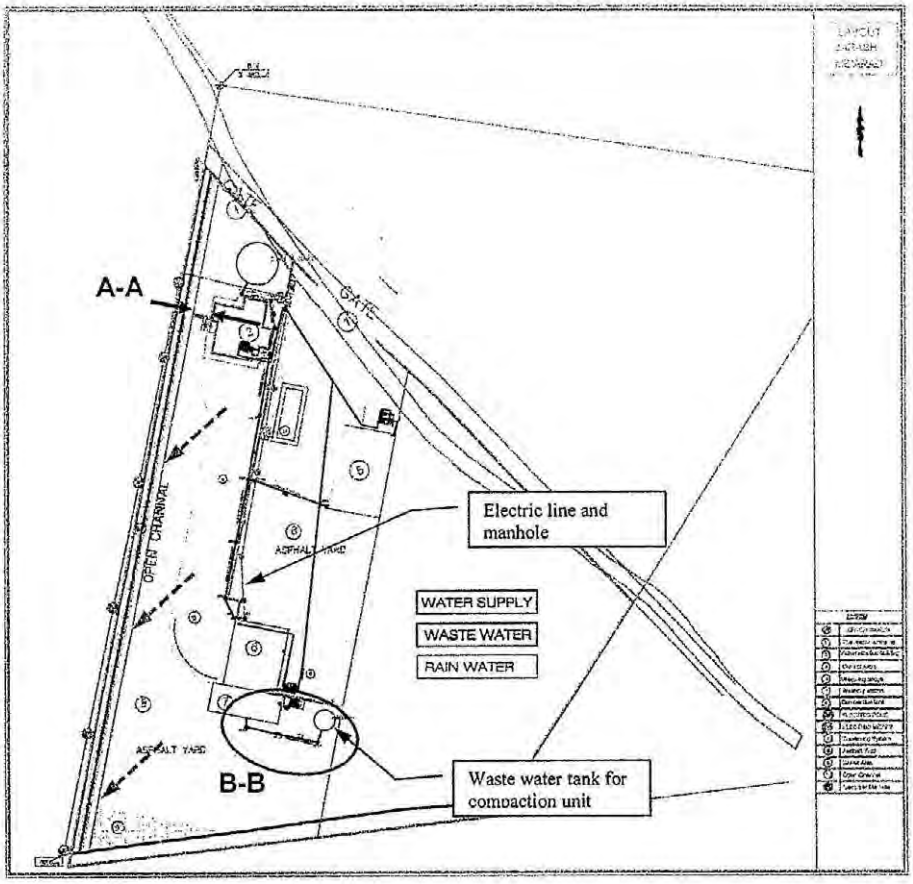


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Figure 3: Cross Section of Compaction Unit Building

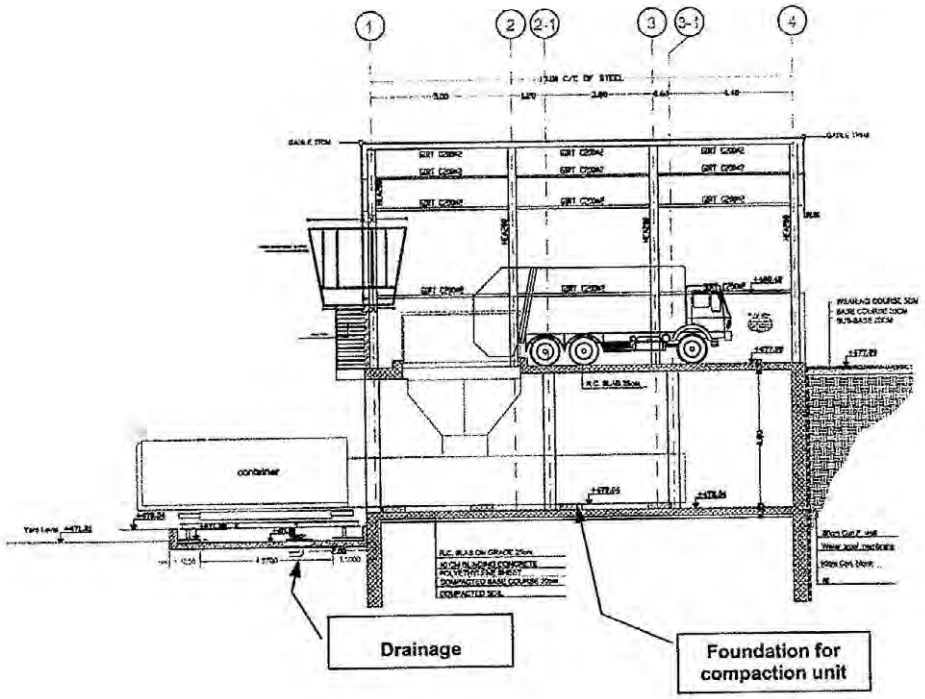

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Figure 4: Plan of Compaction Unit Building

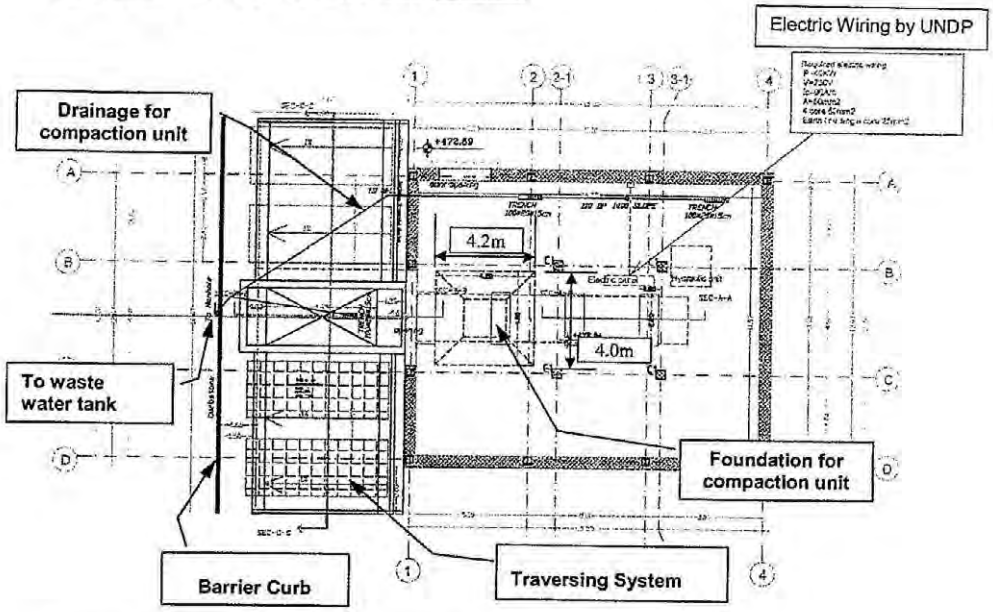
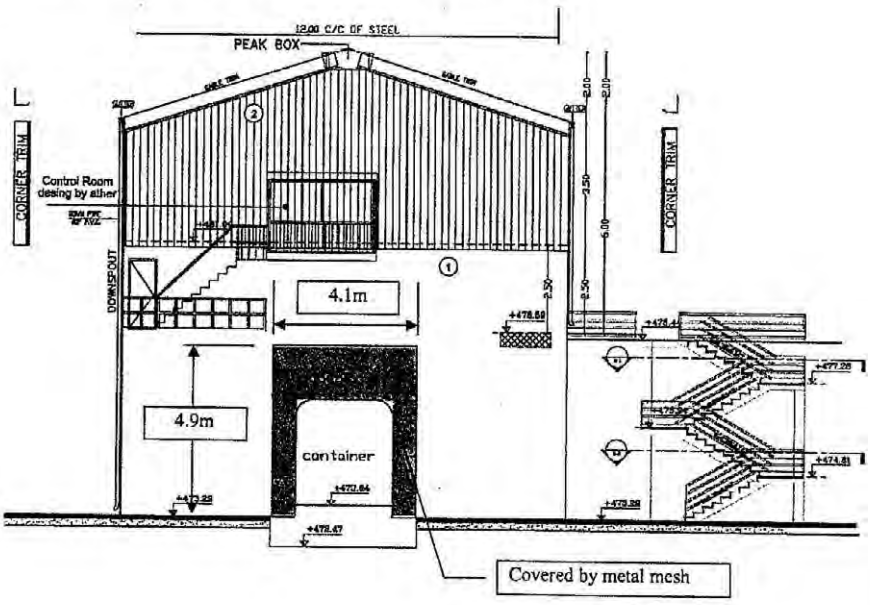


Figure 5: Side View of Compaction Unit Building



9

A5 Soft Component Plan

The Hashemite Kingdom of Jordan
Ministry of Municipal Affairs

Project for Improvement of Waste Management Equipment in Northern Region Hosting Syrian Refugees in The Hashemite Kingdom of Jordan

Soft Component Plan

August 2017

Japan International Cooperation Agency
(JICA)

Kokusai Kogyo Co., Ltd.

Contents

1 Background of the Soft Component Plan

"Project for Improvement of Waste Management Equipment in Northern Region Hosting Syrian Refugees" (hereafter refer to as the Project) is to assist the development and upgrading of the waste transfer stations and the final disposal sites in the norther region (Governorates of Irbid, Mafraq, Ajloun, Zarqa, Balqa and Jerash) which has been largely influenced by the rapid increase of waste volume due to the refugee influx. It then aims to contribute to the improved sanitation and living conditions of the local residents as well as the Syrian refugees in the target region.

There are 12 sites of existing or planned transfer stations (hereafter referred to as TS, eight existing sites and four new sites) and 14 final disposal sites (hereafter referred to as FDS, 12 existing sites and two new sites) in the region. Among those, five TS (four existing sites and one new site) and five FDS (all are existing sites) were selected as shown in the table below to be covered by the Project.

Table 1: Facilities to be Covered by the Project

Target Facilities		Type	Users	Operation Body
TS01	Aghwar Al Shamaliyah	Existing TS	5 Municipalities	Aghwar Al Shamaliyah JSC
TS02	Rabiet Al-Kura	Existing TS	3 Municipalities	Rabiet Al-Kura JSC
TS03	Ajloun	Existing TS	5 Municipalities	Ajloun JSC
TS09	Al Shoneh Al-Wsta	Existing TS	2 Municipalities	Al Shoneh Al-Wsta Municipality
TP03	Jerash*	New TS	4 Municipalities	Irbid JSC
DS02	Al Ekaider	Existing FDS	18 Municipalities and 4 TS (13 Municipalities)	
DS05	Al Huseyneyat	Existing FDS	8 Municipalities	Mafraq JSC
DS06	Al Badiah Al Shamaliyah	Existing FDS	4 Municipalities	Badiah Shamaliyah JSC
DS07	Al Duleil	Existing FDS	4 Municipalities	Zarqa JSC
DS09	New Dair Alla	Existing FDS	3 Municipalities and one TS (2 Municipalities)	Al Shoneh Al-Wsta JSC

*Note: TP03 Jerash TS is the planned facility. The number of user municipalities are the planned figure for the year 2022. Other information is based on the survey in 2017.

The facilities listed above are categorized into three types as follows. The implementation of the Project will solve the problem of physical capacity shortage in waste transfer and transportation and final disposal at those facilities. Nevertheless, in order to appropriately operate and maintain the facilities and to perform waste management as planned, they still have to handle the following issues respectively.

1. Existing TS (TS01, TS02, TS03, TS09): Operation and maintenance plans of the facility and equipment and facility operation structure are not yet well designed or established. This has been causing such problems as serious time loss of primary waste collection vehicles at the TS, waste disposal at the adjacent unofficial disposal site, waste dumping in the premises of the TS, frequent malfunction of waste transfer and transportation equipment, and others.

   - Operation and Maintenance (O&M) Plan: The incoming schedule of primary collection vehicles (collection area, incoming time and quantity, etc.) is not indicated. There is no transfer and transportation plan corresponding to the incoming schedule of the primary collection vehicle. Only incoming records pertaining to the disposal fee at the disposal site, and incoming / outgoing records are not maintained.
   - Operation Structure: Firstly, there is no sufficient equipment to respond to transfer and transportation demand. Preventive maintenance of equipment (cleaning, planned repair /

maintenance, etc.) is insufficient.

2. Planned TS (TP03): The TS to be newly constructed will employ indoor-type structure unlike the other existing TS which are mostly outdoor-type. Therefore, the operation and maintenance system should be newly established.
   - Formulation of O&M Plan: Personnel plan concerning O&M of equipment to be procured. Incoming schedule of primary collection vehicles. Transfer and transportation plan. Development of incoming / outgoing records.
   - Operation Structure: Securing and training personnel involved in the O&M of equipment to be Procured. Establishment of preventive maintenance system of equipment (cleaning, planned repair / maintenance, etc.).
3. Existing FDS (DS02, DS05, DS06, DS07, DS09): Since operation and maintenance plans of the facility and equipment and facility operation structure are not yet well designed or established, problems such as waste scattering, waste dumping in the non-designated area, frequent breakdown of waste disposal equipment and so on have been taking place.
   - O&M Plan: There is not sufficient landfill plan prepared for unloading area, excavation area of covering soil, etc. There is also no drawing showing the landfill operation plan. The plan to use heavy machinery for landfill has not been developed, such as using wheel loader for levelling and compaction of MSW.
   - Operation Structure: Firstly, there are not sufficient equipment (such as an excavator for covering soil excavation, etc.) that responds to the demand for sanitary landfill. Preventive maintenance of equipment (cleaning, planned repair / maintenance etc.) is insufficient.

With the understanding of these issues, (i) the formulation of the proper operation and maintenance plans and (ii) the establishment of the plan implementation structure are inevitable for the JSCs and the municipality, which are responsible for the operation and maintenance of equipment to be provided by the Project. The technical assistance through the Project's soft component is necessary to support the JSCs and the municipality in this light.

2 Objectives of the Soft Component

The soft component will assist the establishment of operation and maintenance system under the following objectives.

(1) The MSW transfer and transportation

(2) equipment to be procured for the existing TS is properly operated and maintained.

The Project will procure new waste compression equipment to three existing TS except for TS01 Aghwar TS. It will also procure waste transfer and transportation vehicles for all the four existing TS, which will transport planned amount of waste from each of the TS to the corresponding FDS. The soft component will formulate the operation and maintenance plans for the TS which will be necessary for the JSCs and the municipality to properly utilize the newly procured equipment and assist in enforcing the operation and maintenance system.

(3) To appropriately operate and maintain the new MSW transfer and transportation equipment to be procured by the Project for the new Jerash TS

The Project will procure waste compression equipment and waste transfer and transportation vehicles for the Jerash new TS, whereby planned amount of waste can be transported to Al Ekaider FDS. The soft component will formulate the TS operation and maintenance plan necessary for the Irbid JSC to properly utilize the newly procured equipment and vehicles and assist in enforcing the operation and

maintenance system.

(4) To appropriately operate and maintain the new waste disposal equipment to be procured by the Project

The Project will procure waste disposal equipment which is deemed necessary to properly dispose of the planned amount of waste considering the status of existing equipment at the five FDS based on the result of field surveys. The soft component will formulate the FDS operation and maintenance plans necessary for the JSC to properly utilize newly procured equipment and assist in enforcing the operation and maintenance system.

Since DS02 Al Ekaider is currently in a travel prohibited area of JICA project personnel, field survey by Japanese consultants and local assistants is not conducted, and the survey is conducted by inviting persons concerned to the Irbit JSC

3 Outputs of the Soft Component and Means of Verification

The objectives and outputs of the soft components and the means of their verification are shown in the following table.

Table 2: Objectives, Outputs and Means of Verifications

Objectives	Outputs	Means of Verification
1. The equipment for the existing TS is properly operated and maintained.	• The existing waste transfer and transportation plans and equipment operation and maintenance plans are reviewed and revised for the four existing TS in consideration of such factors as waste transfer and transportation amount from the municipalities and the haulage distance from the TS to the FDS.	• Revised waste transfer and transportation plans • Revised equipment operation and maintenance plans
2. The equipment for the new Jerash TS is properly operated and maintained.	• The waste transfer and transportation plan and equipment operation and maintenance plans will be formulated for the Jerash new TS in consideration of such factors as the waste transfer and transportation amount from the municipalities and the haulage distance from the TS to the FDS.	• Formulated waste transfer and transportation plan • Formulated equipment operation and maintenance plan
3. The equipment for the existing FDS is properly operated and maintained.	• The waste disposal plans and equipment operation and maintenance plans will be reviewed and revised for the five existing FDS in consideration of such factors as the waste disposal amount, waste composition and locational conditions.	• Revised waste disposal plans • Revised equipment operation and maintenance plans

4 Activities of the Soft Component (Plan of the Input)

To accomplish the aforementioned outputs, the field of training to be provided by the soft component will include the operation and maintenance of waste transfer and transportation equipment and the operation and maintenance of waste disposal equipment. It is to be noted that the initial instructions of the equipment will be provided during the operational guidance of the Project, while trainings for the effective operation and maintenance after the incipient period will be provided by the soft component.

Table 3: Work Demarcation between Operational Guidance and Soft Component

Items of Instructions	Operational Guidance	Soft Component
Initial instructions of waste transfer and transportation equipment and waste disposal equipment including: ● Basic equipment operation (how to use) ● Regular checks before use ● Trouble shooting	X	
Instructions of proper equipment operation and maintenance in order to achieve the project purposes including: ● Instructions for the review and revision of the waste transfer and transportation plans and the equipment operation and maintenance plans for the target four existing TS. ● Instructions for the formulation of the waste transfer and transportation plan and the equipment operation and maintenance plan for the new Jerash TS. ● Instructions for the review and revision of the waste disposal plans and the equipment operation and maintenance plans for the existing five TS.		X

The Project outputs and activities which will be carried out to achieve the outputs are presented in the table below.

Table 4: Activities of the Soft Component

Outputs	Activities
1. The existing waste transfer and transportation plans and equipment operation and maintenance plans are reviewed and revised for the four existing TS in consideration of such factors as waste transfer and transportation amount from the municipalities and the haulage distance from the TS to the FDS.	Activity 1: Instructions for the review and revision of the waste transfer and transportation plans and the equipment operation and maintenance plans for the target four existing TS. 1.1. Study and evaluation of the existing waste transfer and transportation plans, and the equipment operation and maintenance plans. 1.2. Assistance to formulate the improvement plans for operation of TS. 1.3. Assistance to formulate the equipment operation and maintenance plans. 1.4. Instruction to improve the equipment operation and maintenance system.
2. The waste transfer and transportation plan and equipment operation and maintenance plans will be formulated for the Jerash new TS in consideration of such factors as the waste transfer and transportation amount from the municipalities and the haulage distance from the TS to the FDS.	Activity 2: Instructions for the formulation of the waste transfer and transportation plan and the equipment operation and maintenance plan for the new Jerash TS. 2.1. Assistance to formulate the waste transfer and transportation plan. 2.2. Assistance to formulate the equipment operation and maintenance plan. 2.3. Assistance to develop the equipment operation and maintenance system.
3. The waste disposal plans and equipment operation and maintenance plans will be reviewed and revised for the five existing FDS in consideration of such factors as the waste disposal amount, waste composition and locational conditions.	Activity 3. Instructions for the review and revision of the waste disposal plans and the equipment operation and maintenance plans for the existing five TS. 3.1. Study and evaluation of the existing waste disposal plans and the equipment operation and maintenance plans. 3.2. Assistance to formulate the waste disposal plans. 3.3. Assistance to formulate the equipment operation and maintenance plan. 3.4. Instruction to improve the equipment operation and maintenance system.

Further details of each activity is described below.

4.1 Activity 1: Instructions for the review and revision of the waste transfer and transportation plans and the equipment operation and maintenance plans for the target four existing TS

Activity 1 will be carried out in the following process.

1.1. Identification of Current Issues: The waste transfer and transportation plans, and the equipment operation and maintenance system of the 4 target existing TSs will be studied. The issues to achieve the project objectives are then discussed and clarified by working together with the counterparts (C/Ps) of the target JSCs and the municipality. This activity is carried out by Japanese consultants, who visit the target four TS.

1.2. Formulation of improvement plans for operation and management of TS: To address the identified issues on operation and management system, the C/Ps will be assisted in revising the current waste transfer and transportation plans, and operation and management system. As for the waste transfer and transportation plans, the basic planning data such as the names of user municipalities, their waste volumes and the waste haulage distance to the FDS at the target year of 2022 will be provided to the C/Ps in order to help their plan revision works. As for the operation and management system, the revision of management of incoming and outgoing vehicles will need to eliminate such on-going problems as time loss of primary collection vehicles, direct haulage without waste transfer, and waste disposal in the adjacent area. For this activity, the C/Ps of the four TSs will gather at one place and discuss to revise their plans in a form of workshop.

1.3. Formulation of improvement plans for O&M of the equipment: At the same time the C/Ps will be assisted in planning the improvement of issues on the current O&M system. Since the Project will greatly increase the handling capacity of equipment compared to the ante-project level, the improvement planning of C/Ps will be assisted focusing on (1) management system (securing budget, supplementing personnel, operation of equipment, management of spare parts, etc.), (2) maintenance system (daily inspection, preventive maintenance, outsourcing, etc.). Since the Project will greatly increase the handling capacity of equipment compared to the ante-project level, the revision of equipment operation and maintenance plan will need to eliminate such on-going problems as time loss of primary collection vehicles, direct haulage without waste transfer and transportation and waste disposal in the adjacent area. For this activity, the C/Ps of the four TS will gather at one place and discuss to make their plans in a form of workshop.

1.4. Instruction to improve the equipment operation and maintenance system: To ensure the implementation of 1.2 improvement plans for operation and management of TS and 1.3 improvement plans for O&M of the equipment, operators of the TSs are directly instructed. Specifically, record keeping of in-coming and out-going waste amount (Data of incoming vehicles such as name of municipality and vehicle, arrival time and maximum loading capacity, Data of transportation vehicles: departure time) and elimination of time loss of primary collection vehicles are instructed for the operation and management of TS. Management of spare parts and preventive maintenance for equipment will be instructed for O&M of the equipment. For this activity, the Japanese consultants will visit the target four TS.

Table 5: Instructions for the Review and Revision of the Waste Transfer and transportation Plans and the Equipment Operation and Maintenance Plans for the Target Four Existing TS

Activities	Month and year	Japanese consultants (in charge of waste transfer and equipment)	Interpreters (Local resource)	JSCs and Municipality	
				Head of the TS, 4 persons	Officer in charge of planning, 4 persons
1.1. Study and evaluation of the existing waste transfer and transportation plans and equipment operation and	September and October, 2019	2 persons x 8 days	2 persons x 8 days	4 persons x 1 day	4 persons x 2 days

management plans					
1.2. Assistance to review the waste transfer and transportation plans		1 person x 3 days	1 person x 3 days	4 persons x 1 day	4 persons x 3 days
1.3. Assistance to review the equipment operation and maintenance plans		1 person x 3 days	1 person x 3 days	4 persons x 1 day	4 persons x 3 days
1.4. Instruction to enforce the equipment operation and maintenance system		2 persons x 8 days	2 persons x 8 days	4 persons x 1 day	4 persons x 2 days
Total (Number of Working Days)		38 person-day	38 person-ay	16 person-ay	40 person-ay

4.2 Activity 2: Instructions for the formulation of the waste transfer and transportation plan and the equipment operation and maintenance plan for the new Jerash TS

The Jerash TS is a new and indoor-type facility unlike the TS operated by most other JSCs. The Irbid JSC, which will operate and maintain the Jerash TS, does not have experience of the operation and maintenance of any TS, either outdoor-type or indoor-type. Under such understanding, Activity 2 will be implemented as below.

2.1. In the formulation of the waste transfer and transportation plan, the basic planning data such as the names of user municipalities, their waste volumes and the waste haulage distance to the Al Ekaider FDS at the target year of 2022 will be provided to the Irbid JSC (C/P) in order to help their plan formulation works. For this activity, a Japanese consultant will visit the Jerash TS.

2.2. In order that the C/P can carry out the waste transfer and transportation plan, the formulation of the equipment O&M plan will be assisted. The plan formulation will include the management of in-coming and out-going waste by weighbridge (Data of incoming vehicles such as name of municipality and vehicle, arrival time and waste amount, Data of transportation vehicles: departure time), use of the data obtained, and maintenance (inspection and repair, washing, wastewater management, etc.) of the equipment such as compaction unit, transportation vehicles and containers. For this activity, a Japanese consultant will visit the Jerash TS.

2.3. To ensure the implementation of the equipment operation and maintenance plan, the C/P will be assisted in establishing the operation and maintenance system. Specifically, operators of the TSs are instructed of record keeping of in-coming and out-going waste amount, preventive maintenance for equipment, etc. For this activity, a Japanese consultant will visit the Jerash TS. In addition, trainings related to the operation and maintenance of indoor-type transfer stations, which is found at only one location and similar to the Jerash TS.

Table 6: Instructions for the Formulation of the Waste Transfer and transportation Plan and the Equipment Operation and Maintenance Plan for the New Jerash TS

Activities	Month and year	Japanese consultants (in charge of waste transfer and equipment)	Interpreters (Local resource)	Irbid JSC	
				Head of the TS, One person	Officer in charge of planning, One person
2.1. Assistance to formulate the waste transfer and transportation plan	September and October, 2019	one person x 4 days	one person x 4 days	one person x 1 day	one person x 4 days
2.2. Assistance to formulate the equipment operation and maintenance plan		one person x 4 days	one person x 4 days	one person x 1 day	one person x 4 days
2.3. Assistance to develop the		one person	one person	one person x	one person x 4

equipment operation and maintenance system		x 4 days	x 4 days	1 day	days
Total (Number of Working Days)		12 person-day	12 person-day	3 person-day	12 person-day

4.3 Activity 3. Instructions for the review and revision of the waste disposal plans and the equipment operation and maintenance plans for the existing five TS

Activity 3 will be carried out in the following manner.

3.1. Identification of Current Issues: The current waste disposal plans and the equipment operation and maintenance plans of the target five FDS are studied. The issues to achieve the project objectives are then discussed and clarified by working together with the counterparts (C/Ps) of the target JSCs. This activity is carried out by Japanese consultants, who visit the target five FDS.

3.2. Formulation of improvement plans for operation and management of FDS: To address the identified issues on operation and management system, the C/Ps will be assisted in revising the current waste disposal plans, and management system. The basic planning data such as the names of user municipalities, incoming waste amount, waste composition and locational conditions at the target year of 2022 will be provided to the C/P in order to help their plan revision works. Specifically, C/Ps of FDS are assisted in landfill planning (cells and order of operation) and mitigating adverse impacts such as odor, insects, scattering waste, etc. by frequency of soil cover. For this activity, the C/Ps of the five FDS will gather at one place and discuss to revise their plans in a form of workshop.

3.3. Formulation of improvement plans for O&M of the equipment: At the same time the C/Ps will be assisted in planning the improvement of issues on the current O&M system. The improvement planning of C/Ps will be assisted focusing on (1) management system (securing budget, supplementing personnel, operation of equipment, management of spare parts, etc.), (2) maintenance system (daily inspection, preventive maintenance, outsourcing, etc.). For this activity, the C/Ps of the target five FDS will gather at one place and discuss to revise their plans in a form of workshop.

3.4. Instruction to improve the equipment operation and maintenance system: To ensure the implementation of 3.2 improvement plans for operation and management of FDS and 3.3 improvement plans for O&M of the equipment, operators of the FDS are directly instructed. Specifically, record keeping of in-coming and out-going waste amount (Data of incoming vehicles such as name of municipality and vehicle, arrival time and incoming waste amount by weighbridge for Two FDS with it, and Other Three FDS without weighbridge by Data of incoming vehicles such as name of municipality and vehicle, and arrival time.) and preventive maintenance for equipment will be instructed for O&M of the equipment. For this activity, the Japanese consultants will visit the target five FDS. (Two FDS with weighbridge are DS02 Al Ekaider and DS05 Al Huseyneyat.)

Table 7: Instructions for the Review and Revision of the Waste Disposal Plans and the Equipment Operation and Maintenance Plans for the Existing Five TS

Activities	Month and year	Japanese consultants (in charge of waste transfer and equipment)	Interpreters (Local resource)	JSC	
				Head of the TS, 5 persons	Officer in charge of planning, 5 persons
3.1. Study and evaluation of the existing waste disposal plans and the equipment operation and maintenance plans	September and October, 2019	2 persons x 10 days	2 persons x 10 days	5 persons x 1 day	5 persons x 2 days
3.2. Assistance to revise the waste disposal plans.		one person x 3 days	one person x 3days	5 persons x 1 day	5 persons x 3 days

3.3. Assistance to revise the equipment operation and maintenance plan.		one person x 3 days	one person x 3 days	5 persons x 1 day	5 persons x 3 days
3.4. Instruction to enforce the equipment operation and maintenance system		2 persons x 10 days	2 persons / 10 days	5 persons x 1 day	5 persons x 2 days
Total (Number of Working Days)		46 person-day	38 person-day	20 person-day	50 person-day

5 Resource Procurement Methods to Implement Soft Component

The soft component of the Project will be directly assisted by the Japanese consultants.

This soft component is to assist the planning and equipment operation and management for both the TS and the FDS. The Japanese consultants who have been engaged in the outline design, equipment procurement and the supervision of equipment installation will be basically appointed and local interpreters (English-Arabic) will be hired, which will enable efficient technical assistance in a limited short period.

A6 References

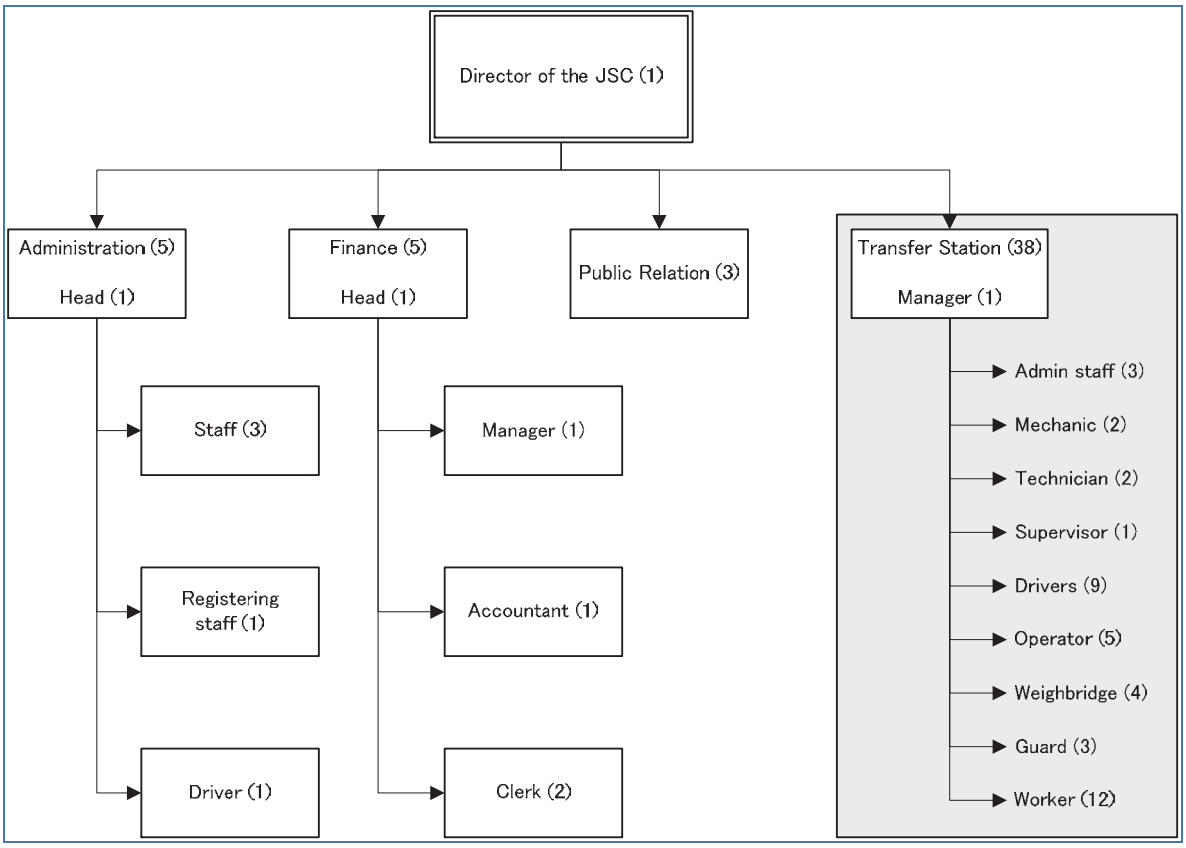
(1) List of References Obtained

Table 1: List of References Obtained

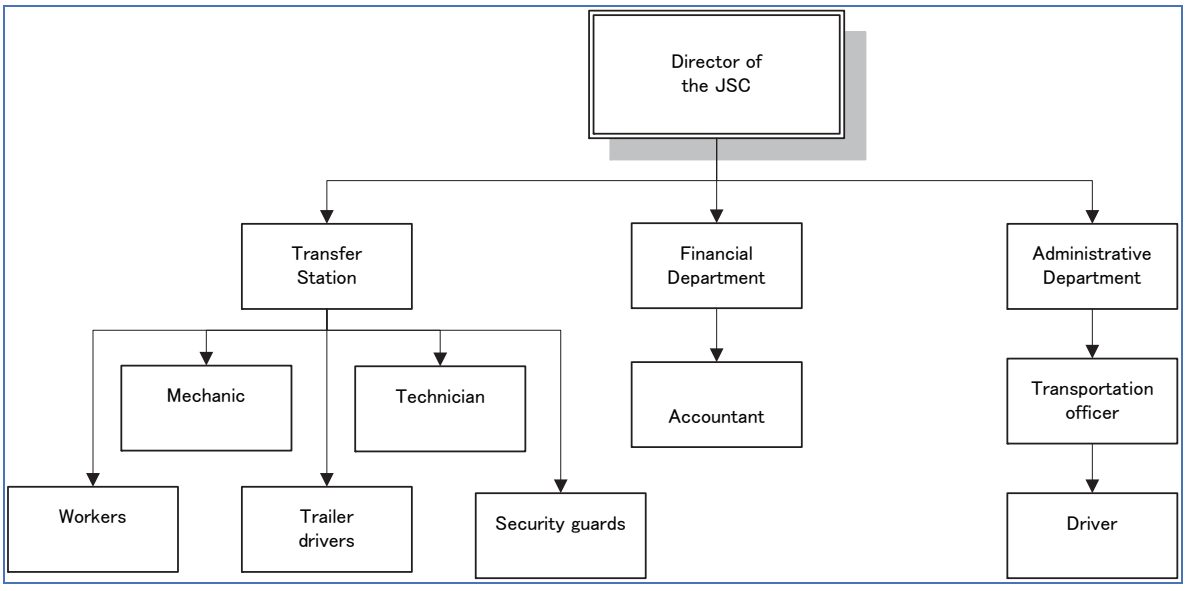
No.	Name	Media (Printed matter・video・map・photo, etc.)	Original / copy	Publishing organizatoin	Year of Publication
1	Central Region Regional Municipal Solid Waste Management Plans	Printed matter	Copy	MOMA	August, 2017
2	Nothern Region Regional Municipal Solid Waste Management Plans	Printed matter	Copy	MOMA	August, 2017
3	Nothern and Central Region Presentation of Regional Plan	Printed matter	Copy	LDK	January, 2017
4	Equipment list of LOT 1 by JICS	Printed matter	Copy	JICS	January, 2017
5	Bulldozer list of LOT 1 by JICS	Printed matter	Copy	JICS	July, 2016
6	Specification of Equipment for Jerash Transfer Station Equipment	Printed matter	Copy	UNDP	February, 2017
7	JSC Regulations	Printed matter	Copy	MOMA	2009
8	Shahinat Transfer station Drawing	Data	Copy	UNDP	February, 2017
9	Specification of Equipment for Jerash Transfer Station Equipment	Data	Copy	UNDP	February, 2017
10	Jerash Transfer station Drawing	Data	Copy	UNDP	February, 2017

(2) Organization Charts of JSCs in the Target Region

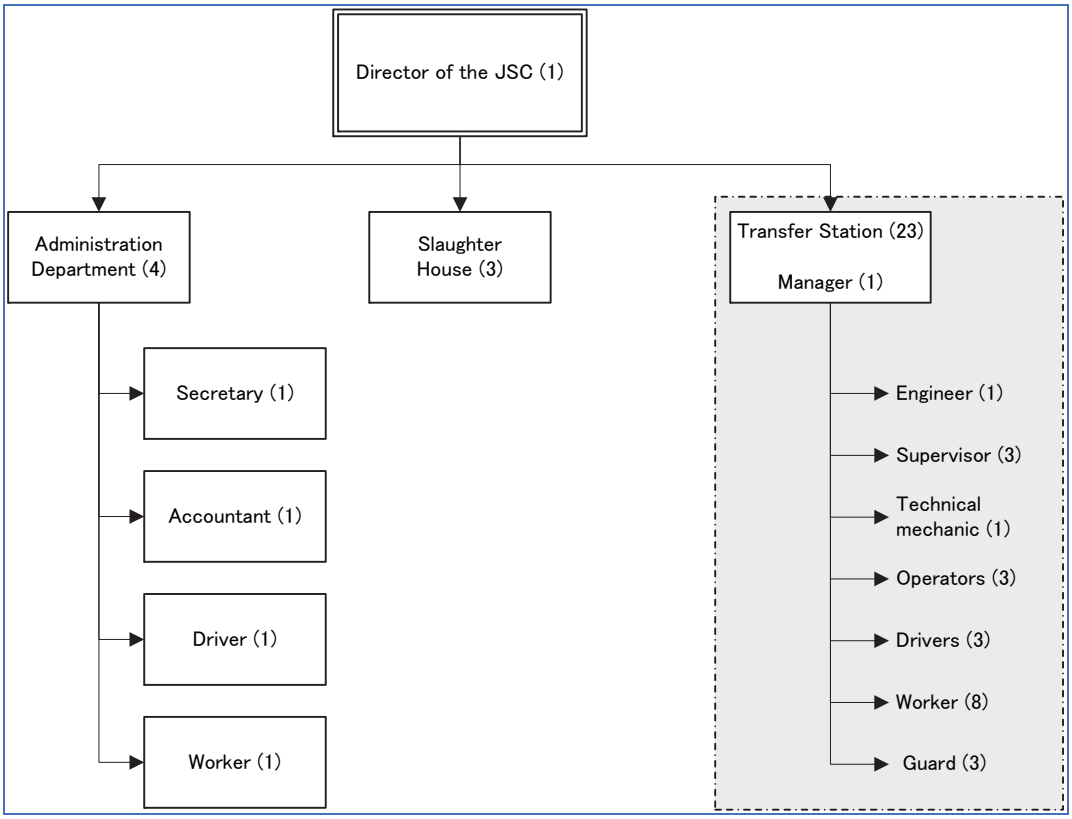
1） Agwar Shamaliyah JSC



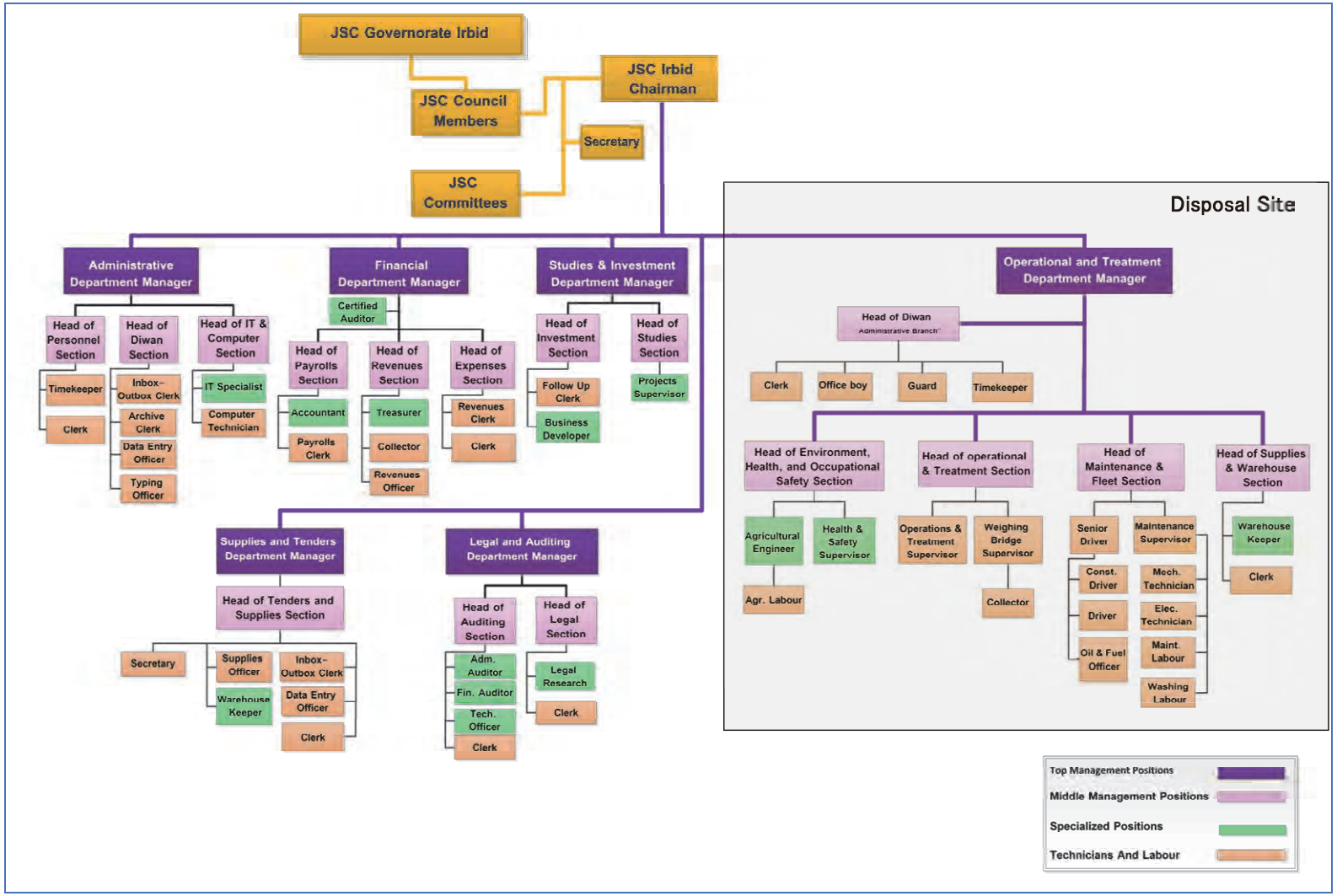
2） Rabiet Al-Kura JSC



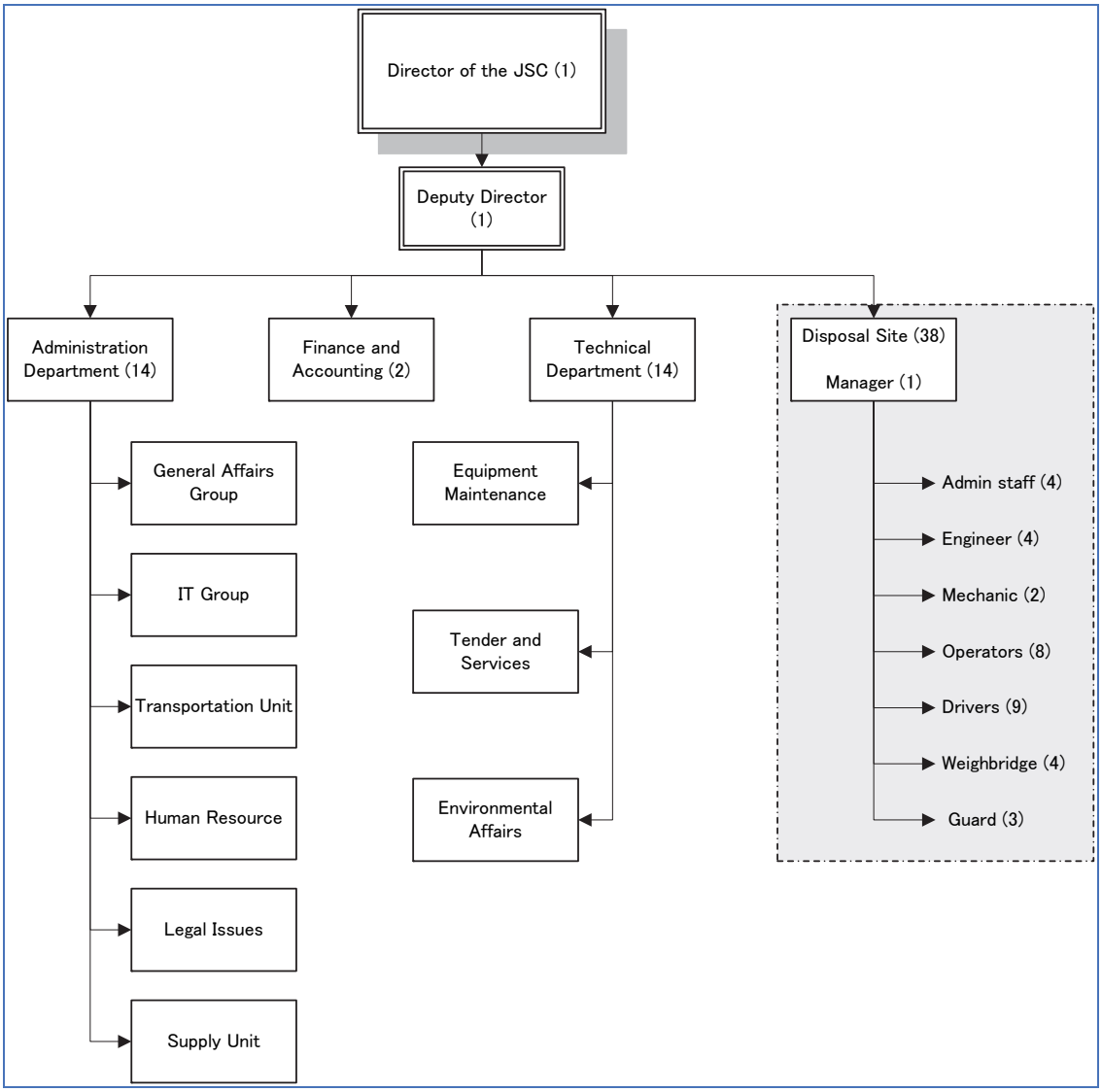
3） Ajloun JSC


Director of the JSC (1)
Administration Department (4)
Slaughter House (3)
Transfer Station (23)
Manager (1)
Secretary (1)
Accountant (1)
Driver (1)
Worker (1)
Engineer (1)
Supervisor (3)
Technical mechanic (1)
Operators (3)
Drivers (3)
Worker (8)
Guard (3)

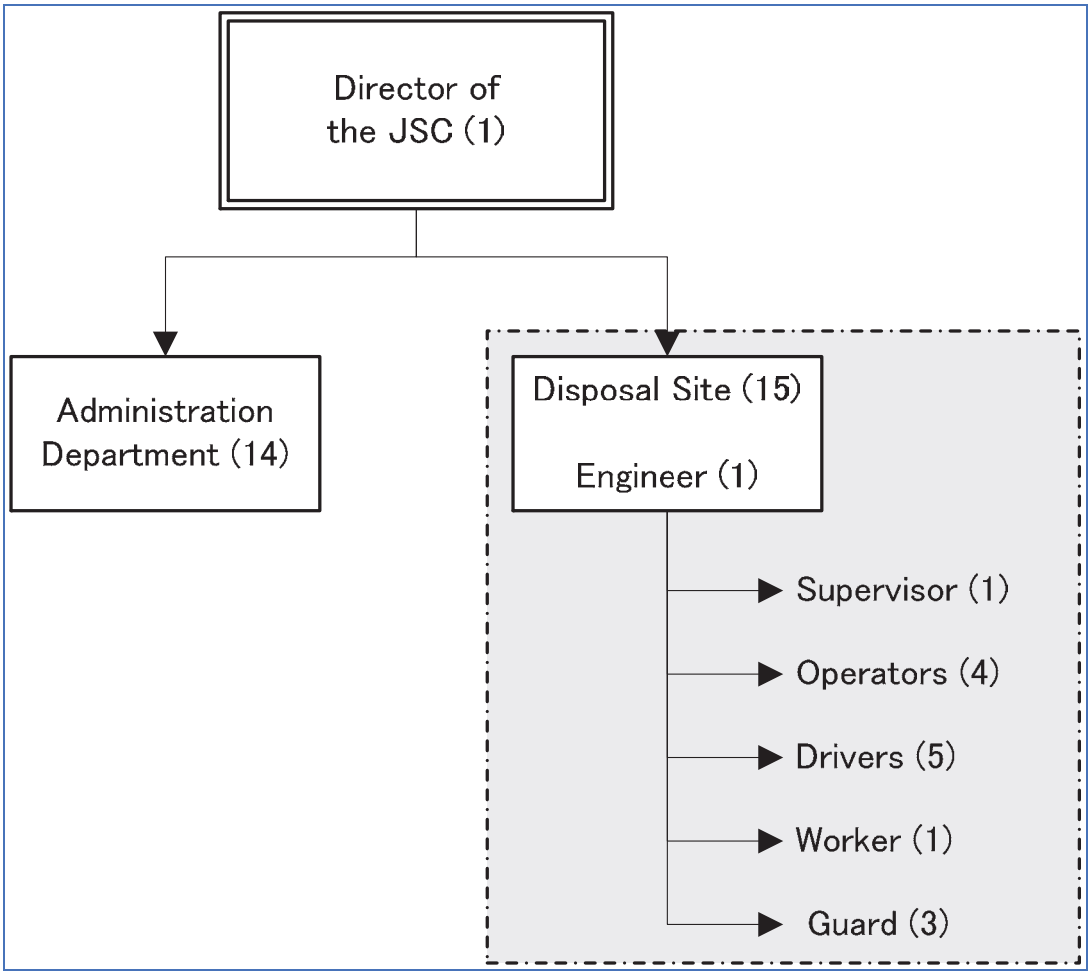
4） Irbid JSC


JSC Governorate Irbid
JSC Irbid Chairman
JSC Council Members
Secretary
JSC Committees
Disposal Site
Administrative Department Manager
Head of Personnel Section
Head of Diwan Section
Head of IT & Computer Section
Timekeeper
Clerk
Inbox-Outbox Clerk
Archive Clerk
Data Entry Officer
Typing Officer
IT Specialist
Computer Technician
Financial Department Manager
Certified Auditor
Head of Payrolls Section
Head of Revenues Section
Head of Expenses Section
Accountant
Payrolls Clerk
Treasurer
Collector
Revenues Officer
Revenues Clerk
Clerk
Studies & Investment Department Manager
Head of Investment Section
Head of Studies Section
Follow Up Clerk
Business Developer
Projects Supervisor
Operational and Treatment Department Manager
Head of Diwan Administrative Branch
Clerk
Office boy
Guard
Timekeeper
Head of Environment, Health, and Occupational Safety Section
Head of operational & Treatment Section
Head of Maintenance & Fleet Section
Head of Supplies & Warehouse Section
Agricultural Engineer
Agr. Labour
Health & Safety Supervisor
Operations & Treatment Supervisor
Weighing Bridge Supervisor
Collector
Senior Driver
Const. Driver
Driver
Oil & Fuel Officer
Maintenance Supervisor
Mech. Technician
Elec. Technician
Maint. Labour
Washing Labour
Warehouse Keeper
Clerk
Supplies and Tenders Department Manager
Head of Tenders and Supplies Section
Secretary
Supplies Officer
Warehouse Keeper
Inbox-Outbox Clerk
Data Entry Officer
Clerk
Legal and Auditing Department Manager
Head of Auditing Section
Head of Legal Section
Adm. Auditor
Fin. Auditor
Tech. Officer
Clerk
Legal Research
Clerk
Top Management Positions
Middle Management Positions
Specialized Positions
Technicians And Labour

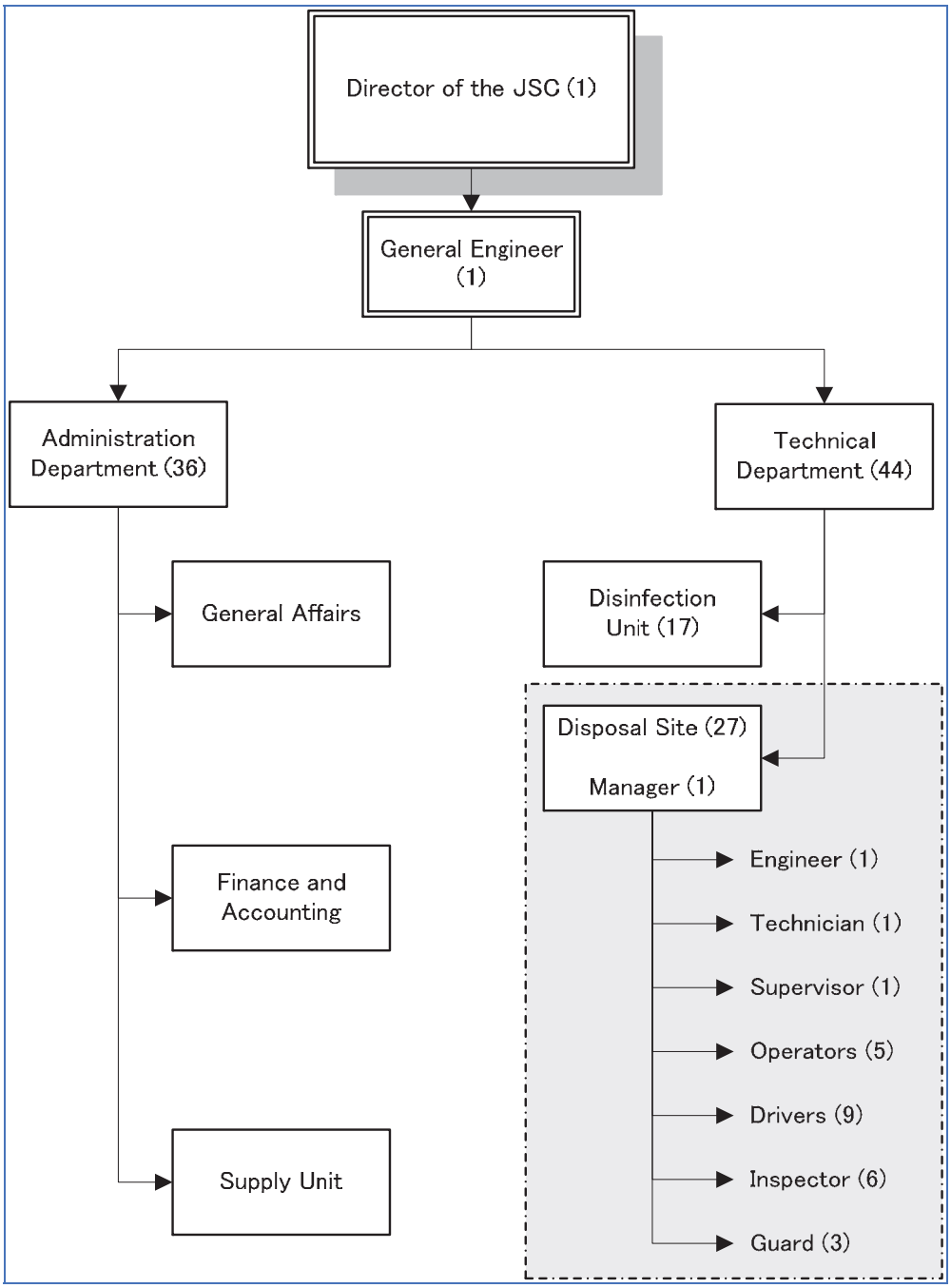
５） Mafraq JSC


Director of the JSC (1)
Deputy Director (1)
Administration Department (14)
Finance and Accounting (2)
Technical Department (14)
Disposal Site (38)
Manager (1)
General Affairs Group
IT Group
Transportation Unit
Human Resource
Legal Issues
Supply Unit
Equipment Maintenance
Tender and Services
Environmental Affairs
Admin staff (4)
Engineer (4)
Mechanic (2)
Operators (8)
Drivers (9)
Weighbridge (4)
Guard (3)

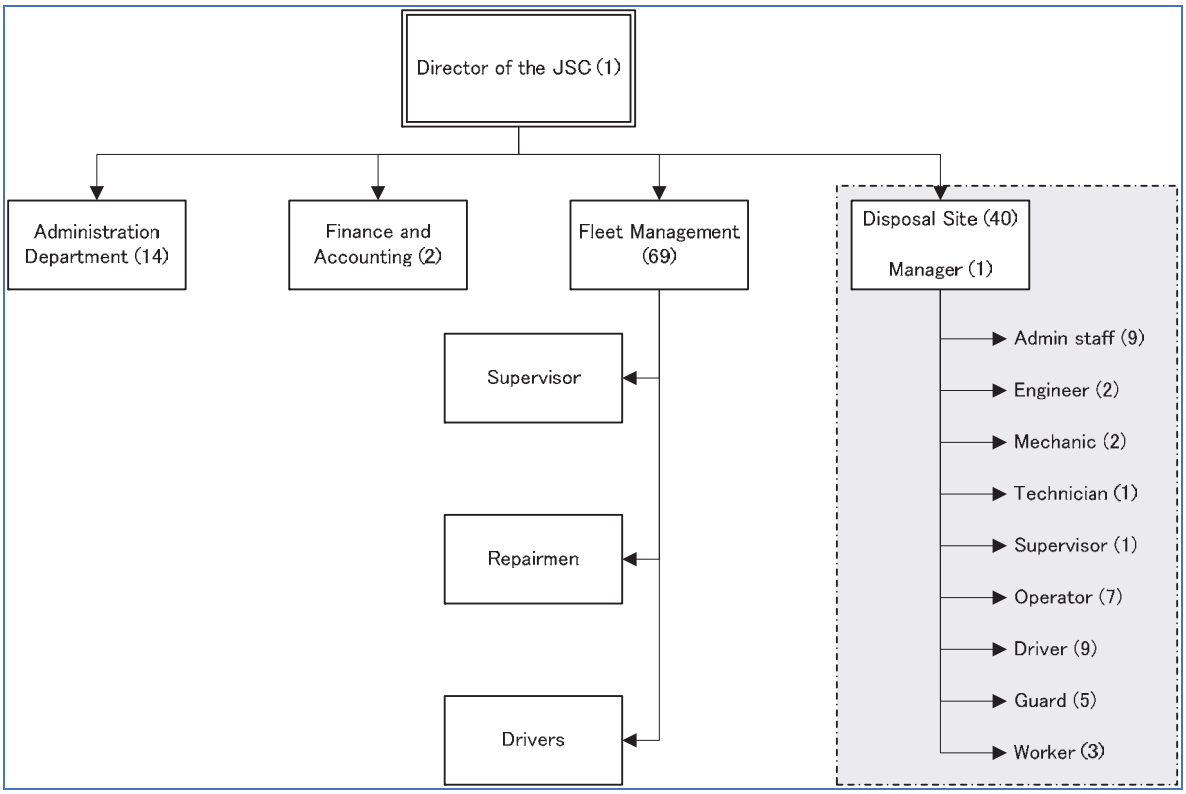
6） Al Badiah Al Shamaliyah JSC



7） Zarqa JSC


Director of the JSC (1)
General Engineer (1)
Administration Department (36)
Technical Department (44)
General Affairs
Disinfection Unit (17)
Disposal Site (27)
Manager (1)
Finance and Accounting
Supply Unit
Engineer (1)
Technician (1)
Supervisor (1)
Operators (5)
Drivers (9)
Inspector (6)
Guard (3)

8） Balqa JSC


Director of the JSC (1)
Administration Department (14)
Finance and Accounting (2)
Fleet Management (69)
Supervisor
Repairmen
Drivers
Disposal Site (40)
Manager (1)
Admin staff (9)
Engineer (2)
Mechanic (2)
Technician (1)
Supervisor (1)
Operator (7)
Driver (9)
Guard (5)
Worker (3)

(3) Financial Reports of JSCs in the Target Region in 2014 and 2015

1） Financial Reports in 2014

No	Items	JSC01 Aghwar Al Shamaliyah JSC	JSC02 Rabiet Al-Kura JSC	JSC03 Ajloun JSC	JSC04 Irbid JSC	JSC05 Mafraq JSC	JSC06 Badiah Shamaliyah JSC	JSC07 Zarqa JSC	JSC08 Balqa JSC	JSC09 Al Shoneh Al-Wsta JSC
(A)	REVENUES:									
A1	Subsidies from MOMA	456277.19	187696	364750.49	1088790	663655	105125	673282	946963	264303
A2	Operational Revenues:									
1	Contributions from Municipalities	0.00	18,500.00	0.00	0.00	2,500.00	2,000.00	0.00	5,000.00	4,000.00
2	Other Revenues of Operations:									
	Revenues from SWM operations	0.00		0.00	297,644.72	5,049.00	0.00	117,054.00	24,817.00	2,500.00
	Revenues from other operation (Slaughter House etc)	8,716.06		1,616.00	137,937.25	0.00	0.00	0.00	0.00	
	Total of Other Operational Revenues	8,716.06	0.00	1,616.00	435,581.97	5,049.00	0.00	117,054.00	24,817.00	2,500.00
	Total Operational Revenues	8,716.06	18,500.00	1,616.00	435,581.97	7,549.00	2,000.00	117,054.00	29,817.00	6,500.00
A2	Non-operational Revenues:									
4	Interest Revenues	0.00		0.00	42,207.76	0.00	0.00	0.00	0.00	1,899.00
5	Grants and Donations from External Organizations	0.00		0.00	0.00	0.00	0.00	0.00	3,000.00	
6	Other Non-operational Revenues (rent of assets etc)	0.00		45.00	0.00	112,691.00	0.00	0.00	0.00	37.00
	Total Non-operational Revenues	0.00	0.00	45.00	42,207.76	112,691.00	0.00	0.00	3,000.00	1,936.00
	Total Revenues	464,993.25	206,196.00	366,411.49	1,566,579.73	783,895.00	107,125.00	790,336.00	979,780.00	272,739.00
(B)	EXPENDITURES:									
B1	Recurrent Expenditures:									
1	Salaries and allowances	318,342.00	101,274.00	233,684.99	878,492.17	598,659.00	70,430.00	565,446.00	836,875.00	207,519.00
2	Other recurrent expenses	200,500.66	89,669.00	104,026.48	560,334.33	176,733.00	32,673.18	216,352.00	185,216.00	36,396.00
	Total Recurrent Expenditures	518,842.66	190,943.00	337,711.47	1,438,826.50	775,392.00	103,103.18	781,798.00	1,022,091.00	243,915.00
B2	Capital Expenditures									
3	Procurement Costs of Equipment and Too	1,700.00		625.00	29,465.00	1,723.00	1,900.00	799.00	3,716.00	
4	Developmental Expenses:									
	Construction of Facilities	32,600.67		19,954.64	0.00	0.00	2,600.00	3,678.00	0.00	
	Other developmental expenses	0.00	1,800.00	0.00	68,630.94	0.00	0.00	0.00	0.00	65.00
	Total Developmental Investments	32,600.67	1,800.00	19,954.64	68,630.94	0.00	2,600.00	3,678.00	0.00	65.00
	Total Capital Expenditures	34,300.67	1,800.00	20,579.64	98,095.94	1,723.00	4,500.00	4,477.00	3,716.00	65.00
	Total Expenditures	553,143.33	192,743.00	358,291.11	1,536,922.44	777,115.00	107,603.18	786,275.00	1,025,807.00	243,980.00
(C)	PROFITS/LOSSES	(88,150.08)	13,453.00	8,120.38	29,657.29	6,780.00	(478.18)	4,061.00	(46,027.00)	28,759.00

Source: MOMA

2） Financial Reports in 2015

No	REVENUES	JSC01 Aghwar Al Shamaliyah JSC	JSC02 Rabiet Al-Kura JSC	JSC03 Ajloun JSC	JSC04 Irbid JSC	JSC05 Mafraq JSC	JSC06 Badiah Shamaliyah JSC	JSC07 Zarqa JSC	JSC08 Balqa JSC	JSC09 Al Shoneh Al-Wsta JSC
1	Subsidies									
	State contribution (MOMA?)	440,533.0	142,736.0	378,051.0	3,396,504.2	621,523.0	201,255.0	574,761.0	979,184.0	294,005.0
	Allowance for using landfill									
	Rent for landfill									
	Total subsidies	440,533.0	142,736.0	378,051.0	3,396,504.2	621,523.0	201,255.0	574,761.0	979,184.0	294,005.0
2	Collected fees:									
a	Municipal contributions	1,500.0	20,234.0		120,757.0	5,000.0	2,000.0	6,500.0	0.0	4,000.0
b	Fees from other than municipalities			0.0	191,621.3	37,000.0	17,867.5	117,588.0	3,500.0	6,500.0
	Total collected fees	1,500.0	20,234.0	0.0	312,378.3	42,000.0	19,867.5	124,088.0	3,500.0	10,500.0
3	Other revenues:									
a	Interest on the money deposit			0.0	13,096.9				0.0	1,669.8
b	Revenues of slaughter house			935.0						
	Land rent									
	Contract payment from recycler company						4,500.0			
	Sale of metallic scrap				44,600.0					
c	Other revenues	12,083.9		120.0	7,655.0	88,174.6	0.0	5,470.0	28,720.5	159.9
	Total other revenues	12,083.9	0.0	1,055.0	65,351.9	88,174.6	4,500.0	5,470.0	28,720.5	1,829.7
	TOTAL REVENUES	**454,116.9**	**162,970.0**	**379,106.0**	**3,774,234.5**	**751,697.6**	**225,622.5**	**704,319.0**	**1,011,404.5**	**306,334.7**
	EXPENSES									
A	RECURRENT EXPENSES									
1	**HQ expenses:**									
	Salary and wages*1	29,197.7	4,865.1	35,285.5	159,119.7	54,946.2	66,285.0	100,791.0	175,585.1	37,460.6
	Other bonuses*1	7,989.9	66.7	1,795.9	13,450.8	13,619.3	5,806.5	12,195.9	7,576.5	81,959.4
	Social Insurance*1	6,998.3	933.3	3,562.0	34,019.7	8,436.6	9,175.0	24,393.7	37,858.3	14,184.8
	Transporation and travel allowances*	3,434.1	220.3	2,645.8	18,524.1	6,969.0	5,578.6	11,849.1	16,927.0	4,584.0
	Posts, mail and telephone*2	112.6	0.0	75.3	772.3	627.6	125.3	0.0	319.0	97.4
	Public utilities (water, electricity etc)*	873.3	0.0	416.7	8,923.4	1,034.9	470.6	862.6	2,502.5	1,418.7
	Civil defense*2	0.0	0.0	0.0	14,763.8	0.0	0.0	0.0	0.0	0.0
	Other expenses*2	107.7	33.6	43.4	1,645.6	2,971.4	19.2	71.1	1,322.6	0.0
	Office stationary	966.5	0.0	700.9	5,461.9	953.7		837.0	2,241.2	200.0
	Advertisements	0.0	0.0	133.7	783.0	0.0		0.0	666.2	55.0
	Festivals	0.0	0.0	0.0			0.0			30.0
	Renting of counicl bulding			0.0	0.0		2,000.0	0.0	6,600.0	4,860.0
	Court expenses	0.0	0.0	110.0	51,096.0	0.0		0.0	1,993.0	
	Training and courses			0.0	0.0	0.0		0.0	0.0	0.0
	Hospitality	0.0	0.0	511.8	985.3	100.0		200.0		
	Interest expenses			0.5				135.0		
	Snow removal								5,441.2	
	Offices devices maintenance				101.0			215.0	240.0	
	Total HQ and Other Unit Expenses	49,680.1	6,118.9	45,281.6	309,646.7	89,658.8	89,460.2	151,550.4	259,272.6	144,850.0

No	REVENUES	JSC01 Aghwar Al Shamaliyah JSC	JSC02 Rabiet Al-Kura JSC	JSC03 Ajloun JSC	JSC04 Irbid JSC	JSC05 Mafraq JSC	JSC06 Badiah Shamaliyah JSC	JSC07 Zarqa JSC	JSC08 Balqa JSC	JSC09 Al Shoneh Al-Wsta JSC
2	**TS/DS expenses:**									
a	Salary expenses:									
	Salary and wages*1	79,250.9	82,705.9	101,446.0	119,884.7	65,248.6	66,285.0	49,479.2	81,667.5	27,793.4
	Other bonuses*1	21,686.9	1,133.3	5,163.3	10,134.2	16,172.9	5,806.5	5,987.1	3,524.0	60,808.6
	Social Insurance*1	18,995.4	15,866.7	10,240.8	25,631.3	10,018.5	9,175.0	11,975.1	17,608.5	10,524.2
	Technical bonuses	158864.592			455,608.5	329538.82	13014.84	256709	407453.4	
	Infectiuos allowance				42,366.6				20,200.0	
	Total salary expenses	278,797.8	99,705.9	116,850.0	653,625.3	420,978.9	94,281.3	324,150.4	530,453.4	99,126.2
c	Facility operational expenses:									
	Vehicles insurance*3	19,000.0	3,050.0	0.0	93,823.4	15,058.7	7,184.6	14,929.0	18,798.3	7,550.0
	Fuel and lubricants*3	21,667.0	0.0	51,422.9	179,601.1	33,432.0	9,555.3	95,100.0	46,708.7	10,370.2
	Vehicles and equipment maintenar	36,761.3	28,697.0	59,839.7	248,249.8	27,508.9	20,543.3	25,307.0	20,620.8	4,804.0
	Renting vehicles				97,099.3		0.0		1,575.0	
	Disinfection of facility	0.0	0.0	120.0	10,299.5	0.0	0.0	0.0	1,269.5	0.0
	Tipping fees to Disposal Site			0.0						
	Safety items for facility (TS and D	100.0					0.0	0.0	1,960.4	
	Total operational expenses	77,528.3	31,747.0	111,382.7	629,073.1	75,999.6	37,283.2	135,336.0	90,932.6	22,724.2
b	Facility administration expenses:									
	Transporation and travel allowanc	9,321.2	3,744.7	7,606.7	13,956.5	8,275.7	5,578.6	5,816.9	7,873.0	3,401.0
	Posts, mail and telephone (commu	305.7	0.0	216.5	581.9	745.3	125.3	0.0	148.4	72.3
	Public utilities (water, electricity et	2,370.3	0.0	1,197.9	6,723.1	1,229.0	470.6	423.4	1,163.9	1,052.6
	Civil defense*2	0.0	0.0	0.0	11,123.4	0.0	0.0	0.0	0.0	0.0
	Other expenses*2	292.3	571.4	124.9	1,239.8	3,528.6	19.2	34.9	615.2	0.0
	Renting warehouse								1,200.0	
	Total administration expenses	12,289.5	4,316.1	9,146.0	33,624.8	13,778.6	6,193.7	6,275.2	11,000.5	4,525.9
	Total TS/DS expenses	368,615.6	135,769.1	237,378.6	1,316,323.2	510,757.1	137,758.2	465,761.6	632,386.5	126,376.3
3	**Expenses of staffs dispatched to municipalities:**									
	Salary and wages*1	16,684.4	0.0	79,392.5	119,884.7	78,985.2	4,419.0	64,139.7	89,834.3	0.0
	Other bonuses*1	4,565.7	0.0	4,040.8	10,134.2	19,577.8	387.1	7,761.0	3,876.3	0.0
	Social Insurance*1	3,999.0	0.0	8,014.5	25,631.3	12,127.7	611.7	15,523.2	19,369.4	0.0
	Total expenses of dispatched staffs	25,249.1	0.0	91,447.8	155,650.2	110,690.6	5,417.8	87,424.0	113,080.0	0.0
	Total recurrent expenses	443,544.8	141,888.0	374,108.1	1,781,620.0	711,106.5	232,636.2	704,736.0	1,004,739.1	271,226.2
B	CAPITAL EXPENSES:									
1	Renovation of TS and DS			11,457.9			0.0	0.0		0.0
2	Land development and public safety	0.0			19,987.4					
3	Renovation of slaughter house			104.9						
4	Renovation and maintenance of building	3,943.7	1,680.0		181.0		790.7	60.0		
5	Other				0.0		0.0	0.0	0.0	
	Total capital expenses	3,943.7	1,680.0	11,562.8	20,168.4	0.0	790.7	60.0	0.0	0.0
	TOTAL EXPENSES	**447,488.5**	**143,568.0**	**385,670.9**	**1,801,788.5**	**711,106.5**	**233,426.9**	**704,796.0**	**1,004,739.1**	**271,226.2**

Source: Financial Reports of JSCs