THE PALESTINE INTERIM SELF-GOVERNMENT AUTHORITY
MINISTRY OF LOCAL GOVERNMENT

THE PREPARATORY SURVEY (BASIC DESIGN) ON THE PROJECT FOR THE IMPROVEMENT OF SOLID WASTE MANAGEMENT IN THE WEST BANK, PALESTINE

FINAL REPORT

February 2013

JAPAN INTERNATIONAL COOPERATION AGENCY

NJS CONSULTANTS CO., LTD

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Executive Summary

E-1 Background

Solid waste in the West Bank is generated at approximately 79,000 tons a month, 0.6 kg per capita per day. Solid waste management is implemented by the Joint Council (hereafter called "JC") of each local government, which supports and supervises each JC. In the designated areas, some activities regarding solid waste collection and transportation are being implemented and many landfills controlled effectively exist especially in Jenin and Jericho JCs. Most JCs are facing difficulties in transferring solid waste to the landfill due to financial issues. As a result, 147 open dump sites still exist in the PNA. The open burning and the open dumping have bad impacts on the environment and health conditions of residents. In addition, the existing landfill in Jericho is expected to fill up in the near future. Therefore, disposal waste reduction and expansion of existing landfill in Jericho are required.

Palestine has formulated "The National Strategy of Solid Waste Management (2010-2014)", which aims to develop comprehensive, independent and growing solid waste management system including the development of wide area solid waste collection and disposal systems, the start of 3R (Reduce Reuse and Recycle), as well as profitability improvement of recycling and business operation. The strategy has a plan to build three (3) sanitary landfills to dispose solid waste generated from all the areas (already developed in Jenin, under construction in Bethlehem and Hebron, and in the planning stage in Ram Allah).

E-2 Implementation System of the Project

Equipment and facilities that will be provided by the project shall be operated and well maintained in order to achieve the project targets. It is important that capacity development of the JCs carries out. Jericho, Hebron and Jenin JCs have enough knowledge and skill for SWM. Japanese side and Palestine side will share the project cost as follows;

1) Japanese Side

Procurement and transportation of equipment, Construction of facilities and Management guidance.

2) Palestinian Side

Transportation of equipment in the West Bank Area, Organization of operation/maintenance system and Preparation of the budget.

E-3 Project Component

The major components of the project are as follows;

1) Equipment and heavy machines

19 Compactor vehicles, 2,365 containers, 12 transfer equipment, 8 heavy machines

2) Facilities

Expansion of the Jericho sanitary landfill site, construction of a Material Recovery Facility in Jericho.

3) Soft components

Five (5) of the JCs targeted in this project have the capacity to use the equipment and facilities sustainably but soft components designed to encourage greater efficiencies regarding separate collection of solid waste, education for inhabitants, planning of solid waste management should be implemented in order to effectively contribute to "The National Strategy for Solid Waste Management (2010-2014)" in the west bank of Palestine.

E-4 Implementation Schedule

After signing Exchange Notes by both Governments, the Consultant will conduct detailed designs. (1) Tendering/procurement contracts and (2) procurement will be implemented. The implementation schedule is shown in **Figure E-1**.

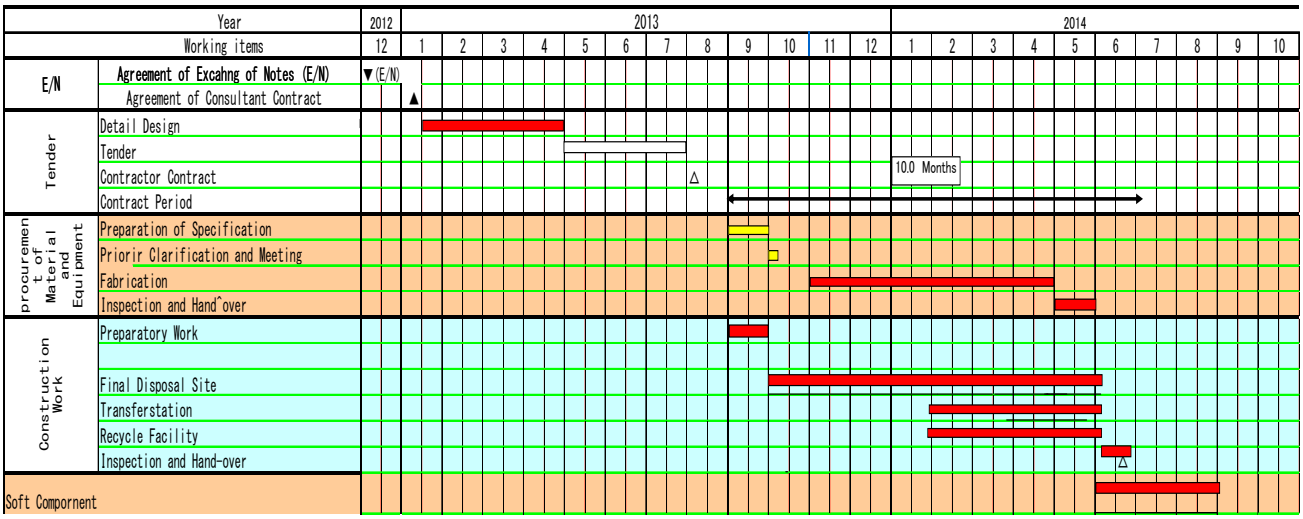


Figure E-1 Project Implementation Schedule

E-5 Project Evaluation

E-5-1 Validity

The project is in perfect harmony with the needs and development policy of PNA. Also, the project is evaluated that it has high priority, because the Jericho JC has to receive the business waste from the agricultural industry base assisted by the Japanese Government.

A major component of the project is the "provision of collection/transportation equipment" for more than half million beneficiary (residents). This component will improve sanitary conditions of the residents without fail and will be operated by their own skill and financial capability.

E-5-2 Effectiveness

(1) Quantitative effectiveness

1) Improvement of collection capacity

Collection capacity by the project is shown in **Table E.1**. The capacity is calculated based on an 8 hour working time frame. The Hebron and Jenin JCs need over-time to collect all solid waste in their service areas. The Jenin JC is required to come up with some ways to prolong life of the existing collection vehicle's life.

Table E.1 Improvement of Collection Capacity by the Project

Indexes	Collection Capacity （8hr working time）	
	Present Capacity (AD 2011)	Future Capacity after Project Implementation (AD 2017)
Hebron JC: Collection capacity (t/day)	46	308
Jenin JC: Collection capacity (t/day)	204.7	148
Jericho JC: Collection capacity (t/day	45	59
Salfit JC: Collection capacity (t/day)	53.5	62
Tulkarem JC: Collection capacity (t/day)	30.1	133
Recycle amount in Jericho JC (Plastic: kg/day）	0	800
Recycle amount in Jericho JC（Metal: kg/day）	0	200

Note) Jenin has many old collection vehicles which will reach the life-span at the target year, therefore Jenin shall replace new collection vehicles and/or maintain old vehicles well to keep required collection capacity.

2) Reduction of dumping sites

Open dumping sites will be closed by the improvement of transportation capacity.

Table E.2 Number of Open Dump Sites

JC	Number of existing open dump sites (AD 2011)	Number of future open dump sites (AD 2017)
Hebron JC	17	0
Jenin JC	1	0
Jericho JC	1	0
Salfit JC	10	0
Tulkarem JC	0	0
Total	29	0

(2) Qualitative Effectiveness

The project will implement sustainable and sanitary SWM systems in Jericho and Jordan River Rift Valley (JJRRV)" and will carry out popularization of the project SWM system as a model for other areas in PNA. The project is expected to improve the public sanitary condition and the health condition of the residents.

E-6 Conclusion

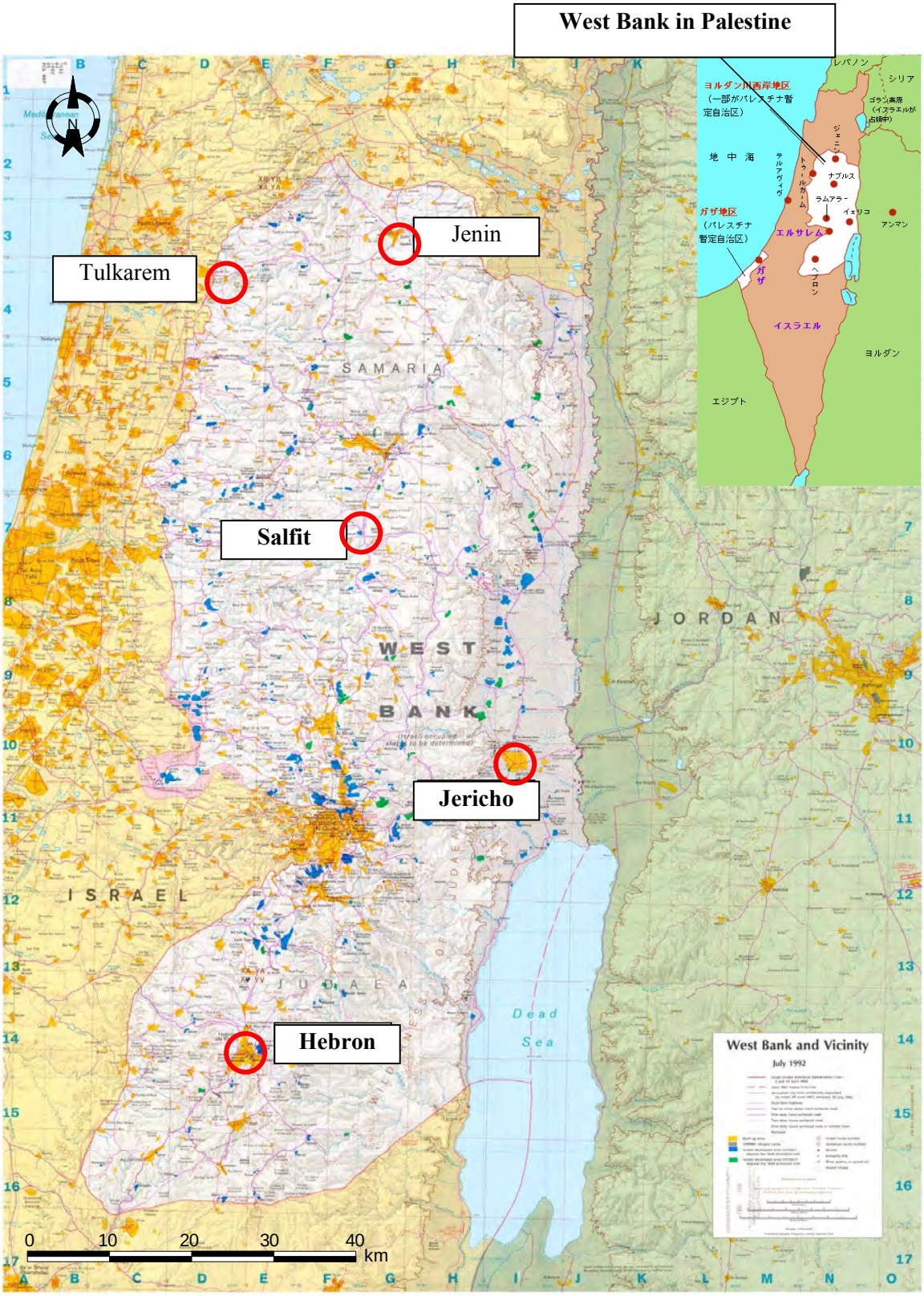
The project is expected to improve the public sanitary condition and the health conditions of Jenin, Hebron, Jericho, Salfit and Tulkarem. The project has proven validity and effectiveness as mentioned above. Soft components in combination of providing equipment and heavy machines will promote the multiplier effectiveness of the project.

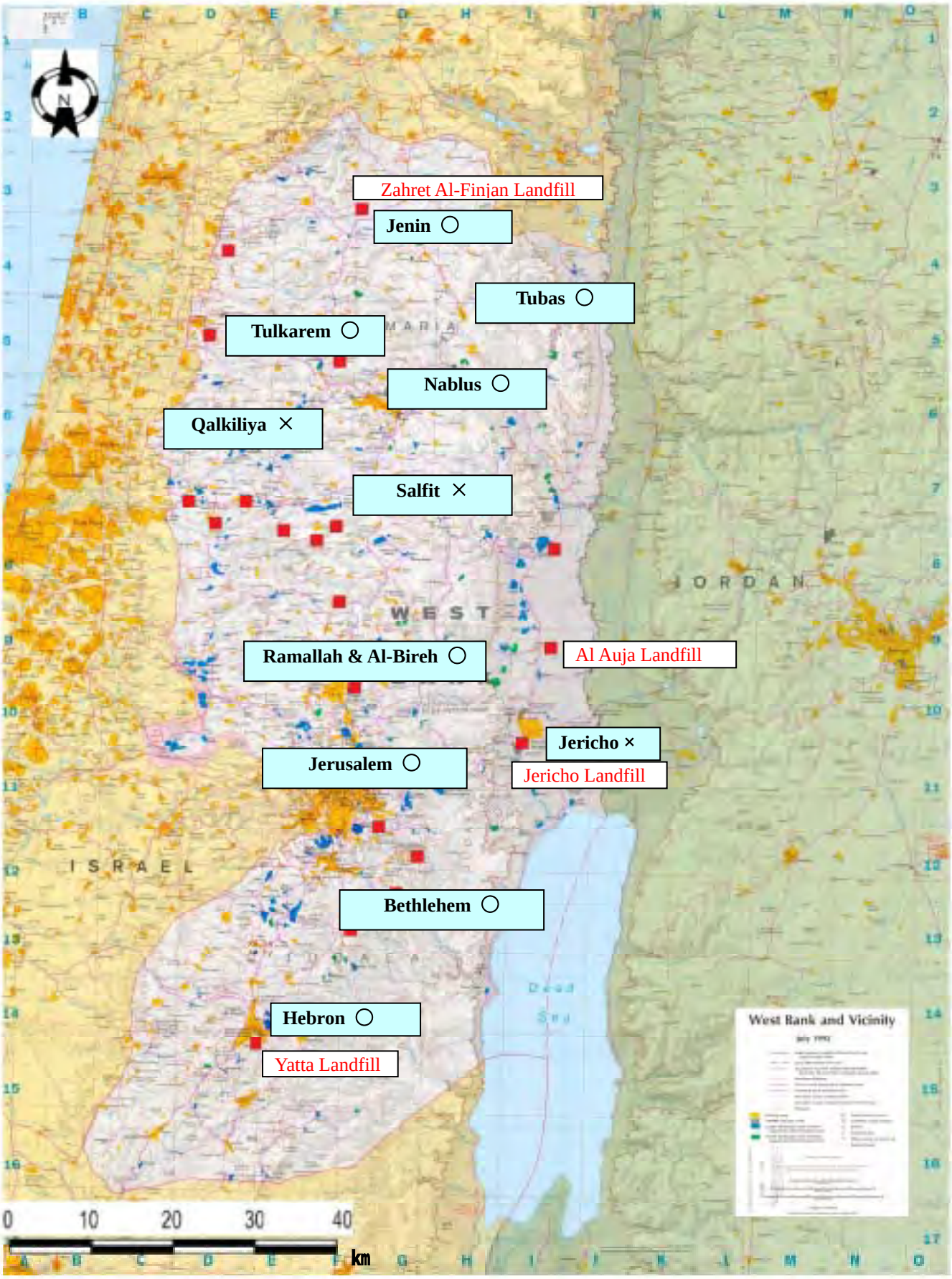
THE PREPARATORY SURVEY (BASIC DESIGN) ON THE PROJECT FOR THE IMPROVEMENT OF SOLID WASTE MANAGEMENT IN THE WEST BANK, PALESTINE

Table of Contents

ANNEX

Location Map

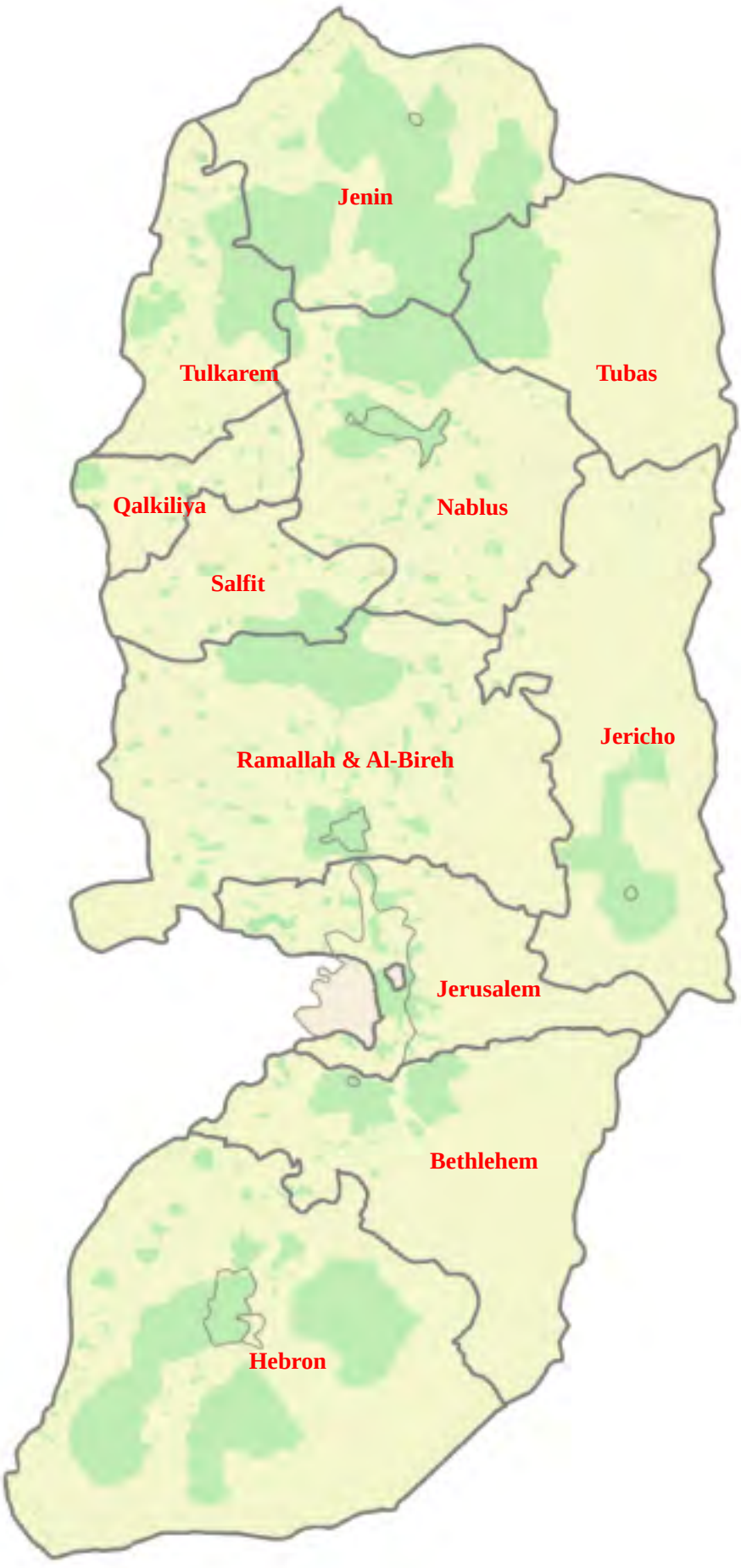




Location Map of Existing Facilities on Solid Waste Management

■ Existing final landfill

○ and × shows presence and absence of transfer station



Administrative Boundary Map of the West Bank in Palestine

Pictures taken at the site

Pic-1 Landfill in Jenin JC (1): Household waste is collected/transferred by collection vehicle and disposed at the landfill.

Pic-2 Landfill in Jenin JC (2): Recyclable material is selected by hand sorting from the belt conveyor system.

Pic-3 Transfer Station in Hebron JC: Household waste is compacted at waste transfer station and transferred/disposed at the landfill.

Pic-4 Sanitary Landfill in Hebron JC: The sanitary landfill is under construction by the World Bank Assistance.

Pic-5 Waste Transfer Station in Tulkarem JC (1): Household waste is compacted by compaction unit at the waste transfer station, transferred/disposed at the Jenin landfill.

Pic-6 Waste Transfer Station in Tulkarem JC(2): Existing compaction unit will be used after repairing by a local firm.

Pic-7 Landfill in Jericho JC (1): Solid waste from Jericho JC is disposed at this sanitary landfill.

Pic-8 Landfill in Jericho JC (2): New project area for a waste transfer station in Jericho JC.

Pic-9 New Landfill in Jericho JC (2): Project site for a new Sanitary landfill located near the existing site in Jericho JC: The project site is currently being used as agricultural land.

Pic-10 Existing Open Dump Site in Salfit JC (1): Household waste is dumped without cover soil.

Pic-11 Existing Open Dump Site in Salfit JC (2): Solid waste is scattered at the open dump site. Secondary pollution is concerned by the residents.

Pic-12 Collection Vehicle in Salfit JC: The vehicle was provided by JAPAN ODA in 2009.

Pic-13 Jericho JC: Meeting between Jericho JC and JICA Mission, July in 2012.

Pic-14 Tulkarem JC: Meeting between Tulkarem JC and JICA Mission, July in 2012.

Pic-15 Ministry of Local Government: Solid waste management in the West Bank of PNA is under controlled by the Ministry of Local Government.

Pic-16 Joint Council Meeting:
Each Joint Council provides solid waste management services for local governments.

List of Tables and Figures

Tables

Figures

Abbreviations

A/P	Authorization to pay
B/A	Banking Arrangement
BOG	Basic Operating Guideline
CIA	Central Intelligence Agency
EIA	Environmental Impact Assessment
E/N	Exchange of Notes
EQA	Environmental Quality Authority
EU	European Union
FAO	Food and Agriculture Organization
G/A	Grant Agreement
GDP	Gross Domestic Product
GIZ	Deutsche Gesell-schaft fur Inter-natio-nale Zusam-men-arbeit
IEE	Initial Environmental Examination
IMF	International Monetary Fund
JC	Joint Council
JICA	Japan International Cooperation Agency
JSC	Joint Services Council
KfW	Kreditanstalt für Wiederaufbau
MEnA	Ministry of Environment Affairs
MOA	Ministry of Agriculture
MOLG	Ministry of Local Government
MOTA	Ministry of Tourism and Antiquities
MRF	Materials Recovery Facility
NIS	New Israeli Shekel
PCBS	Palestinian Central Beureau of Statistics
PEL	Palestinian Environmental Law
PNA	Palestinian National Authority
PWA	Palestinian Water Authority
UNDP	United Nations Development Programme
UNRWA	United Nations Works and Relief Agency
USAID	United States Agency for International Development
VAT	Value Added Tax
WB	World Bank
WFP	World Food Programme

Currency Exchange Rate (June 2012): 1USD=JPY79.83
1EUR=JPY105.72
1NIS=JPY21.20

Chapter 1 Background and Circumstances of the Project

1-1 Present Status and Issues of the Sector Concerned

1-1-1 Present Status and Issues

Palestine is officially referred to as the Palestinian National Authority (hereinafter called "PNA") which governs the area in Gaza, the Mediterranean Sea coastal area, and approximately 40 percent of the West Bank area of the Jordan river in the eastern part of Israel in accordance with the agreements under the "Declaration of Principles on Interim Self-Government Arrangements" in September 1993, "Gaza and Jericho Agreement" in May 1994 and other agreements thereafter. The administrative capital is Ramallah in the central West Bank.

According to the country information from the Ministry of Foreign Affairs, Japan (as of January 2012), the area is approximately 6,020 km^2 (as of the end of 2007, according to the Palestinian Central Bureau of Statistics), which consists of 5,655 km^2 (almost the same area of Mie Prefecture) in the West Bank area and 365 km^2 in the Gaza area (almost the same area of Tanegashima, 40 km north to south, 10km east to west). The population in PNA totals 4.1 million, of which 2.5million live in the West Bank area and 1.6 million live in the Gaza area (as of the end of 2010, according to Palestinian Central Bureau of Statistics). 92 percent of the people living in PNA are Muslim, seven (7) percent Christian and one (1) percent made up of others, the center of the PNA is located in Ram Allah (in the West Bank). People belong to the Arab race and speak the Arabic language. The target site of this project is located in the West Bank area which is hilly. Altitudes in Ram Allah, Nablus, Jerusalem and Hebron are between 800 and 1,000 m, on the other hand Jericho is located in a deep valley whose altitude is minus 200 to 300m. The weather condition depends on the area due to the big differences of altitude, in Jericho, the average temperature is 31.4°C in summer and 15.5°C in winter and the annual rainfall is around 95 mm (data in 1998: Statistical Abstract of Palestine No.5, January 2004). On the other hand, in Hebron which is at a higher altitude, the maximum average temperature is less than 30 °C even in the hottest season (July and August), but the minimum temperature in January and February goes down to 5 °C. Annual rainfall which falls mainly in the winter season is approximately 410 mm (http://wether.jp.com, 2011).

The solid waste generated in the West Bank is approximately 79 thousand tons a month, 0.6 kg per capita per day. Solid waste management has been implemented by the Joint Council (hereafter called "JC") of each local government, which supports and supervises each JC. In the concerned area, some activities regarding solid waste collection and transportation are being implemented but any landfill controlled effectively exists especially in Jenin and Jericho JC. Most JCs are facing difficulties in transferring solid waste to the landfill due to financial issues. As a result, 147 open dumping sites still exist in the PNA. Open burning and open dumping have a bad impact at environment and health conditions of residents. In addition, the existing landfill in Jericho is expected to fill up in the near future. However, the sanitary landfill in Ram Allah located in the central area of

the West Bank planned with KfW assistance has not started construction work as yet. Therefore, both disposal waste reduction and expansion of existing landfill in Jericho are required.

1-1-2 Development Plan

Palestine has formulated "The National Strategy of Solid Waste Management (2010-2014)", which aims to develop a comprehensive, independent and growing solid waste management system including the development of wide area solid waste collection and disposal systems, the start of 3R (Reduce Reuse and Recycle), as well as profitability improvement of recycling and business operations. The strategy has a plan to build three (3) sanitary landfills to dispose solid waste generated from all the areas (already developed in Jenin, under construction in Bethlehem and Hebron, and in the planning stage in Ram Allah).

1-1-3 Social and Economic Situation

Since 1967, when Gaza and the West Bank area of the Jordan river had been occupied by Israel, the PNA had difficulty in trading with other countries, became dependent on the Israeli economy and lost economic independence with under developed economy related organizations and financial institutions because Israel had been controlling the borders. The Palestine economy grew steadily along with the peace process since 1993, due to economic assistance by donors and international organizations, alliance between Western companies and the Palestinian companies, trading with Egypt and Jordan. However, since the end of September 2000, the Palestine economy had been heavily damaged due to incidents between Israel and Palestine, blockade by Israel and restraints on movements. According to the World Bank, the economic recession surpassed the worldwide financial crisis and economic crisis in Argentina.

Moreover when Hamas won in the Palestinian Legislative Council in January 2006, the Israel Government which was levying customs duties on behalf of Palestine, decided to freeze the refund to Palestine from March, and since then, salaries for Palestinian officers had fallen behind, and resulted in an enormous impact on the Palestinian economy. Thereafter Fayyad's new cabinet consisting of non-Hamas ministers was launched and the Israel government again started to pay the refund which had been frozen, thereafter Fayyad's cabinet restarted to pay salaries for non-Hamas officers after an interval of one year and 3 months.

In the light of this background, the current economy is US$ 5.1 billion for Gross Domestic Product (nominal GDP), per capita GDP is approximately US$ 1,400, growing rate of GDP is 4.2 percent (PCBS : Palestinian Central Bureau of Statistics). On a percentage basis the breakdown is agriculture and fishery (5.5percent), industry (12.4percent), construction (9.7percent), retail and trading (10.7percent), finance and instrumentality (5.5percent), public and defense (14.2percent), service (22.3percent), transportation and communication (8.6percent). The unemployment rate tended

to deteriorate due to a four (4) percent or more increase in population growth and the recent Palestinian economy downturn, according to the Office for the Coordination of Humanitarian Affairs of the United Nations (OCHA). Unemployment rate at the end of September 2008 reached 26.4 percent in the West Bank area, 46.1 percent in the Gaza area and 32.7 percent in all of the PNA. Inflation rate is three (3) percent and is somewhat severe.

1-2 Background for the Request of Grant Aid Project

Administrative activities of solid waste management has been developed since 1990's with assistance from donor countries although there still remains many issues specific to Palestine involving the establishment of sanitary and environment-friendly solid waste management systems. Under such circumstances, the Government of Japan has been implementing grant aid for general projects such as the "Project for Capacity Development on Solid Waste Management in Jericho and the Jordan River Rift Valley (2006-2010)" with the MOLG as the counterpart organization. As a result, the Government of Japan has been acclaimed by both Palestine and international agencies for the considerable effects made towards the organization and the implementation of capacity strengthening for the regional implementing body of JCspd in solid waste management. However, the effects observed and the organization activities and the capacity development are achievements at the initial stages and in reality there are still a number of challenges left for improvements in equipment, facilities and operations for appropriate management of solid waste. Because of this situation, operation of sanitary landfill is being carried out in limited areas in the Jenin and Jericho governorates.

In order to cope with and address the situation, the authority concerned formulated the National Strategy for Solid Waste Management in the Palestine Territory (2010-2014) aimed at the development of integrated and self-reliant solid waste management systems through regional waste collection & disposal, implementation of 3R activities, saving resources by recycling and leading to the improvement of profitability. Further enhancement in the fields of institutional setup, development & improvement of the facilities and equipment, as well as human resource development are essential and required for the achievement of the above aims.

Currently, three regional landfill sites are being developed to centralize disposal of waste discharged in the West Bank. In parallel with this the development of the regional landfill sites, improvement of the systems for recovery of recyclable materials from the collected municipal waste and transport of residual waste to the final disposal site are aimed at completing the integrated system.

1-3 Assistance from Japan

According to the report from OECD-DAC 2008/2009, USA, EU, Arab countries, Japan, UK, Norway, Spain, Germany, and Sweden are the major donor countries that have provided several kinds of assistance. As regards the assistance of the government of Japan till the 2010 fiscal year, the

cumulated amount reached consisted of i) grant aid, 82,761 Million Yen in terms of the amount stated in E/N, ii) technical cooperation, 8,166 Million Yen in terms of JICA expenditure. The major projects in the fiscal year 2010 consist of i) grant aid comprising a)urgent grant aid 2,205 Million Yen, b)grant aid/food aid 870 Million Yen (600 Million Yen via and 270 Million Yen via WFP), c) non-project grant aid 2,500 Million Yen, and d) grass roots/human security grant aid (11 projects) 100 Million Yen, ii) technical assistance projects through the technical cooperation projects, dispatch of experts, training programs in Japan, and provision of equipment. The major technical cooperation projects being carried out currently are i) Improving Health with a Special Focus on Maternal and Child Health in Palestine (Phase 2), ii) Sustainable Tourism Development in Jericho through Public Private Partnership, and (iii) Industrial Strengthening of PIEFZA for the Agro-industry Park in Jericho.

1-3-1 Technical Cooperation Project

The Government of Japan had commenced a technical cooperation project on solid waste management titled "The Project for Capacity Development on Solid Waste Management in Jericho and Jordan River Rift Valley (JJRRV)". The project was formulated as three years cooperation project and started in 2005. But the project was extended for a period and the completion report submitted in February 2010. The project was implemented in the service areas of Jericho and the Jordan River Rift Valley for the 17 LGUs including eight (8) LGUs in the Jericho Governorate, three (3) LGUs in the Tubus Governorate and six (6) LGUs in the Nablus Governorate based on the following project purposes and expected outputs.

Project Purpose

(1) Sustainable sanitary system for SWM is introduced in JJRRV.
(2) Experience of improvements on SWM in JJRRV are shared as a model for other areas in the PNA

Project Outputs

(1) Organizational aspects for project operation are established
(2) A System for SWM in JJRRV is established
(3) The Present situation of SWM in JJRRV is understood
(4) An Action plan for the improvement of SWM in JJRRV is formulated
(5) The action plan is put into practice and necessary improvements are made
(6) Seminars/workshops are held and the project experiences in JJRRV are disseminated among the Palestine local authorities
(7) Those in charge of SWM in local authorities and related ministries acquire basic knowledge on integrated SWM and their basic knowledge is disseminated

1-3-2 Grant Aid Project

The Government of Japan implemented the grant aid project titled "The Project for Improvement of Solid Waste Management" in fiscal year 1998 to provide collection vehicles and heavy machinery. These collection vehicles and heavy machinery have been superannuated and it is the time for replacement due to the need for considerable expenditure on repairs and recurring maintenance costs. The following is an outline of the main features of grant aid project.

- Project Name: The Project for Improvement of Solid Waste Management
- Implementation Year: 1998 Fiscal Year
- Project Cost: 1,328 Million Yen
- Outline of the Project: Procurement of vehicles and heavy machinery required to resolve waste collection and waste disposal operations for 160 LGUs and five (5) regional waste disposal facilities including 79 units of collection vehicles and seven (7) units of landfill machinery.

The Government of Japan implemented the second phase grand aid project for improvement of solid waste management titled "The Project for Improvement of Solid Waste Management (Phase 2)" in 2006 fiscal year. The grant aid project was formulated to assist the joint councils of Jericho and the Jordan River Rift Valley (JJRRV), Tulkarem, Salfit and Bethlehem. Consequently, the grant aid project was carried out by UNDP using the Japan Fund and the compactors and the heavy machinery were provided in the years from 2009 to 2010.

1-3-3 Loan Assistance

The Government of Japan has not yet implemented the loan assistance in the field of the solid waste management sector.

1-4 Assistance from Other Donors

With regard to the international aid group activities, there is loan assistance financed by the WB towards the construction of the Jenin Regional Landfill. Currently, a number of international donor agencies including WB, EU, Germany, Italy, etc. provide grant aid. The SWM sector activities of other donors in the West Bank are summarized in the following subsections.

1-4-1 World Bank（WB）

(1) Jenin Regional Landfill

This project is the first sanitary landfill project in the West Bank to construct a regional landfill and the project was carried out by the Jenin Joint Council for SWM. The construction site is located in the South West hills about 13km away from the Jenin Municipality. The site falls into the B area

including a part of C area and the project is approved by the Israel authority. The environmental impact assessment (EIA) was conducted in 2000. The World Bank evaluated the EIA and it was officially approved by the Environmental Quality Authority (EQA) thereafter. The landfill site uses the topographic condition of the valley wall for containment and was installed with PE sheet lining in addition to the facilities for leachate treatment. The landfill operation started in 2007. Currently, the Jenin municipality and the neighboring municipalities including Tubas and Tulkarem utilize the landfill facilities. This project also includes procurement of the collection and transportation vehicles financed by the loan of four (4) Million US$ from the EU. The following outlines the main features of the project.

> The Self-Government Category in the Palestinian National Authority
> The self-Government Category in the Palestine National Authority based on the Oslo Accords is classified into three (3) areas as follows.
> **A area:** Full civil and security control by PA, with no Israeli settlements (All of Gaza area, Hebron, Jenin, Tulkarem, Bethlehem, Jericho, Nablus, Ram Allah in the West Bank etc.)
> **B area:** Self Government area but joint security control with Israel.
> **C area:** Israeli Sovereignty; civil and security control.

- Name of Regional Landfill Site : Zaharat Al Finjan Landfill
- Landfill Capacity : 400,000 m^3
- Project Cost : 14 Million US$(WB Loan 9.5 Million US$)
- Repayment Period : 30 years
- Borrower : Ministry of Finance, PNA

(2) Hebron Regional Landfill

The World Bank grant aid project was approved in May 2009 for the overall improvement of SWM services in the areas of the Hebron and Bethlehem JCs. The project finance also includes subsidies of the PNA and aid from other donor countries. The main component of the project, namely the sanitary landfill is under construction with the construction period of 18 months. The construction is scheduled to be completed in March 2013. After completion of the construction work, the landfill volume will be held at 12 million m^3 in a 20 hectare land area. The actual landfill work will be carried out in four (4) phases. The landfill site is located in the Category C area but the project has to be implemented after approval by the Israeli authority and is consequent to the EIA as well. The following outlines the main features of the project.

- Project Name : Southern West Bank Solid Waste Management Program
- Purpose of the Project :
  - Strengthen the administrative and technical capacity and implement low cost solid waste management
  - Construct a sanitary landfill and associated facilities to improve waste disposal operations,

- Implement a raising public awareness campaign to reduce waste, generation rate, recovery of recyclable materials, and recovery of costs to revitalize and maintain the financial aspects.

- Total Project Cost : 24 Million US$
- Breakdown:
- World Bank : 12.0 Million US$
- PNA Subsidy : 2.0 Million US$
- EU : 6.8 Million US$
- Italian Government : 0.4 Million US$
- USAID : 3.0 Million US$
- Completion Date of the Project : December 30, 2014

1-4-2 European Union (EU)

Currently, EU is implementing the assistance project of the Southern West Bank Solid Waste Management Program in coordination with WB. The main contents of the assistance project consist of procurement of equipment to Hebron and Bethlehem JCs in connection with the Hebron Regional Landfill Project stated above. The total project cost amounts to 8.46 million EURO to cover the equipment categorized in the following seven (7) lots.

Lot 1 : Solid Waste Containers
Lot 2 : Solid Waste Collection and Transfer Trucks
Lot 3 : Solid Waste Handling and Landfill Machinery
Lot 4 : Landfill Compactors
Lot 5 : Service and Mobilization Vehicles
Lot 6 : Miscellaneous Equipment
Lot 7 : Recycling Equipment

The target JCs of this project include i) Jenin, ii) Hebron & Bethlehem, iii) Ramallah, iv) Tubas, v) Tulkarem, vi) Qalkilya, vii) Nablus and viii) Jerusalem. The Jericho and Salfit JCs are excluded from the target project area. The equipment was supplied in spring 2012. The suppling equipment to the JCs and the LGUs in the Governorates are summarized in **Table 1.1**.

Table 1.1 Equipment Procurement List of EU Project

Items	Spec./JC	Jenin	Hebron & Bethlehem	Ramallah	Tubas	Tulkarem	Qalkilya	Nablus	Jerusalem	Total (Number of Units)
Collection Equipment										
Container (steel)	1.1 m^3	571	1,100	770	170	478	569	497	295	4,450
Container (steel)	2 m^3	0	238	0	0	0	0	0	0	238
Container (steel))	4 m^3	60	100	0	0	0	0	0	0	160
Container (steel) closed type	32 m^3	3	10	0	2	4	3	0	0	22
Container (steel)	40 m^3	0	10	0	0	0	0	0	0	10
Container (plastic)	80*l*	0	45	0	0	0	0	0	0	45
Container (plastic)	240*l*	0	1,500	0	0	0	0	0	0	1,500
Compactor	8 m^3	0	2	5	1	0	1	3	1	13
Compactor	13 m^3	2	6	3	0	0	2	0	1	14
Compactor	21 m^3	1	3	0	0	0	0	0	0	4
Transportation Vehicle, Heavy Machine										
Hook Lift Track/Trailer	32 ton	0	3	0	0	0	0	0	0	3
Pickup	4x4	0	1	0	0	0	0	0	0	1
Dump Truck	18 m^3	0	3	0	0	0	0	0	0	3
Hook Lift Truck	10 m^3	0	1	0	0	0	0	0	0	1
Septic Sanction Truck	9 m^3	0	1	0	0	0	0	0	0	1
Wheel Loader	185 HP	0	2	0	0	0	0	0	0	2
Track Loader	180 HP	0	3	0	0	0	0	0	0	3
Track Excavator	240 HP	0	1	0	0	0	0	0	0	1
Backhoe Loader	90 HP	0	2	0	0	0	0	0	0	2
Load Compactor	24 ton	0	1	0	0	0	0	0	0	1
Load Compactor	36 ton	0	1	0	0	0	0	0	0	1
Grapple Crane	19 m^3	0	1	0	0	0	0	0	0	1
Others										
Track scale	100 ton	0	2	0	0	0	0	0	0	2
Generator	150 KVA	0	1	0	0	0	0	0	0	2
Tractor	75 HP	0	1	0	0	0	0	0	0	1
Service Truck	unknown	0	1	0	0	0	0	0	0	1
Compaction Unit	100 m^3/h	0	1	0	0	0	0	0	0	1
Compost Plant	various	0	1	0	0	0	0	0	0	1

Source: PALESTINIAN AUTHORITY, MINISTRY OF LOCAL GOVERNMENT, BID DOSSIER, CONTRACT NO.: MoF/MoLG/EU/2011-SWE02, PROCUREMENT OF SOLID WASTE EQUIPMENT, January 2011

1-4-3 Germany

The Government of Germany through GIZ and KfW had been implementing the SWM program during the period of 2005-2012, which is addressed mainly to the MoLG. The program mainly aims at improvements to public sanitation and reduction of loading to the environment through implementation of ecologically sustainable waste disposal plans. Outlines of the programs are summarized in the following subsections.

(1) Formulation of National Strategy for Solid Waste Management in the Palestine Territory (2010-2014)

The National Strategy for Solid Waste Management in the Palestine Territory (2010-2014) was formulated by the members from MOP, EQA, MOA, MOH, etc. under the initiative of MoLG and the technical assistance of GIZ. The national strategies were issued in 2008 after deliberation and approval by the Cabinet Meeting of the PNA. The national strategies comprised of eight (8) strategic objectives and 16 policies on SWM activities.

The items related with the project concerned is stated in Policy-5 under Strategic Objective Three (3) namely "Safe and efficient disposal of SW in regional sanitary landfills servicing all communities". The policy is being materialized by the development of three (3) regional landfills in the West Bank, which include at the Northern area an existing regional landfill in Jenin, the Ramallah regional landfill being planned in the middle area of Palestine and the Hebron regional landfill (Al-Minya) being constructed in the Southern area.

In addition, Policy-6 under Strategic Objective Three (3) outlines a plan to reduce waste amounts destined to landfill through raising public awareness and promotion of participation by the private recycling industry. Moreover, Policy-7 under Strategic Objective Three (3) advocates closure of random dumpsites or through improvements to mitigate the risk of impacts to the environment and to the human health. Accordingly, waste disposal work of each JC will be shifted to sanitary landfills at the said regional landfill sites in the future.

(2) Ramallah Regional Landfill

The regional landfill project of the Ramallah JC is carried out by two projects involving technical assistance of GIZ and the financial assistance by KfW. The landfill site is located in the valley walls of gentle hills about 12 km away from Ramallah in the East-North-East or about 15 km away from Jericho in the West-North-West. The site belongs to Area C and was approved by the Israeli authority concerned in December 2005. However, more than 100 landowners had not agreed to the sale of their land and the site procurement has not been completed. However, the government decided to procure the land by expropriation in December 2011 and commenced procedures for procurement. From now on, the Ramallah JC will prepare the EIA in a half year and execute the detail design in a half year thereafter. The implementation schedule is tight, since, the Ram Allah JC needs to proceed to the tender and signing of contracts to start the construction work in one and a half years. At present, Ram Allah JC is awaiting final approval of Israeli Authority.

1-4-4 Italy

The Italian government is implementing the tie-up projects between the Italian LGUs and the

Palestine LGUs in consideration of the necessity to upgrade the management capacity of the LGUs in cooperation with the public services. The Italian government provides the equipment to the Hebron JC in connection with the aforementioned project "Southern West Bank Solid Waste Management Program" as listed in **Table 1.2**. The listed equipment was provided around May 2012.

Table 1.2 Recycling Equipment (Grant of Italian Government)

Type	Quantity
Portable waste water tank fitted in trailer	1
Horizontal baling machine	1
Green waste pre-shredder	1
Foot pull type compost windrow turner	1
Compost screening/ sieving machine	1
Tires de-beader	1
Tires shredder	1
Trailer (trolley) for farm tractor	1
Portable compost storage container	1
Portable ready- made office	1

Source: PALESTINIAN AUTHORITY, MINISTRY OF LOCAL GOVERNMENT, BID DOSSIER, CONTRACT NO.: MoF/MoLG/EU/2011-SWE02, PROCUREMENT OF SOLID WASTE EQUIPMENT, January 2011

1-4-5 Spain

The government of Spain started development plans for waste collection and transportation in 1996. The compactors mounted on Nissan chassis and containers were supplied to the LGUs in the West Bank in the period of 1998-1999. Although 10 years have passed since the supply of the vehicles, a part of the compactors are still in operational.

Chapter 2 Results of the Study

2-1 Current Status of Solid Waste Management

2-1-1 Outline of the Activities of JCs

(1) Jenin

Jenin is the capital and the center of the Governorate located in the North of the West Bank. The population of the Governorate is estimated at 280,000 according to the statistical records of the PCBS. The Jenin JC was established by order of the MoLG in 2000. The committee of the JC consists of the members from 15 municipalities and five (5) towns. The Zahret Al Finjan sanitary landfill was constructed with the assistance of the WB and started operations in 2007. Approximately 90 random dumpsites were closed following commencement of this landfill operation. The main mission of the Jenin JC is to construct the regional landfill and oversee its operations. The Jenin JC is the most active JC conducting collection of municipal waste, transport and final waste disposal since commencement of operation of the Zahret Al Finjan Landfill in 2007. The Jenin JC receives solid waste from Tulkarem and Nablus in addition to the waste collection within the Governorate area.

The revenue of Jenin JC in 2010 was 10.24 Million NIS (New Israel Shekel; hereinafter referred to as NIS) and the expenditure was 8.49 Million NIS in 2011, the profit was 1.75 Million NIS. The cost benefit (B/C) is only 0.2, but the financial condition is favorable.

According to future plans, in order to improve the public sanitary environment in this region, the collection service ratio will be increased from 90 % to 100 % by 2015. The amount of collected solid waste will be increased from 205 tons per day to 265 tons per day. Therefore, the JC will need to prepare lists of necessary equipment and staff. Also the JC is considering the support of transportation from the surrounding JCs. The Jenin JC has responsibility as the core JC in the Northern area of the West Bank. **Table 2.2** shows the existing equipment of the Jenin JC for waste management services. The equipment which will be procured by EU by May 2012 is shown in **Table 2.3**.

Table 2.1 Baseline Data of the Jenin JC

Parameter	Number		Parameter	Number
Baseline Data			**Organization Status**	
No. of LGUs & Localities in the Governorate	71		Status of Activities	operational
Population in the Governorate (PCBS estimation in 2011) (persons)	281,156		Total No. of Staff (persons)	140
No. of LGUs served by JC	68		No. of Staff for Waste Collection Service (persons)	56
Population of LGUs & Localities in Service Area(2011) (persons)	263,889		Waste Collection Amount per staff (ton/day/person)	1.5
Covering Ratio to the Governorate Population (%)	94		**Future Plans**	
Collation Ratio in Service Area (%)	90		Population in the Governorate (2015) (persons)	311,231
Actual Service Population by JC (2011) (persons)	237,500		No. of LGUs % Localities served by JC	68
Collection Amount (tons/day) (2011)	204.7		Population of LGUs and Localities in Service Area (2015) (persons)	292,041
Per Capita Waste Discharge Amount (g/c/day)	862		Coverage Ratio to the Governorate Population (%)	94
Financial Status			Planned Collection ratio (%)	100
Revenue (NIS, 2010)	10,239,969		Service Population by JC (2015) (persons)	292,041
Expenditure (NIS, 2010)	8,488,325		Future Waste Collection Amount (t/day) (2015)	262
Balance (NIS, 2010)	1,751,644		Per Capita Waste Discharge Amount (g/c/day) (2015)	897
Cost Efficiency; Benefit by Cost (B/C)	0.206			
Cost per ton-waste (NIS/ton)	113.6			
Revenue per collection population (NIS/person/year)	43.1			

Table 2.2 Existing Equipment of the Jenin JC

JC	Item	Spec.	Q'ty	Manufact.	Maker	Procured	Donor
Jenin	Vacuum Car	$8m^3$	1	2008	Iveco	2009	JC purchased
	Waste Transfer Vehicle		1	2010	Iveco	2011	Procured by MOLG
	Compactor	$12m^3$	3	2004	Iveco	2004	EU
	Dump Truck		1	2005	Iveco	2005	EU
	Compactor	$6m^3$	4	2009	Volvo	2009	EU
	Compactor	$9m^3$	2	2008	Volvo	2010	JC procured
	Compactor	$5m^3$	6	1999	Isuzu	2008	JC procured
	Compactor	$21m^3$	1	2001	Man	2010	JC procured
	Landfill Compactor		1	2004	Bomag	2005	EU
	Truck Loader		1	2004	N. A	2005	EU
	Bulldozer		1	2004	N. A	2005	EU
	Wheel Loader		1	2004	N. A	2005	EU

Table 2.3 Equipment provided by the EU

Name of Equipment	Specification	Numbers of Equipment
Container	1.1 m^3	571
Container	4.0 m^3	150
Container	32 m^3	3
Compactor	13 m^3	3
Compactor	21 m^3	1

(2) Hebron

Hebron is a center of the Southern part of the West Bank where the industrial work of quarrying of marble, leather tanning and shoe manufacturing has been actively carried out. Accordingly, Hebron has many of the immigration population and the population growth rate has become 3percent per annum. The Hebron Governorate has the largest population in the West Bank estimated approximately at 620,000 in 2011. The Hebron JC was established in 2007 with only six (6) municipalities out of 85 total municipalities & towns in the governorate and the present waste management collection serviced population is estimated at 62,000. Construction of the regional landfill is in progress in Hebron and a plan has been prepared to include an additional 14 municipalities for the waste management service coverage areas upon completion of the construction work in March 2013.

The revenue of the Hebron JC is quite low because the JC is carrying out the waste collection services at only six (6) municipalities. The revenue in 2010 was 185,000 NIS and the expenditure was 64,000 NIS, the profit was around 18,500 NIS. There is no serious financial problem currently. However, the collection of waste fees shall have to be ensured in the future, because the future plans show that the service area will be greatly expanded.

The collection service population will be increased from 62,000 to 512,000. The amount of the collected waste will be increased from 46 tons per day to 395 tons per day. The Hebron JC will grow as a core JC by construction of the sanitary landfill. The following **Table 2.5** shows the existing equipment of the Hebron JC for waste management services. The EU has a plan to provide the equipment to the Hebron and Bethlehem JCs as shown in **Table 2.6**.

Table 2.4 Base line Data of the Hebron JC

Parameter	Number		Parameter	Number
Baseline Data			**Organization Status**	
No. of LGUs & Localities in the Governorate	85		Status of Activities	Operation
Population in the Governorate (PCBS estimation in 2011) (persons)	620,417		Total No. of Staff (persons)	16
No. of LGUs served by JC	6		No. of Staff for Waste Collection Service (persons)	9
Population of LGUs & Localities in Service Area(2011) (persons)	70,638		Waste Collection Amount per staff (ton/day/person)	2.9
Covering Ratio to the Governorate Population (%)	11		**Future Plans**	
Collation Ratio in Service Area (%)	88		Population in the Governorate (2015) (persons)	706,509
Actual Service Population by JC (2011) (persons)	62,161		No. of LGUs % Localities served by JC	20
Collection Amount (tons/day) (2011)	46		Population of LGUs and Localities in Service Area (2015) (persons)	602,862
Per Capita Waste Discharge Amount (g/c/day)	740		Coverage Ratio to the Governorate Population (%)	85
Financial Status			Planned Collection ratio (%)	85
Revenue (NIS, 2010)	185,280		Service Population by JC (2015) (persons)	512,433
Expenditure (NIS, 2010)	63,938		Future Waste Collection Amount (t/day) (2015)	395
Balance (NIS, 2010)	121,342		Per Capita Waste Discharge Amount (g/c/day) (2015)	770
Cost Efficiency; Benefit by Cost (B/C)	1.9			
Cost per ton-waste (NIS/ton)	3.8			
Revenue per collection population (NIS/person/year)	3.0			

Table 2.5 Existing Equipment of the Hebron JC

JC	Item	Spec.	Q'ty	Manufact.	Maker	Donor
Hebron	Compactor	12m^3	1	2009	Iveco	UNDP/Japan
	Compactor	8 m^3	1	2009	Volvo	EU

Table 2.6 Equipment provided by the EU

Name of Equipment	Specification	Numbers of Equipment
Container	Steel : 1.1 m^3	1,350
Container	Steel : 4 m^3	120
Container	Steel : 32 m^3	10
Container	Steel : 40 m^3	10
Container	Plastics : 240*l*	1740
Compactor	8 m^3	3
Compactor	13 m^3	2
Compactor	21 m^3	4
Hook Lift	32 tons	3
Pick Up	4x4	1
Dump Truck	18 m^3	3
Septic Suction Truck	9 m^3	1
Wheel Loader	185 HP	2
Truck Excavator	240 HP	1
Backhoe Loader	90 HP	2
Rolling Compactor	24 tons	1
Rolling Compactor	36 tons	1
Truck Scale	100 tons	2
Diesel Engine Generator	150 KVA	2
Tractor	75 HP	1
Service Truck	N.A.	1
Compaction Unit	100 m^3/h	1
Compost Plant Facility	N.A.	1set

(3) Jericho

Jericho is a municipality in the governorate located near the Jordan River in the northwest of the Dead Sea. The land in Jericho has an average altitude of minus 250 m M. S. L. which is the lowest inhabited area in the world. Agriculture is prevalent in Jericho, even bananas are cultivated and Jericho has become the supply center of vegetables and fruits. In Jericho, with the assistance of the Government of Japan, construction projects of an agro-industrial park and sewerage facilities are in progress.

The Jericho JC was established in 2005 for the regional level solid waste management association named by the Jericho and Jordan River Rift Valley Joint Council. The organization is composed of 17 municipalities including three (3) municipalities from the Tubas Governorate and six (6) municipalities from the Nablus Governorate. Presently the serviced population in 2011 is 52,000 and the future serviced population in 2015 is estimated at 62,000. Jericho plans to expand a sanitary landfill in the adjacent area of the existing landfill site due to the delay of the regional landfill project

in the Ramallah Governorate and due to the fact that there is no landfill in the neighboring area. The plan was accepted by MoLG on the condition that it serve for less than five (5) years or terminate by the time the Ramallah Regional Landfill becomes operational.

The collection ratio of waste fees is increasing in the Jericho JC and the collection ratio including the schedule payment reached 82 percent in November 2011. The revenue in 2010 was 1.51 Million NIS and expenditure was 1.49 Million NIS. The profit was 20,000 NIS in 2010. There is no serious financial problem at this time. However, the current financial conditions cannot accommodate future investments.

According to the future plans, the target collection ratio in the serviced area is 100 percent, the amount of collected waste will be increased from 45 tons per day to 58 tons per day.

In case the sanitary landfill in Ramallah is built, transportation cost for collection must be estimated and, reduction of waste amounts and recycling are also necessary to implement.

After 5 years, the Jerico JC will not be able to further use its own landfill site, so the JC needs to establish a waste recycling system.

Table 2.7 Baseline Data of the Jericho JC

Parameter	Number		Parameter	Number
Baseline Data			**Organization Status**	
No. of LGUs & Localities in the Governorate	12		Status of Activities	operational
Population in the Governorate (PCBS estimation in 2011) (persons)	46,718		Total No. of Staff (persons)	24
No. of LGUs served by JC	15		No. of Staff for Waste Collection Service (persons)	18
Population of LGUs & Localities in Service Area(2011) (persons)	58,134		Waste Collection Amount per staff (ton/day/person)	1.9
Covering Ratio to the Governorate Population (%)	124		**Future Plans**	
Collation Ratio in Service Area (%)	90		Population in the Governorate (2015) (persons)	52,154
Actual Service Population by JC (2011) (persons)	52,321		No. of LGUs % Localities served by JC	17
Collection Amount (tons/day) (2011)	45.0		Population of LGUs and Localities in Service Area (2015) (persons)	64,819
Per Capita Waste Discharge Amount (g/c/day)	860		Coverage Ratio to the Governorate Population (%)	124
Financial Status			Planned Collection ratio (%)	100
Revenue (NIS, 2010)	1,512,836		Service Population by JC (2015) (persons)	64,819
Expenditure (NIS, 2010)	1,492,608		Future Waste Collection Amount (t/day) (2015)	58
Balance (NIS, 2010)	20,228		Per Capita Waste Discharge Amount (g/c/day) (2015)	895
Cost Efficiency; Benefit by Cost (B/C)	0.014			
Cost per ton-waste (NIS/ton)	90.9			
Revenue per collection population (NIS/person/year)	28.9			

The following **Table 2.8** shows the existing equipment of the Jericho JC for waste management services. The EU will not be providing any equipment to the Jericho JC.

Table 2.8 Existing Equipment of the Jericho JC

JC	Item	Spec.	Q'ty	Manufact.	Maker	Procured	Donor
Jericho	Compactor	12 m^3	3	2009	Iveco	2009	UNDP/Japan
	Compactor	8 m^3	1	2009	Iveco	2009	UNDP/Japan
	Compactor	5 m^3	3	1999	Isuzu	2000	Japan Grant
	Fuck Lift Vehicle	8 m^3	1	2009	Iveco	2009	UNDP/Japan
	Grapplle Crane	18 m^3	1	2009	Volvo	2009	EU
	Dump Truck	13 ton	1	2009	Iveco	2010	UNDP/Japan
	Backhoe Loader	1 m^3	1	2008	CAT	2008	UNDP/Japan
	Landfill Dozer	12 m^3	1	2009	CAT	2009	EU
	Landfill Compactor	20 ton	1	2009	Bomag	2009	EU

(4) Salfit

The Salfit Governorate is located in the northwest part of the West Bank with the population of approximately 64,000. The Salfit JC provides the services for waste collection, transport and final disposal for 19 municipalities in the governorate. Waste collected from 19 municipalities are carried to 10 random dump sites near the generation sources of the municipalities and disposed by open dumping. The Salfit JC is planning to increase the waste collection and transport efficiency through construction of two transfer stations in the Salfit and the Biddya areas.

The revenue of the Salfit JC was 1.28 Million NIS, expenditure was 1.25 Million in 2010. The profit was 29,000 NIS. The cost efficiency is calculated as 0.02, the efficiency suggests that a financial source for the future procurement of equipment needs to be secured.

According to the future plans, the collection ratio in the service area will be increased from 90 % up to 100 % by 2015. Collected waste amounts will increase from 53.5 tons per day to 68 tons per day. In addition, the JC aims to close random dumping sites to improve waste transfer capacity. **Table 2.10** shows the existing equipment of the Salfit JC for waste management services. The EU will not be providing equipment to the Salfit JC.

Table 2.9 Baseline Data of the Salfit JC

Parameter	Number		Parameter	Number
Baseline Data			**Organization Status**	
No. of LGUs & Localities in the Governorate	20		Status of Activities	operational
Population in the Governorate (PCBS estimation in 2011) (persons)	64,615		Total No. of Staff	28
No. of LGUs served by JC	20		No. of Staff for Waste Collection Service (persons)	19
Population of LGUs & Localities in Service Area(2011) (persons)	64,615		Waste Collection Amount per staff (ton/day/person)	1.9
Covering Ratio to the Governorate Population (%)	100		**Future Plans**	
Collation Ratio in Service Area (%)	90		Population in the Governorate (2015) (persons)	70,727
Actual Service Population by JC (2011) (persons)	58,154		No. of LGUs % Localities served by JC	20
Collection Amount (tons/day) (2011)	53.5		Population of LGUs and Localities in Service Area (2015) (persons)	70,727
Per Capita Waste Discharge Amount (g/c/day)	920		Coverage Ratio to the Governorate Population (%)	100
Financial Status			Planned Collection ratio (%)	100
Revenue (NIS, 2010)	1,283,516		Service Population by JC (2015) (persons)	70,727
Expenditure (NIS, 2010)	1,254,633		Future Waste Collection Amount (t/day) (2015)	68
Balance (NIS, 2010)	28,883		Per Capita Waste Discharge Amount (g/c/day) (2015)	957
Cost Efficiency; Benefit by Cost (B/C)	0.023			
Cost per ton-waste (NIS/ton)	64.2			
Revenue per collection population (NIS/person/year)	22.1			

Table 2.10 Existing Equipment of the Salfit JC

JC	Item	Spec.	Q'ty	Manufact.	Maker	Procured	Donor
Salfit	Compactor	$8m^3$	-	2009	Iveco	2009	UNDP/Japan
	Compactor	$8m^3$	-	2009	Iveco	2009	UNDP/Japan
	Compactor	$8m^3$	-	2009	Iveco	2009	UNDP/Japan
	Compactor	$8m^3$	-	2009	Volvo	2009	EU
	Compactor	$8m^3$	-	2009	Volvo	2009	EU
	Waste Transfer Vehicle	$32m^3$	-	2010	Iveco	2010	UNDP/Japan
	Rig Calf		-	2007	CAT	2007	UNDP/Japan
	Rig Calf		-	2009	CAT	2009	EU

(5) Bethlehem

The Bethlehem Governorate, composed of 44 municipalities, is located in the middle part of the West Bank. Bethlehem is a famous tourist spot, being the birthplace of Jesus Christ with daily visitors

of 4,000 to 6,000 from all over the world. The waste generated from the tourist spots is also included in the services of waste collection in Bethlehem and is carried out by the small vehicles since the municipality is an ancient one and the streets in the town area are narrow. The Bethlehem JC was established in 2006 and started financial accounts in 2009. The actual service of waste collection and transport started in the beginning of 2010. Currently, 27 municipalities participate in the organization of the JC with a serviced population of 127,000. The JC plans to include an additional eight (8) municipalities in 2015 and the serviced population is estimated to reach 189,000. The Bethlehem JC is suffering financial deficits due to the low waste fee collection ratio which is 50 percent.

Table 2.11 Baseline Data of the Bethlehem JC

Parameter	Number		Parameter	Number
Baseline Data			**Organization Status**	
No. of LGUs & Localities in the Governorate	44		Status of Activities	operational
Population in the Governorate (PCBS estimation in 2011) (persons)	194,095		Total No. of Staff (persons)	63
No. of LGUs served by JC	27		No. of Staff for Waste Collection Service (persons)	59
Population of LGUs & Localities in Service Area(2011) (persons)	133,487		Waste Collection Amount per staff (ton/day/person)	1.6
Covering Ratio to the Governorate Population (%)	69		**Future Plans**	
Collation Ratio in Service Area (%)	95		Population in the Governorate (2015) (persons)	216,114
Actual Service Population by JC (2011)	126,813		No. of LGUs % Localities served by JC	35
Collection Amount (tons/day) (2011)	101		Population of LGUs and Localities in Service Area (2015) (persons)	208,776
Per Capita Waste Discharge Amount (g/c/day)	799		Coverage Ratio to the Governorate Population (%)	97
Financial Status			Planned Collection ratio (%)	100
Revenue (NIS, 2010)	3,976,191		Service Population by JC (2015) (persons)	208,776
Expenditure (NIS, 2010)	5,070,311		Future Waste Collection Amount (t/day) (2015)	174
Balance (NIS, 2010)	－1,094,120		Per Capita Waste Discharge Amount (g/c/day) (2015)	831
Cost Efficiency; Benefit by Cost (B/C)	-0.216			
Cost per ton-waste (NIS/ton)	137.1			
Revenue per collection population (NIS/person/year)	31.4			

According to future plans, the JC will provide increased collection services from 27 LGUs to 35 LGUs by 2015. The amount of the collected waste will become 174 tons per day from 101 tons per day at present. In order to achieve this target, it is important not only to have adequate equipment but also suitable organization and organizational systems in place. The, establishment of a suitable tariff collection system is especially required. Sustainable services will be provided by a favorable financial status. The JC shall cooperate with the Hebron JC to improve its skills, and knowledge of SWM.

Table 2.12 shows the existing equipment of the Bethlehem JC for waste management services. The EU will provide equipment to the Bethlehem JC in conjunction with the Hebron JC. Refer to **Table 2.6**.

Table 2.12 Existing Equipment of the Bethlehem JC

JC	Item	Spec.	Q'ty	Manufact.	Maker	Procured	Donor
Bethlehem	Compactor	5 m^3	4	2009	Volvo	2009	EU
	Compactor	8 m^3	3	2009	Iveco	2009	UNDP/Japan
	Compactor	12 m^3	7	2009	Iveco	2009	UNDP/Japan
	Compactor	12 m^3	1	1995	Benz	1995	Municipality

(6) Ramallah and Al-Bireh

The Ramallah and Al-Bireh Governorate is located in the middle part of the West Bank and is the center of political, economic and commercial activities, and it is regarded as the capital of Palestine. The governorate is composed of 74 municipalities and towns. The waste collection service was suspended as of the end of 2011 and waste collection was carried out by individual municipalities and subordinate JCs. Currently, the activities of the Ramallah and Al-Bireh JC includes promoting the construction of the regional landfill and the waste collection service will be started again in the Spring of 2012 as the vehicles and equipment will be provided by the EU aid project. 50 municipalities and towns will have services when the JC starts its waste collection again. The serviced population of 166,000 as of 2011 is estimated to rise to 207,000 in 2015.

The financial source for the regional landfill project was approved by KfW and the project is in progress assisted by the experts dispatched from GIZ. With regard to procurement of the construction site, in December 2011, the Government decided to take the expropriation for procurement of the site and the activities are moving towards construction of the regional landfill. However, as of July 2012, the land application has still not been approved by Israel. According to MoLG, they have a plan to build 2 new controlled dumping sites in the Ramallah governorate and use them temporarily until the new landfill construction is completed.

The revenue of the JC was 1.08 Million NIS and expenditure was 1.33 NIS in 2011. The deficit was 0.25 Million NIS. The present financial condition is unfavorable.

The landfill preparation is a big issue in order to achieve the objectives of the national plan, the construction of a new sanitary landfill is an urgent matter. **Table 2.14** shows the existing equipment of the Ramallah and Al-Bireh JC for waste management services. Equipment will be provided to the Ramallah and Al-Bireh JC by the EU is shown in **Table 2.15**.

Table 2.13 Baseline Data of the Ram Allah and Al-Bireh JC

Parameter	Number		Parameter	Number
Baseline Data			**Organization Status**	
No. of LGUs & Localities in the Governorate	74		Status of Activities	In suspension
Population in the Governorate (PCBS estimation in 2011) (persons)	310,218		Total No. of Staff	5
No. of LGUs served by JC	50		No. of Staff for Waste Collection Service (persons)	0
Population of LGUs & Localities in Service Area(2011) (persons)	184,514		Waste Collection Amount per staff (persons) (ton/day/person)	33.5
Covering Ratio to the Governorate Population (%)	59		**Future Plans**	
Collation Ratio in Service Area (%)	90		Population in the Governorate (2015) (persons)	348,110
Actual Service Population by JC (2011)	166,063		No. of LGUs % Localities served by JC	54
Collection Amount (tons/day) (2011)	168		Population of LGUs and Localities in Service Area (2015) (persons)	225,931
Per Capita Waste Discharge Amount (g/c/day)	1,010		Coverage Ratio to the Governorate Population (%)	65
Financial Status			Planned Collection ratio (%)	100
Revenue (NIS, 2010)	1,078,892		Service Population by JC (2015) (persons)	225,931
Expenditure (NIS, 2010)	1,327,085		Future Waste Collection Amount (t/day) (2015)	237
Balance (NIS, 2010)	－248,193		Per Capita Waste Discharge Amount (g/c/day) (2015)	1,051
Cost Efficiency; Benefit by Cost (B/C)	-0.19			
Cost per ton-waste (NIS/ton)	21.7			
Revenue per collection population (NIS/person/year)	6.5			

Table 2.14 Existing Equipment of the Ram Allah and Al-Bireh JC

JC	Item	Spec.	Q'ty	Manufact.	Maker	Procured	Donor
Ramallah and Al-Bireh	Compactor	6 ton	1	2009	Iveco	2009	N.A.
	Compactor	6 ton	1	1988	Iveco	1988	N.A.
	Compactor	9 ton	1	1999	Iveco	1999	N.A.
	Compactor	4 ton	1	2009	Volvo	2009	N.A.
	Compactor	8 ton	1	1989	Volvo	1989	N.A.
	Compactor	5 ton	1	2000	Volvo	2000	N.A.
	Compactor	5 ton	1	1996	Benz	1996	N.A.
	Compactor	8 ton	1	2011	Volvo	2011	N.A.
	Compactor	8 ton	1	2011	Volvo	2011	N.A.
	Compactor	8 ton	1	1999	Iveco	1999	N.A.
	Compactor	6 ton	1	2009	Iveco	2009	N.A.
	Compactor	5.5 ton	1	2000	Isuzu	2000	N.A.
	Compactor	2.5 ton	1	2000	Isuzu	2000	N.A.
	Compactor	6 ton	1	1999	Volvo	1999	N.A.
	Compactor	6.5 ton	1	2000	Iveco	2000	N.A.
	Compactor	3 ton	1	2001	Isuzu	2001	N.A.
	Compactor	2.5 ton	1	1999	Isuzu	1999	N.A.
	Compactor	6 ton	1	1999	Isuzu	1999	N.A.
	Compactor	6 ton	1	2009	Isuzu	2009	N.A.

Table2.15 Equipment provided by the EU in 2012

Name of Equipment	Specification	Numbers of Equipment
Compactor	8 m^3	7
Compactor	13 m^3	3

(7) Tubas

The Tubas Governorate is located in the northwest part of the West Bank and the north side is bordered by the Jenin Governorate, the West side is bordered by the Nablus Governorate and the South side is bordered by the Jericho Governorate. The Tubas Governorate consists of 18 local government units and the total population in 2011 is estimated at 56,000. The Tubas JC started waste collection services in 2006. Out of 18 municipalities and towns in the governorate, the Tubas JC undertakes the services for nine (9) municipalities and towns with the collection coverage ratio at 82 percent. There are several municipalities and towns inconvenient for access and the waste collection of these municipalities and towns is served by the Jericho JC with about six (6) percent of the population.

Municipal waste collected from the service area by the Tubas JC is accumulated at the existing transfer station and transported to the Zahret Al Finjan final disposal site in Jenin.

Revenue of the Tubas JC was 0.37 Million NIS and expenditure was 0.32 Million NIS in 2010. The profit of the JC was only 0.05 Million NIS. The cost efficiency is calculated as 0.18. The current financial condition is such that it could not secure the future financial source for the procurement of equipment.

According to the future plans, the collection ratio in the service area will be increased from 90 % to 100 % by 2015. The collected waste amount will be increased from 32.3 tons per day to 43 tons per day. The Tubas JC will need to improve its financial condition for provision of suitable SWM services. **Table 2.17** shows the existing equipment of the Tubas JC for waste management services. EU will provide equipment to The Tubas JC shown in **Table 2.18**.

Table 2.16 Baseline Data of the Tubas JC

Parameter	Number		Parameter	Number
Baseline Data			**Organization Status**	
No. of LGUs & Localities in the Governorate	18		Status of Activities	operational
Population in the Governorate (PCBS estimation in 2011) (persons)	56,642		Total No. of Staff	21
No. of LGUs served by JC	9		No. of Staff for Waste Collection Service	10
Population of LGUs & Localities in Service Area(2011) (persons)	44,747		Waste Collection Amount per staff (ton/day/person)	1.5
Covering Ratio to the Governorate Population (%)	79		**Future Plans**	
Collation Ratio in Service Area (%)	90		Population in the Governorate (2015) (persons)	64,719
Actual Service Population by JC (2011) (persons)	40,272		No. of LGUs % Localities served by JC	9
Collection Amount (tons/day) (2011)	32.3		Population of LGUs and Localities in Service Area (2015) (persons)	51,126
Per Capita Waste Discharge Amount (g/c/day)	801		Coverage Ratio to the Governorate Population (%)	79
Financial Status			Planned Collection ratio (%)	100
Revenue (NIS, 2010)	371,504		Serviced Population by JC (2015) (persons)	51,126
Expenditure (NIS, 2010)	315,528		Future Waste Collection Amount (t/day) (2015)	43
Balance (NIS, 2010)	55,976		Per Capita Waste Discharge Amount (g/c/day) (2015)	834
Cost Efficiency; Benefit by Cost (B/C)	0.177			
Cost per ton-waste (NIS/ton)	26.8			
Revenue per collection population (NIS/person/year)	9.2			

Table 2.17 Existing Equipment of the Tubas JC

JC	Item	Spec.	Q'ty	Manufact.	Maker	Procured	Donoar
Tubas	Compactor	12 m^3	1	1999	Volvo	1999	Japan Grant
	Compactor	8 m^3	2	1999	Volvo	1999	Japan Grant
	Compactor	12 m^3	3	2009	Iveco	2009	EU
	Compactor	4 m^3	4	2000	Isuzu	2000	Japan Grant

Table 2.18 Equipment provided by the EU

Name of Equipment	Specification	Numbers of Equipment
Container	1.1 m^3	598
Container	32 m^3	2
Compactor	8 m^3	1

(8) Tulkarem

The Tulkarem Governorate is located in the northwest part of the West Bank and the west side is bordered by the Israeli cities of Netanya and Haifa, moreover, the East side is bordered by Jenin and Nablus.The Tulkarem Governorate consists of 34 local government units and the total population in 2011 was estimated at 169,000. With support from the MoLG and JICA, the Tulkarem JC was established in 2005 for the purpose of undertaking waste management services in the area. The Tulkarem JC covers 19 local governments out of a total of 34 local government units in the governorate. Currently, the service covers approximately 27 percent of the population. Municipal waste collected from the service area by the Tubas JC is accumulated at the existing Wadi Ashaeer transfer station and transported with all the other waste to the Zahret Al Finjan final disposal site at Jenin.

The revenue of Tulkarem was 0.96 Million NIS and the expenditure was 0.49 Million NIS in 2011. The profit was 0.47 Million NIS in 2010. The cost efficiency is calculated as 1.0, the value is the highest profitability among the 11 JCs. The financial condition is very favorable. **Table 2.20** shows the existing equipment of the Tulkarem JC for waste management services. EU will provide equipment to the Tulkarem JC in 2012 is shown in **Table 2.21**.

Table 2.19 Baseline Data of the Tulkarem JC

Parameter	Number		Parameter	Number
Baseline Data			**Organization Status**	
No. of LGUs & Localities in the Governorate	34		Status of Activities	operational
Population in the Governorate (PCBS estimation in 2011) (persons)	168,973		Total No. of Staff (persons)	25
No. of LGUs served by JC	19		No. of Staff for Waste Collection Service (persons)	21
Population of LGUs & Localities in Service Area(2011) (persons)	45,000		Waste Collection Amount per staff (ton/day/person)	1.2
Covering Ratio to the Governorate Population (%)	27		**Future Plans**	
Collation Ratio in Service Area (%)	90		Population in the Governorate (2015) (persons)	182,053
Actual Service Population by JC (2011) (persons)	40,500		No. of LGUs % Localities served by JC	34
Collection Amount (tons/day) (2011)	30.1		Population of LGUs and Localities in Service Area (2015) (persons)	182,053
Per Capita Waste Discharge Amount (g/c/day)	743		Coverage Ratio to the Governorate Population (%)	100
Financial Status			Planned Collection ratio (%)	100
Revenue (NIS, 2010)	963,907		Service Population by JC (2015) (persons)	182,053
Expenditure (NIS, 2010)	493,812		Future Waste Collection Amount (t/day) (2015)	141
Balance (NIS, 2010)	470,095		Per Capita Waste Discharge Amount (g/c/day) (2015)	773
Cost Efficiency; Benefit by Cost (B/C)	0.952			
Cost per ton-waste (NIS/ton)	45.0			
Revenue per collection population (NIS/person/year)	23.8			

Table 2.20 Existing Equipment of the Tulkarem JC

JC	Item	Spec.	Q'ty	Manufact.	Maker	Procured	Donor
Tulkarem	Compactor	12 m^3	10	2009	Iveco	2009	UNDP/Japan
	Compactor	8 m^3	1	2009	Volvo	2009	EU
	Compactor	5 m^3	1	2009	Volvo	2009	EU
	Dump Truck	9 ton	1	2009	Volvo	2009	EU
	Waste Transfer Vehicle	17 ton	1	2009	Volvo	2009	EU
	Waste Transfer Vehicle	17 ton	1	2009	Volvo	2010	Italy
	Trailer	1	1	2009	Bassamco	2009	EU
	Trailer	1	1	2009	Bassamco	2010	Italy
	Backhoe Loader	1	1	2009	CAT	2007	EU
	Bull Dozer	1	1	2009	CAT	2009	EU
	Container	32 m^3	6	2009	Local	2009	EU
	Container	32 m^3	5	2009	Local	2010	Italy

Table 2.21 Equipment provided by the EU

Name of Equipment	Specification	Numbers of Equipment
Container	1.1 m^3	598
Container	32 m^3	4

(9) Qalkilya

The Qalkilya Governorate is located in the northwest part of the West Bank and consists of 33 local government units. The population in 2011 is estimated at 100,000. Currently, the collected waste is disposed at the random dump sites or is disposed individually. The activities of the Qalkilya JC are still low and the service is mainly provided by the local government units. The revenue of the Qalkilya JC was 765,000 NIS and expenditures was 773,000 NIS in 2010. The balance was minus 8,000 NIS in 2010.

Table 2.22 Baseline Data of the Qalkilya JC

Parameter	Number		Parameter	Number
Baseline Data			**Organization Status**	
No. of LGUs & Localities in the Governorate	40		Status of Activities	operational
Population in the Governorate (PCBS estimation in 2011) (persons)	100,012		Total No. of Staff (persons)	2
No. of LGUs served by JC	20		No. of Staff for Waste Collection Service (persons)	2
Population of LGUs & Localities in Service Area(2011) (persons)	82,103		Waste Collection Amount per staff (ton/day/person)	33.7
Covering Ratio to the Governorate Population (%)	82		**Future Plans**	
Collation Ratio in Service Area (%)	90		Population in the Governorate (2015) (persons)	110,800
Actual Service Population by JC (2011) (persons)	73,893		No. of LGUs % Localities served by JC	40
Collection Amount (tons/day) (2011)	67.5		Population of LGUs and Localities in Service Area (2015) (persons)	110,800
Per Capita Waste Discharge Amount (g/c/day)	913		Coverage Ratio to the Governorate Population (%)	100
Financial Status			Planned Collection ratio (%)	100
Revenue (NIS, 2010)	764,602		Service Population by JC (2015) (persons)	110,800
Expenditure (NIS, 2010)	772,744		Future Waste Collection Amount (t/day) (2015)	105
Balance (NIS, 2010)	-8.142		Per Capita Waste Discharge Amount (g/c/day) (2015)	950
Cost Efficiency; Benefit by Cost (B/C)	-0.011			
Cost per ton-waste (NIS/ton)	31.4			
Revenue per collection population (NIS/person/year)	10.3			

According to the future plans, the JC will expand the service area from 20 LGUs to 40 LGUs.

The collected waste amount will be increased from 67.5 tons per day to 105 tons per day. The LGUs have the responsibility to manage the collection service in the JC, therefore the JC shall direct the LGUs to provide suitable SWM service to the residents.

The Qalkilya JC does not have its own equipment for waste management services. Therefore, the EU will provide the equipment as shown in **Table 2.23**.

Table2.23 Equipment provided by the EU

Name of Equipment	Specification	Numbers of Equipment
Container	32 m^3	3
Compactor	8 m^3	1
Compactor	13 m^3	2

(10) Nablus

The Nablus Governorate is located in the northwest part of the West Bank and consists of 61 local government units. The population in 2011 is estimated at 348,000. Nablus is the center of commercial and industrial activities in the region and produces soaps, olive oil, handicrafts, etc.

The Nablus JC was established in 2007 for the purpose of providing solid waste management services. The collection service cover ratio in terms of population to the governorate population is estimated at 18% which is low and the activities of JC are also low since a fewer number of local government units have participated in its organization. Some local governments bring collected waste to Jenin Landfill site directory, due to topographical conditions. The JC shall formulate total collection and transportation system to enhance the organization. The JC plans to carry out 3R activities through involvement of the private sector. The revenue of the Nablus JC was 1,263,000 NIS and expenditure was 1,240,000 NIS in 2010. The balance was plus 23,000 NIS in 2010. The financial situation is almost balanced at the moment but any increase in the budget would not be able to be supported for any future procurement.

According to the future plans, the JC will expand the service area from 12 LGUs to 61 LGUs. The collected waste amount will be increased from 38 tons per day to 274 tons per day.

In order to manage the rapid increase of the collected waste amounts, the JC will require not only equipment but also the establishment of suitable organization. **Table 2.25** shows the existing equipment of the Nablus JC for waste management services. The EU will provide equipment to the Nablus JC as shown in **Table 2.26**.

Table 2.24 Baseline Data of the Nablus JC

Parameter	Number		Parameter	Number
Baseline Data			**Organization Status**	
No. of LGUs & Localities in the Governorate	61		Status of Activities	operational
Population in the Governorate (PCBS estimation in 2011) (persons)	348,023		Total No. of Staff (persons)	12
No. of LGUs served by JC	12		No. of Staff for Waste Collection Service (persons)	10
Population of LGUs & Localities in Service Area(2011) (persons)	54,957		Waste Collection Amount per staff (ton/day/person)	3.2
Covering Ratio to the Governorate Population (%)	16		**Future Plans**	
Collation Ratio in Service Area (%)	90		Population in the Governorate (2015) (persons)	380,961
Actual Service Population by JC (2011)	49,461		No. of LGUs % Localities served by JC	61
Collection Amount (tons/day) (2011)	38.0		Population of LGUs and Localities in Service Area (2015) (persons)	380,961
Per Capita Waste Discharge Amount (g/c/day)	768		Coverage Ratio to the Governorate Population (%)	100
Financial Status			Planned Collection ratio (%)	90
Revenue (NIS, 2010)	1,263,355		Service Population by JC (2015) (persons)	342,865
Expenditure (NIS, 2010)	1,240,090		Future Waste Collection Amount (t/day) (2015)	274
Balance (NIS, 2010)	23,265		Per Capita Waste Discharge Amount (g/c/day) (2015)	799
Cost Efficiency; Benefit by Cost (B/C)	0.019			
Cost per ton-waste (NIS/ton)	89.4			
Revenue per collection population (NIS/person/year)	25.5			

Table 2.25 Existing Equipment of the Nablus JC

JC	Item	Spec.	Q''ty	Manufact.	Maker	Procured	Donor
Nablus	Compactor	12m^3	-	2009	Iveco	2009	-
	Compactor	12m^3	-	2009	Iveco	2009	-
	Waste Transfer Vehicle		-	2009	Iveco	2009	-

Table 2.26 Equipment supplied by the EU

Name of Equipment	Specification	Number of Equipment
Container	1.1 m^3	497
Compactor	8 m^3	3
Hook Lift Tractor	10 m^3	1

(11) Jerusalem

The Jerusalem Governorate is located in the middle part of the West Bank and consists of 30 local government units. The center of the governorate is the Al-Bireh municipality. The governorate is

divided into the West Jerusalem, the Jewish residential area, and East Jerusalem where the Arab people reside. There are places in Jerusalem, holy to Judaism, Christianity and Islam. The area is crowded with many tourists visiting the Western Wall or Wailing Wall, the Dome of the Rock, and other religious spots.

The Jerusalem JC, assisted by the UNDP, started waste management services in 2006. However, the operation stopped in the summer of 2011 and the activity is suspended as of today. The council was dissolved since the signing of an agreement among 29 member municipalities and towns failed, especially due to disagreements among the small scale local government units. Currently, the waste collection and disposal operation is carried out by the five subordinate JCs in the governorate.

Table 2.27 shows the existing equipment of the Jerusalem JC for waste management services. The EU will provide equipment to the Jerusalem JC in 2012 as shown in **Table 2.28**.

Table 2.27 Existing Equipment of the Jerusalem JC

JC	Item	Spec.	Q'ty	Manufact.	Maker	Procured	Donor
Jerusalem	Compactor	12m^3	1	2009	Turkey-made	2009	UNDP/Japan
	Container	1.1 m^3	40	2010	Local	2010	Italy
	Container	1.1 m^3	170	-	Local	2005 -08	-
	Container	8 m^3	60	-	Local	2005 -08	-
	Hook Lift	8m^3	1	2003	Volvo	2003	-
	Hook Lift	8m^3	1	2009	Volvo	2009	-
	Compactor	8 m^3	1	1997	Nissan	1997	-
	Compactor	8 m^3	1	2009	Volvo	2009	-
	Container	1.1 m^3	250	-	Local	2005 -08	-
	Compactor	8m^3	1	2009	Volvo	2009	-
	Container	1.1 m^3	40	-	Local	2005 -08	-
	Compactor	8 m^3	1	2000	Volvo	2000	-
	Container	1.1 m^3	20	-	Local	-	-
	Container (Rental)	4m^3	1	-	-	-	-
	Container	1.1 m^3	30	-	Local	-	-
	Container (Rental)	4 m^3	1	-	-	-	-

Table2.28 Equipment provided by the EU

Name of Equipment	Specification	Numbers of Equipment
Container	1.1 m^3	375
Container	4 m^3	60
Compactor	8 m^3	1
Compactor	13 m^3	1
Compactor	13 m^3	1

2-1-2 Summary of the Baseline Survey Results of each JC

The baseline survey results of each JC are summarized in **Table 2.29**. Collection service ratios of the Salfit and Jenin JCs exceed 90 percent, but Hebron and Nablus are less than 20 percent. On the other hand, in the Jenin, Ramallah and Bethlehem JCs the collected waste is over 100 tons per day. Discharged amounts of solid waste per capita per day is 743 to 1,010 grams. The financial status in the Bethlehem, Ramallah and Qalkilya JCs were in the red. The Bethlehem JC is required to make an effort to reduce its expenditure, while the Ramallah and Qalkilya JCs are required to increase their revenue. On the other hand, the Jenin JC has good profit from adequate landfill management. The Jerusalem JC could not have acceptable activity, because its SWM activities are carried out by other local government units.

Table 2.29 Summary of Baseline Data of each JC

JSCswm	JC	Jenin	Hebron	Jericho	Salfeet	Bethlehem	Ramallah and Al-Bireh	Tubas	Tulkarem	Qalqilya	Nablus	Jerusalem
Baseline Data	-	-	-	-	-	-	-	-	-	-	-	-
No. of LGUs & Localities in the Governorate (PCBS)	-	71	85	12	20	44	74	18	34	40	61	30
Population in Governorate (PCBS Estimation 2011)	-	281,156	620,417	46,718	64,615	194,095	310,218	56,642	168,973	100,012	348,023	389,298
No. of LGUs & Localities Served by JC (PCBS)	-	68	6	15*1	20	27	50	9	19	20	12	-
Population of LGUs & Localities in Service Area (2011)	-	263,889	70,638	58,134	64,615	133,487	184,514	44,747	45,000	82,103	54,957	-
Covering Ratio to the Governorate Population (%)	-	94%	11%	124%	100%	69%	59%	79%	27%	82%	16%	-
Collation Ratio in Service Area（%）	-	90%	88%	90%	90%	95%	90%	90%	90%	90%	90%	-
Actual Service Population by JC (2011)	-	237,500	62,161	52,321	58,154	126,813	166,063	40,272	40,500	73,893	49,461	-
Collection Amount（t/day)(2011)	-	205	46	45	54	101	168	32	30	67	38	-
Per Capita Waste Discharge Amount（g/c/d）	-	862	740	860	920	799	1,010*2	801	743	913	768	-
Financial Status	-	-	-	-	-	-	-	-	-	-	-	-
Revenue (2010)	-	10,239,969	185,280	1,512,836	1,283,516	3,976,191	1,078,892	371,504	963,907	764,602	1,263,355	-
Expenditure (2010)	-	8,488,325	63,938	1,492,608	1,254,633	5,070,311	1,327,085	315,528	493,812	772,744	1,240,090	-
Balance (2010)	-	1,751,644	121,342	20,228	28,883	(1,094,120)	(248,193)	55,976	470,095	(8,142)	23,265	-
Cost Efficiency: Benefit by Cost（B/C)	-	0.206	1.898	0.014	0.023	(0.216)	(0.187)	0.177	0.952	(0.011)	0.019	-
Cost per ton-waste (NIS/ton-waste）	-	114	4	91	64	137	22	27	45	31	89	-
Revenue per collection population (NIS/person/year）	-	43	3	29	22	31	6	9	24	10	26	-
Status of Organization	-	-	-	-	-	-	-	-	-	-	-	-
Status of Activities	-	operation	operation	operation	operation	operation	in suspension	operation	operation	operation	operation	in
Total No. of Staff	-	140	16	24	28	63	5	21	25	2	12	-
No. of Staff for Waste Collection Service	-	56	9	18	19	59	-	10	21	2	10	-
Waste Collation Amount per Staff（ton/day/person）	-	1.5	2.9	1.9	1.9	1.6	33.5	1.5	1.2	33.7	3.2	-
Future Plan	-	-	-	-	-	-	-	-	-	-	-	-
Population in the Governorate (PCBS Estimation 2015)	-	311,231	706,509	52,154	70,727	216,114	348,110	64,719	182,053	110,800	380,961	-
No. of LGUs & Localities Served by JC (PCBS)	-	68	20	17	20	35	67	12	34	40	61	-
Population of LGUs & Localities in Service Area (2015)	-	292,041	602,862	64,819	70,727	208,776	324,221	52,771	182,053	110,800	372,297	-
Covering Ratio to the Governorate Population (%)	-	94%	85%	124%	100%	97%	93%	82%	100%	100%	98%	0%
Planned Collection Ratio（%）(2015)	-	100%	85%	100%	100%	100%	100%	100%	100%	100%	85%	0%
Service Population by JC (2015)	-	292,041	512,433	64,819	70,727	208,776	324,221	52,771	182,053	110,800	316,452	-
Future Waste Collection Amount（t/day)(2015)	-	262	395	63	68	174	341	44	141	105	253	-
Per Capita Waste Discharge Amount（g/c/d)(2015)	-	897	770	895	957	831	1,051	834	773	950	799	-
Remarks												
*1 Jericho JC collects waste of the LGUs in the governorate in addition to the collection of 3 LGUs in Tubas Governorate and 6 LGUs in Nablus LGUs												
*2 Waste discharge rate per capita estimated by each JC from the past waste collection record is applied.												
*3 Ramallah and Al-Bireh JC is suspending the waste collection operation. The figures indicated in the table are assumed that the JC commence the waste collection service again.												

All the JCs are planning to improve their collection service by 2015, particularly the Hebron JC which has a plan that estimates that collected waste amounts will be over 8 times greater than at present, and also the Nablus JC has a plan that collected waste amounts will be over 7 times of the current amounts. In order to prepare for rapid expansion of the collected waste amounts, the organization and tariff system need to be adequate and carefully considered.

2-2 Equipment Requested by the MoLG

The MoLG had formulated a request list of equipment and facilities for the project based on interviews with each JC, and with the formulation the work carried out between December 2011 and

the beginning of 2012. The MoLG made this request to the JICA Survey Team officially in January 2012. The requested equipment and facilities are shown in **Table 2.30**. The JICA Survey Team studied the contents of the list to decide on the quality and quantity of the equipment and facilities needed.

Table 2.30 Requested Equipment and Facilities*) by the MoLG

JCs	Jenin	Hebron	Jericho	Salfit	Bethelehem	Ramallah & Al-Bireh	Tubas	Tulkarem	Qalqilyah	Nablus	Total
Items	Quantity	Quantity	Quantity	Quantity	Quantity	Quantity	Quantity	Quantity	Quantity	Quantity	Quantity
Collection Vehecle (Compactor)											
5 m³	2	1	2	2	1	*	*	*	2	1	11
8 m³	1	1	*	*	2	8	*	*	2	1	15
12 m³	*	2	*	2	4	5	1	*	2	6	22
19 m³	*	3	*	*	2	2	*	1	*	*	8
Container											
1.1 m³	600	1000	150	500	500	1500	100	500	300	500	5650
4 m³	30	*	10	2	*	*	*	20	20	*	82
8 m³	*	*	2	5	*	*	*	5	*	*	12
10 m³	*	*	5	20	*	*	*	*	*	12	37
40 m³	3	5	*	1	*	*	4	6	6	2	27
Waste transfer equipment											
Dump Truck 15m3 for Waste	1	*	*	1	*	1	*	*	*	*	3
Dump Truck 2 ton			1	*	*	*	*	*	*	*	1
Backhoe Loader 1m3		1	*	*	1	2	1	*	1	1	7
Grapple Crane 19m3	*	1	*	1	*	1	*	*	1	*	4
Hook Llift 10 m³	*	*	*	1	*	*	*	1	*	2	4
Hook Lift with Trailer 32 m³	*	1	*	1	*	*	1	1	1	1	6
Heavy Machine											
Skid Steer Loader 60HP	1	1	1	1	*	*	1	1	1	*	7
Track Excavator with Hydraulic Hammer 240HP	1	*	*	*	*	*	*	*	*	*	1
Track Loader 180HP	1	*	*	*	*	*	*	*	*	*	1
Wheel Loader 185HP	1	*	*	*	*	*	*	*	*	*	1
Compaction unit 100m3/hr	*	*	1	1	*	*	*	*	*	*	2
Truck Scale 60 ton	*			1	*	*	1	*	1	*	3
Trailer for Hook Lift 32m3	*	*	*	*	*	*	*	*	*	1	1

*) Facilities: Landfill expansion and Waste Transfer Station/MRF in Jericho, Waste Transfer Station in Salfit, Tubas and Qalkilya

2-3 Evaluation of Current Solid Waste Management

2-3-1 Problem Analysis and Objective Analysis

In order to ensure that the project objectives were met, a simplified problem analysis and an objective analysis were carried out. The results of the problem analysis and the objective analysis are shown below in **Figure 2.1** and **Figure 2.2**.

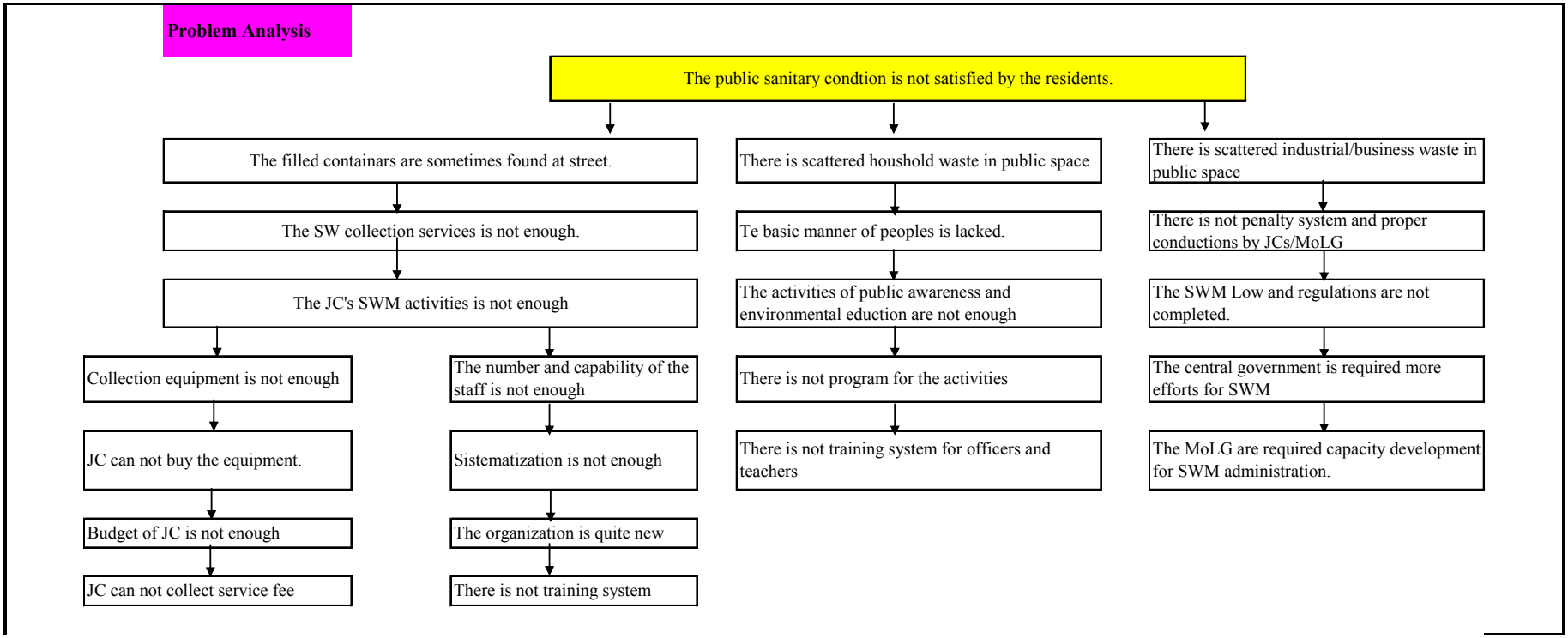


Figure 2.1 Problem Analysis of Solid Waste Management

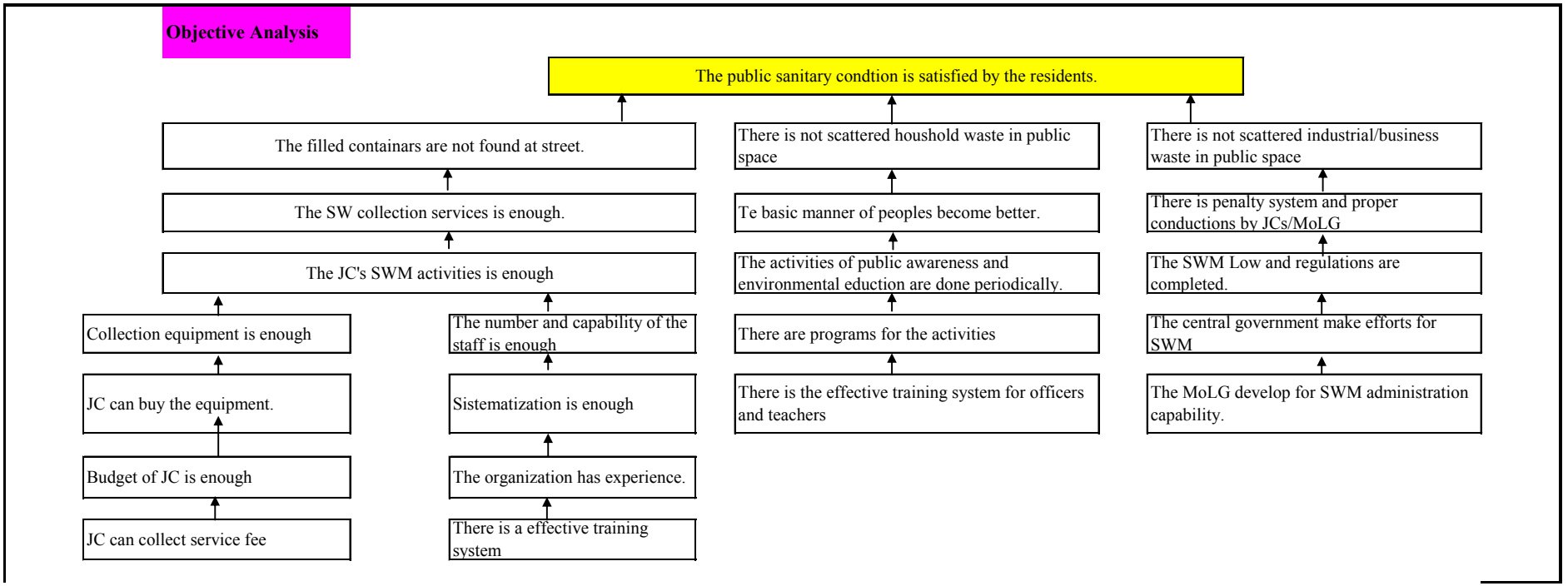


Figure 2.2 Objective Analysis of Solid Waste Management

In order to achieve the primary objective which was that "the public health has reached a level that residents are satisfied with", there is a need to ensure a situation where dust has been eliminated from the living area of the residents. For this purpose, exclusions of domestic waste and industrial waste from the living area will be carried out promptly, and residents will not disperse the waste themselves and shall cooperate towards the clean up. This project contributes significantly towards domestic waste elimination from the living area basically because of equipment provision but the information necessary for the residents remain also as a considerable issue by both the MoLG and each JC. In addition the analysis shows that the equipment provision is inadequate for sustainable domestic waste elimination. That is, the JCs which will receive the equipment, will be required to maintain the equipment sufficiently and consequently their capacity evaluation is important.

A result of the problem analysis and the objective analysis, in order to achieve the goal of where "the public health has reached a level that residents are satisfied with", three (3) series analyses were implemented, namely (i) Scheduled Waste Collection, (ii) Prohibition of scattering waste in public spaces and (iii) Prohibition of leaving industrial waste in public spaces. As this project is a grant aid project, (ii) and (iii) whose objective is to give support regarding educational activities and instructions for environmental authority, are outside its scope.

On the other hand, on (i) of the problem and objective analysis, the issue is the improvement of waste collection services in each of the JCs. In order to achieve this purpose, collection equipment, for each JC, and the waste transfer station for transferring to the landfill as a base are required. Provision of the equipment and these operations is expected to be able to contribute sufficiently towards general public health, improvement of the living environment and general environmental preservation in the West Bank. Thus the necessity and validity of this project can thus be confirmed. However the JC's implementation capacity is necessary to operate autonomously and sustainably even if the equipment is supplied, especially organization capacity and financial capacity (as continuous ensuring of operational and maintenance costs are essential).

According to the research results, the JCs which need to improve their organization capacity greatly and the JCs which have inadequate financial capacity due to continuous deficit and are having difficulty in meeting suitable budgets for operation and maintenance, currently exist, while the JCs having no issues about organization capacity and financial capacity concurrently also co-exist. Therefore, for improving waste collection service and public health through equipment supply by the grant aid project, the JCs having adequate organization capacity and financial capacity to operate the equipment and facilities can be preferentially targeted on the grant aid project. For those JCs having the bigger issues regarding organization or financial problems it is initially necessary to improve their capacity therefore, technical cooperation is appropriate in this instance.

From the above, in view of implementing public health improvements in the West Bank through waste collection services, two (2) supporting approaches are possible specifically (i) provision of

collection equipment and waste transfer station and related items, (ii) equipment provision while improving their capacity through technical cooperation, and these need to be considered. It depends on the JC's capacity as to which assistance approach is adopted.

2-3-2 Evaluation of Implementing Capacity of the JCs

2-3-2-1 General

Evaluation of the implementing capacity of each JC was carried out based on the data and information obtained from a questionnaire survey, interview and site visit. Each organization was established after 2000 and the JCs established most recently lack the experience and knowledge in solid waste management services. Although it is judged that the Jericho, Jenin and Hebron JCs where the solid waste management system is completed with final disposal facilities have high management capacity in general, nevertheless a comprehensive evaluation was carried out for all the JCs including these three JCs as well with respect to organizational, financial, and technical aspects.

Actions involving solid waste management are conducted basically by the phased development or evolution of activities, i.e., phase one (1): secure public health and sanitation through removal of waste from the residential area, phase two (2): mitigate environmental impacts caused by collected waste through appropriate waste treatment and disposal and phase three (3): effective use of the recyclable materials in waste in the course of conducting appropriate waste treatment and disposal. JCs such as Jericho, Hebron and Jenin wherein SWM measures are supported actively by the donors show, even in piloting activities, movement towards phase three (3) activities. However, in some areas, the solid waste management service has not yet reached even up to the level of phase one (1) activities. Waste transportation is required to step up the activities from the phase one (1) level to the phase two (2) level and the financial burden increases on the JCs having no appropriate final disposal site. The JCs lacking the organizational capacity require the support of soft components and the financial support of the MoLG as well to attain the capacity for phase two (2) activities.

2-3-2-2 Evaluation of Implementing Capacity of JCs

(1) Evaluation Indicators and Criteria

1) Evaluation Indicator

The following 12 items in four (4) categories were determined for evaluation of the activity of each JC.

Evaluation Category one (1): Target Beneficiaries

Contributions to larger numbers of the population and waste amounts are expected as the numbers of the equipment provided to each JC and the following four (4) items were identified as indicators to evaluate the capacity under the category of target beneficiaries.

- Evaluation Indicator 1-1: SW Covering ratio to the governorate population (present)
- Evaluation Indicator 1-2: SW Covering ratio to the governorate population (future)
- Evaluation Indicator 1-3: Waste collection amount (present)
- Evaluation Indicator 1-4: Waste collection amount (future)

Evaluation Category two (2): Technical Capacity

The technical capacity of the JC especially the capacity of the managerial level staff to inplement the activities will be required for the effective use of the equipment to be provided and the results shall be reflected to the increase of waste collection ratio in the area. Accordingly, the following two (2) indicators were identified for evaluation of the technical capacity.

- Evaluation Indicator 2-1: Technical capacity of managerial level staff
- Evaluation Indicator 2-2: Waste collection ratio in service area (present)

Evaluation Category three (3): Financial Viability

Financial viability is the base for sustainable development and solid waste management services. Especially the profit & loss and cost benefits are the fundamental factors. The result of waste management is reflected to the unit cost per ton-waste. Moreover, the revenue from the waste fee which is the largest income source of the business shall be converted to the per capita income of the beneficiaries or the residents for estimating whether an appropriate fee is being levied and obtained per capita. Accordingly, the following four (4) items were identified for evaluating the financial capacity of each JC.

- Evaluation Indicator 3-1: Balance of payment
- Evaluation Indicator 3-2: Cost benefit
- Evaluation Indicator 3-3: Expenditure per ton-waste
- Evaluation Indicator 3-4: Revenue per service population

Evaluation Category four (4): Organizational Capacity

The organizational capacity is reflected in the capacity of both the managerial staff and staff members to implement the services. The result will be shown in terms of the waste collection amount per staff of the JC. Accordingly, these two (2) items were identified for evaluating organizational capacity of each JC.

- Evaluation Indicator 4-1: Organizational strength
- Evaluation Indicator 4-2: Waste collection amount per capita-staff member

2) Evaluation Criteria

Evaluation criteria was set to determine the grade of each indicator. With regard to the weight for evaluating the indicators, the indicators under the evaluation category one (1) and category (3) comprised of four (4) evaluation indicators were determined to have the weight of one [1] and the indicators under the evaluation category two (2) and category four (4) comprised on only two (2) evaluation items were decided to have the weight of two (2). The evaluation criteria for the 12 indicators is basically determined through quantitative analysis and summarized as shown in **Table 2.31**. However, the two indicators, technical capacity of managerial staff and organizational strength are evaluated by qualitative means. These two (2) indicators were evaluated through the results of field surveys and the status to the reponses to the questionnaires.

- Evaluation Category one (1): Grade 1=1, Grade 2 = 2, Grade 3 =3
- Evaluation Category two (2): Grade 1 = 2, Grade 2 = 4, Grade 3 = 6
- Evaluation Category three (3): Indicator 3-1 Grade 1= -2, Grade 2=2, Grade3=6
  Indicator 3-2 to 3-4 Grade 1= 1, Grade 2=2, Grade 3=3
- Evaluation Category four (4): Grade1=2, Grade2=4, Grade 3=6

Table 2.31 Evaluation Criteria for the Activities of the JCs

Evaluation Indicators	Weight	Evaluation Criteria		
		Grade1	Grade2	Grade3
Evaluation Category-1: Target Beneficiaries				
Evaluation Indicator 1-1: Covering ratio to the governorate population (present) (%)	1	Less than 50	50-80	More than 80
Evaluation Indicator 1-2: Covering ratio to the governorate population (future) (%)	1	Less than 50	50-80	More than 80
Evaluation Indicator 1-3: Waste collection amount (present) (t/day)	1	Less than 50	50-100	More than 100
Evaluation Indicator 1-4: Waste collection amount (future) (t/day)	1	Less than 50	50-100	More than 100
Evaluation Category-2: Technical Capacity				
Evaluation Indicator 2-1: Technical capacity of managerial level staff	2	Low	Middle	High
Evaluation Indicator 2-2: Waste collection ratio in service area (present) (%)	2	Less than 50	50-80	More than 80
Evaluation Category-3: Financial Viability				
Evaluation Indicator 3-1: Balance of payment	2	Deficit	Profit	High Profit
Evaluation Indicator 3-2: Cost benefit (B/C)	1	Less than 0.5	0.5-0.8	More than 0.8
Evaluation Indicator 3-3: Expenditure per ton-waste (NIS/t)	1	More than 100	100-50	Less than 50
Evaluation Indicator 3-4: Revenue per service population (NIS/t)	1	Less than 20	20-40	More than 40
Evaluation Category -4 :Organizational Capacity				
Evaluation Indicator 4-1: Organizational strength	2	Low	Middle	High
Evaluation Indicator 4-2: Waste collection amount per capita-staff member (t/c/day)	2	Less than 1	1-2	More than 2

The evaluation is calculated as multiplication between the evaluation criteria of the indicators and

weight.

3) Conclusions of the Evaluation

The overall conclusion of the evaluation for the activities of the JCs is summarized in **Table 2.32**. The evaluation was carried out based on the activity data of the JCs in 2011 and the evaluation criteria. The result of the evaluation is tabulated as shown in **Table 2.33**. Notably the activity of the Jerusalem JC which is currently suspended is excluded from the evaluation. The evaluation was carried out for the categories of i) target beneficiaries, ii) technical capacity, iii) financial viability and iv) organizational capacity as explained in the preceding subsection and by the criteria determined with three (3) grades. There was some discussion on how to evaluate the financial situation properly. However, the weight of evaluation for the financial situation was determined at double score and the minus score evaluation was introduced for financial deficit. Accordingly, the difference of scoring in financial deficit will become eight (8) points to the maximum extent. The conclusion of evaluation is summarized as shown in **Table 2.32**.

Table 2.32 Overall Summary of Evaluation of the Activities of the JCs

Evaluation	High	Middle	Low
Name of JC	・Jenin (45) ・Hebron (46)	・Jericho (38) ・Tulkarem (40) ・Salfit (37)	・Bethlehem (33) ・Nablus (34) ・Tubas (33) ・Ramallah (32) ・Qalkilya (32)
Remarks	Bethlehem, Ramallah and Qalkilya JCs are suffering deficits. The deficit amount of Qalkilya JC is very small. The donor activities are in progress in the Bethlehem and Ramallah JCs and it is expected that the activities including the financial situation of these JCs will go forward towards their improvement.		

Tale 2.33 Scoring for Evaluation of the Activities of Each JCs

Result of Evaluation	Weight	Jenin	Hebron	Jericho	Salfit	Bethlehem	Ramallah & Al-Bireh	Tubas	Tulkarem	Qalkilya	Nablus	Jerusalem
Evaluation Category-1: Target Beneficiaries												
➢ Evaluation Indicator 1-1: Covering ratio to the governorate population (present) (%)	1	3	1	3	3	2	2	2	1	3	1	
➢ Evaluation Indicator 1-2: Covering ratio to the governorate population (future) (%)	1	3	3	3	3	3	3	3	3	3	3	
➢ Evaluation Indicator 1-3: Waste collection amount (present) (t/day)	1	3	2	2	2	3	3	2	2	2	2	
➢ Evaluation Indicator 1-4: Waste collection amount (future) (t/day)	1	3	3	1	2	3	3	1	3	3	3	
Evaluation Category-2: Technical Capacity												
➢ Evaluation Indicator 2-1: Technical capacity of managerial level staff	2	6	6	6	4	4	4	4	4	4	4	
➢ Evaluation Indicator 2-2: Waste collection ratio in service area (present) (%)	2	6	6	6	6	6	6	6	6	6	6	
Evaluation Category-3: Financial Viability												
➢ Evaluation Indicator 3-1: Balance of payment	2	6	6	2	2	-2	-2	2	6	-2	2	
➢ Evaluation Indicator 3-2: Cost benefit (B/C)	1	1	3	1	1	1	1	1	2	1	1	
➢ Evaluation Indicator 3-3: Expenditure per ton-waste (NIS/t)	1	1	3	2	2	1	3	3	3	3	2	
➢ Evaluation Indicator 3-4: Revenue per service population (NIS/t)	1	3	1	2	2	2	1	1	2	1	2	
Evaluation Category -4 :Organizational Capacity												
➢ Evaluation Indicator 4-1: Organizational strength	2	6	6	6	6	6	4	4	4	4	4	
➢ Evaluation Indicator 4-2: Waste collection amount per capita-staff member (t/c/day)	2	4	6	4	4	4	4	4	4	4	4	
Total Point	-	45	46	38	37	33	32	33	40	32	34	-
Evaluation	-	H	H	M	M	L	L	L	M	L	L	-

2-3-2-3 Evaluation Results

There is a difference of SWM capacity among the JCs. According to the "Problem Analysis and Objective Analysis", provision of equipment is not enough to achieve the project purpose. Operation and maintenance capacity is required for each of the target JCs to reach sustainable management.

Table 2.33 summarizes the evaluation result of the JCs. The Jenin and Hebron JCs were evaluated as "High", the JCs that reached the level of "Required equipment are procured by themselves". The Jericho, Tulkarem and Salfit JCs were evaluated as "Middle", the JCs that reached the level of "Appropriate operation and maintenance can be done by themselves". The other JCs evaluated as "Low", were the JCs that did not reach a level of sufficiency for operation and maintenance capacity. Among those in the "Low" group, the Bethlehem and Ramallah JCs are being supported by other donors for technical assistance and the solid waste management capacity may be expected to increase to the level of "Middle", and subsequently to the level of "High".

However, the Nablus, Tubas and Qalkilya JCs require establishment of basic capacity of SWM. Therefore, they need a technical assistance project and /or dispatch of expert(s) to improve their capacity.

As a result of the above considerations, the grant aid project will be carried out for the Tulkarem Jenin, Hebron, Jericho, and Salfit JCs.

On the other hand, solid waste management capacity of the Jericho JC has been improved through the technical assistance project "Solid Waste Management Capacity Building Project in Jericho and Jordan Valley". This project contributes towards disseminating an effective solid waste management system as in Jericho throughout the whole country.

2-4 Study of Required Equipment

2-4-1 Waste Collection and Transport Capacity of the Existing Vehicles

The capacity of the existing vehicles of each JC was computed for the waste collection and transfer/transport capacity in 2015. The computation was carried out based on the following assumptions.

- The compactor makes two trips per day and the loading ratio including the operation ratio is assumed at 80 percent to the rated loading capacity.
- The Hook lift vehicle for waste collection makes 6-8 trips per day depending on the distance between the collection area and the disposal site. The loading ratio including the operation ratio is assumed at 80 percent to the waste container volume.
- The waste transfer/transport vehicle makes 2-3 trips per day depending on the distance between the transfer station and the waste disposal site. The loading ratio including the operation ratio is assumed at 80 percent to the container volume.
- The existing vehicles which will be more than 10 years in 2015 since their procurement assumed to be unserviceable vehicles and excluded from the carrying capacity calculations.

The result of calculation based on the above assumption is shown in **Table 2.34** for the carrying capacity of each JC.

Table 2.34 Waste Collection, Transfer/Transport Capacity of Existing Vehicles (as of 2012 and 2015)

Item	Jenin	Hebron	Jericho	Salfit	Tulkarem
Collection Capacity of Existing Vehicles (2012)	162	450	59	32	115
Transfer/Transport Capacity of Existing Vehicles (2012)	29	19	0	0	61
Estimated Collection Capacity of Existing Vehicles (2015)	86	100	51	32	115
Estimated Transfer/Transport Capacity of Existing Vehicles (2015)	29	67	0	0	61

Applying the same assumption in the preceding subsection for estimation of the existing vehicles,

the capacity of the vehicles supplied by the EU in 2012 were estimated as shown in the **Table 2.35**. An assumption is made that all the vehicles supplied by the EU will still be operational in 2015.

Table 2.35 Waste Collection, Transfer/Transport Capacity of the Vehicles Supplied by the EU (in 2015)

Item	Jenin	Hebron	Jericho	Salfit	Tulkarem
Collection Capacity of Existing Vehicles (2012)	48	133	0	0	0
Transfer/Transport Capacity of Existing Vehicles (2012)	0	202	0	0	61

2-4-2 Study for the Validity of Requested Quantity of Waste Collection and Transport Vehicles

The JICA Project Team, the MoLG and each JC discussed the requested equipment during the second field survey period in January 2012 and confirmed the contents listed in **Table 2.36** as the requested items and the quantities for waste collection and transfer/transport vehicles.

Table 2.36 List of Requested Waste Collection and Transfer/Transport Vehicles

Item	Jenin	Hebron	Jericho	Salfit	Tulkarem
Compactor $5m^3$	2	1	2	2	0
Compactor $8m^3$	1	1	0	0	0
Compactor $12m^3$	0	2	0	2	0
Compactor $19m^3$	0	3	0	0	1
Hook Lift $10m^3$	0	0	0	1	1
Hook Lift with Trailer, $32m^3$	0	1	0	1	1

The study was carried out to estimate whether the total capacities of all the vehicles including the existing vehicles, the EU vehicles and the requested vehicles meet with the planned waste collection and waste transfer/transport amounts in the year 2015. The following **Table 2.37** shows the result and the processes of the calculation.

Table 2.37 Study on the Waste Collection and Transfer/Transport Capacity in 2015

Waste Collection & Transport Capacity (t/day)(2015)	Jenin	Hebron	Jericho	Salfit	Tulkarem
Collection Capacity of Existing Vehicles in 2015	86	100	51	32	115
Transfer Capacit of Existing Vehicles in 2015	29	67	0	0	61
Collection Capacity of the EU Supplied Vehicles in 2015	48	133	0	0	0
Transfer Capacit of the EU Supplied Vehicles in 2015	0	202	0	0	0
Total Collection Capacity in 2015	134	233	51	32	115
Total Transfer Capacity in 2015	29	269	0	0	61
Required Waste Collection Amount in 2015	262	395	58	68	141
Required Waste Transfer & Transport Amount in 2015	51	302	44	68	83
Balance (Shortage/Excess of Waste Collection Capacity)	-128	-161	-7	-36	-26
Balance (Shortage/Excess of Waste Transfer & Transport Capacity)	-23	-33	-44	-68	-22
Collection Capacity Computed by the Request Vehicles in 2015	14	75	8	30	18
Transport Capacity Computed by the Request Vehicles in 2015	0	67	0	58	45
Collection Capacity after Supply of the Request Vehicles	148	308	59	62	133
Transport Capacity after Supply of the Request Vehicles	29	336	0	58	106
Shortage/Excess of Waste Collection Amount after Procurement	-114	-86	1	-5	-7
Shortage/Excess of Waste Transport Amount after Procurement	-23	34	-44	-11	23
Waste Collection Coverage Ratio (%)	56%	78%	101%	92%	95%
Waste Transport Coverage Ratio (%)	56%	111%	0%	85%	128%

The result of study is summarized below from the contents shown in the above Table.

- In each JC, the total waste collection and transfer/transport capacity of the existing and the EU supplied vehicles only is not sufficient to handle the planned waste collection amount in 2015.
- Almost all the JCs can meet with the planned waste collection amount in 2015 by adding the capacity of the vehicles to be supplied by the Government of Japan.
- However, the covering ratio of waste collection capacity to the planned waste collection amounts in the Jenin and Hebron JCs is estimated at 56 percent and 78 percent respectively, which do not cover 100 percent of waste amount in the waste collection area. These two (2) JCs must take measures to prolong the life of their existing vehicles.
- The waste transfer/transport capacity is “zero” at the Jericho JC but waste transfer/transport operations will not be immediately required upon expansion of the final disposal site for the

time being.

- In the Jenin and Salfit JCs, the waste transfer/transport capacity of each JC will become 56 percent and 85 percent respectively and the capacities are not sufficient for the planned waste transfer/transport waste amounts. In the Jenin JC, counter measures shall be taken to have direct hauling by large waste collection vehicles. In the Salfit JC, direct hauling by large waste collection vehicles or utilization of the waste transfer/transport facilities at the private sector site constructed at Beita in the Nabulus Governorate will be the suitable response measures to solve the insufficient waste transfer/transport capacity.

In conclusion, almost all the JCs will be able to meet the planned waste collection, transfer/transport amounts with the equipment to be supplied by the Government of Japan. And, the JCs running short of this capacity will be able to meet their needs with the required capacity through provisional prolonging of the life of their existing vehicles, use of large waste collection vehicles for direct hauling, and use of private waste transfer/transport facilities.

2-4-3 Study for the Validity of Requested Quantity of Waste Containers

The requested waste containers include two (2) types, i. e., waste containers placed in the collection areas to receive discharged wastes and the large waste containers for waste transfer/transport purposes. A study was carried out to check whether the waste storage capacity of the requested waste containers are reasonable to accommodate the planned waste amounts in 2015 in consideration of the remaining waste storage capacity of the existing containers in addition to the containers supplied by the EU. The following assumptions are made to the calculation.

1. Bulk density of waste stored in the waste container is determined at 0.15 t/m^3
2. Waste stored in the waste containers was determined at 80 percent of the storage capacity
3. The life of a waste container was determined as being five (5) years and 20 percent of the waste containers are assumed to be discarded every year.

The result of calculation based on above assumption is summarized and shown in **Table 2.38**.

Table 2.38 Study of Storage Capacity of Existing, EU supplied and Requested Containers in 2015

JC	Existing Containers				EU Supply Containers			Existing +EU Storage Cap. (ton) (2015)	Requested Containers			Total Storage Cap. In 2015 (ton)	Waste Discharge Amounmt 2015 (t/d)	Balance Storage Cap. 2015 (t/d)	Ratio to the Waste Discharge Amount (%)
	Volume (m3)	Quantity	Storage Cap. (ton)	Quantity	Volume (m3)	Quantity	Storage Cap. In 2015 (ton)		Volume (m3)	Quantity	Storage Cap. In 2015 (ton)				
Jenin	1.1&4	540	85	34	1.1 & 4	721	147	181	1.1&4	630	94	275	262	13	5%
Hebron	180L&1.1	360	32	13	1.1 & 4	1,470	236	249	1.1	1,000	132	381	395	-14	-4%
Jericho	1.1,4 & 8	414	78	31		0	0	31	1.1,4,8&10	167	28	59	58	1	2%
Salfit	1.1	474	63	25		0	0	25	1.1,4,8&10	527	96	121	68	53	78%
Tulkalem	1.1	1,642	217	87	1.1	598	79	166	1.1,4& 8	525	80	246	141	105	74%

Output of the calculation is summarized as follows.

- In the Salfit and Tulkarem JCs, the storage capacity after including the requested containers have excess amounts of 78 percent and 74 percent to the waste discharge amount in 2015. The requested quantity of containers for these two (2) JCs is too much.
- In the other JCs, the requested quantities of the containers almost meet the planned waste discharge amount in 2015.

2-4-4 Study for the Necessity of Waste Transfer Station

Under the study, the minimum waste hauling distance was defined, in comparison to the cost for waste transfer/transport vs. direct hauling, It was found that the waste transfer/transport is advantageous in cost if the hauling distance exceeds a minimum waste hauling distance. The study was made with the calculation model constructed based on the required vehicles, fuel and personnel costs converting to the per ton cost for the waste transfer/transport vehicle and for each capacity of the collection vehicles for direct hauling to the disposal site. The results were plotted on the graph in **Figure 2.3** and **Figure 2.4** for the cases of with and without depreciation cost of the vehicle.

The graphs in the figures indicate the following results.

The hauling distance of each vehicle including depreciation cost was estimated for ; five (5) m^3 compactor : 13km, eight (8) m^3 compactor: 26km, 12m^3 compactor: 28km and 19m^3 compactor: 40km. The results of the calculations without depreciation cost show almost the same trend.

1) The minimum waste hauling distance of 19m^3 compactor was estimated at 40km and indicated that direct hauling after waste collection by the 19 m^3 vehicle is advantageous in cost comparison to the waste transfer/transport system. The study results indicate that use of large vehicles such as 19m^3 compactor is preferable as long as the conditions of collection area allow its use. Direct hauling by large waste collection vehicle is economical and preferable in consideration of the processes for land procurement and the probable environmental risk in the surrounding area of the transfer station.

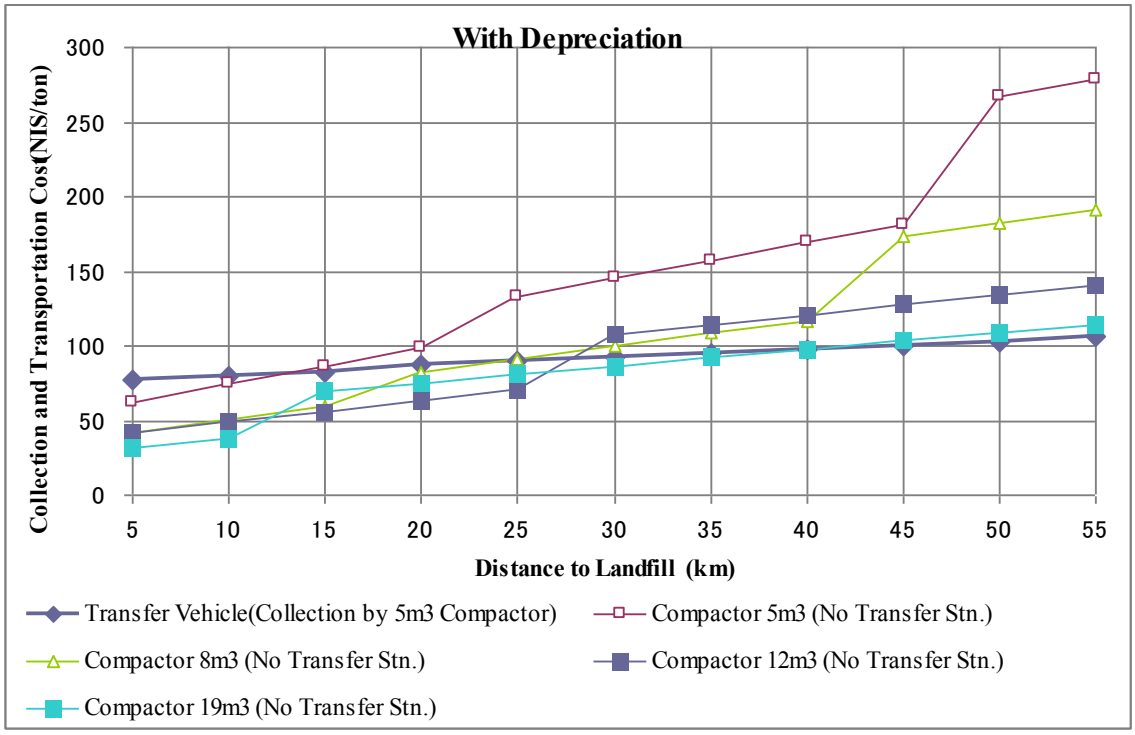


Figure 2.3 Unit Cost Comparison between Transfer/Transport vs Direct Haul (with depreciation cost)

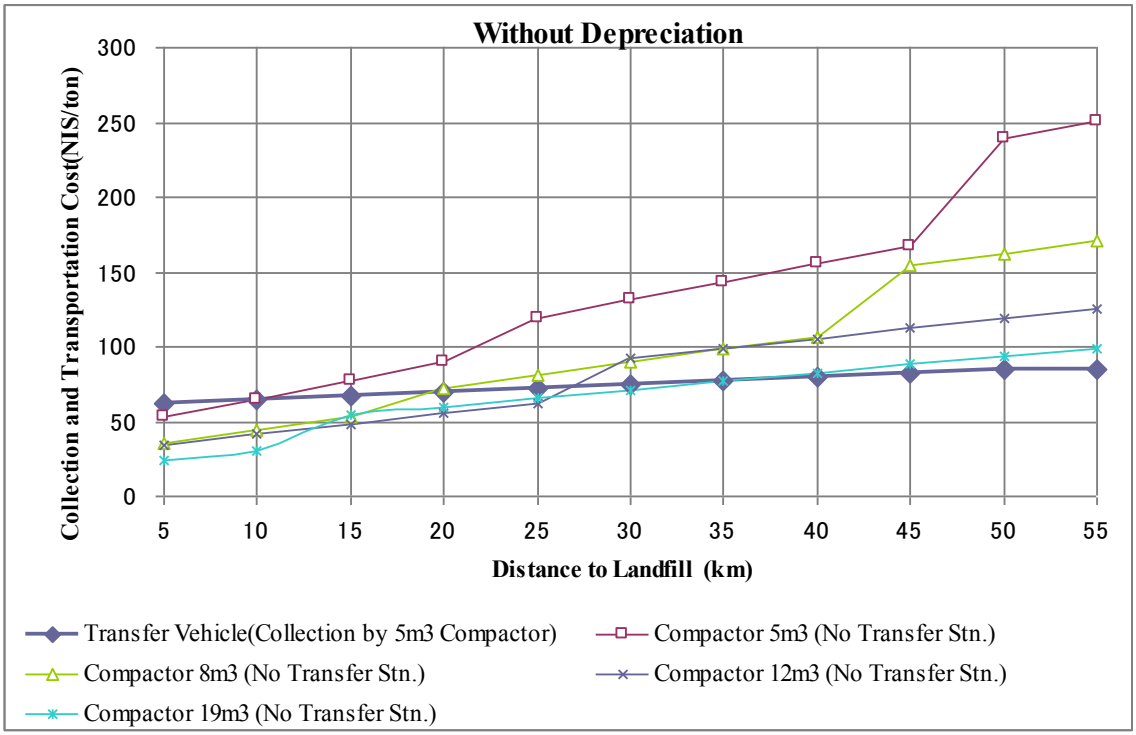


Figure 2.4 Unit Cost Comparison between Transfer/Transport vs Direct Haul (without depreciation cost)

2-4-5 Proposed Equipment List by the JICA Survey Team

The requested equipment other than vehicles and waste containers are listed in **Table 2.39** together with their purpose of use. These equipment and machines are used for waste collection, waste transfer/transport, waste disposal landfill work, expansion of waste disposal site, cleansing work in the town, etc. and commonly required for waste management services.

Table 2.39 Purpose of Use of the Requested Equipment other than Collection Vehicle and Waste Containers

Item	Purpose of Use
Dump Truck for Waste15m^3	Transport of sand, soil bulky waste
Dump Truck 2 ton	Separate collection of recyclable materials in Jericho
Backhoe Loader	Excavation and loading of illegally discarded waste
Grapple Crane Vehicle 19m^3	Loading & transport of illegally discarded waste, trimmings of trees
Hook Lift Vehicle 10 m^3	Loading and transport of large waste containers
Hook Lift Vehicle 32 m^3 with Trailer	Waste transfer/transport vehicle
Skid Steer Loader 60HP	Multi-purpose loading of waste
Track Excavator with Hydraulic Hammer 240HP	Excavation for expansion of waste disposal site at Jenin
Track Loader 180HP	Landfill work at the Jenin landfill
Wheel Loader 185HP	Loading of soil for expansion of the Jenin disposal site
Compactor 100m^3/hr for Waste Transfer Station	Compaction and volume reduction of solid waste
Track Scale 60ton for Waste Transfer Station	Measurement of solid waste
Hook Lift Vehicle 32m^3 Trailer	Trailer for 32m^3 Hook LiftVehicle32m^3

The proposed equipment list was prepared as shown in **Table 2.40**. These equipment numbers were basically agreed among the parties, (JICA Project Team, the MoLG and each JC), after several discussions during the second field survey period. Moreover, the validity of the equipment was justified through the studies in the preceding subsections for the necessary equipment for improvement of solid waste management and upgrading of the services. However, the numbers of 1.1m^3 waste containers requested by the Salfit and Tulkarem JCs, 500 units each, were reduced to 250 units each since the waste storage capacity after procurement exceed the required storage capacity in 2015. Furthermore, the requested equipment and facilities for waste transfer station were deleted since the Salfit JC could not obtain the permission for construction of the transfer station from the Israeli

authorities by the time limit. Instead, the Salfit JC made a plan, for the provisional measures, to load waste by the existing backhoe and haul to the disposal site in Jenin by the waste transfer/transport vehicles and direct hauling by large waste collection vehicles. Accordingly, two (2) units of $12m^3$ compactors, one (1) unit of hook lift $32m^3$ with trailer and one (1) unit of $40m^3$ waste containers were added to the request equipment to cope with the shortage of waste transfer/transport capacity. The validity for the additional equipment was confirmed by the parties.

Table 2.40 Proposed Equipment List

JCs	Jenin	Hebron	Jericho	Salfit	Tulkarem
Item	Quantity	Quantity	Quantity	Quantity	Quantity
Compactor 5 m³	2	1	2	2	*
Compactor 8 m³	1	1	*	*	*
Compactor 12 m³	*	2	*	2	*
Compactor 19 m³	*	3	*	*	1
Container 1.1 m³	600	1,000	150	250	250
Container 4 m³	30	*	10	2	20
Container 8 m³	*	*	2	5	5
Container 10 m³	*	*	5	20	*
Container 40 m³	3	5	*	2	6
Dump Truck $15m^3$ for Waste	1	*	*	1	*
Dump Truck 2 ton	*	*	1	*	*
Backhoe Loader $1m^3$	*	1	*	*	*
Grapple Crane $19m^3$	*	1	*	1	*
Hook Llift 10 m³	*	*	*	1	1
Hook Lift with Trailer 32 m³	*	1	*	2	1
Skid Steer Loader 60HP	1	1	1	1	1
Track Excavator with Hydraulic Hammer 240HP	1	*	*	*	*
Track Loader 180HP	1	*	*	*	*
Wheel Loader 185HP	1	*	*	*	*

2-5 Policy of Number of Supplied Equipment and Specification

This project gives support to JCs already having sustainable solid waste management capacity including equipment operation and maintenance capacity, in order to handle illegal dumping sites and

improve regional environment and public health through promotion of waste collection and transportation. Based on a request from the MoLG and results of the site survey and discussion, the numbers of requested equipment are being supplied to the selected JCs which can implement sustainable solid waste management by efficient use and maintenance, after capacity evaluation of the 11 JCs

2-5-1 Number and Specification of Supplied Equipment

(1) Equipment

The requested items are basically agreed upon. There are evaluated for 2015 as the target year and used as indicators whether each JC has the collection capacity to meet the expanded collection area planned by them and whether the JC has collection and transportation capacity to handle illegal dumping in their governorate. The number and specifications of the requested equipment was decided by quantitative evaluation about their necessity. Exhaust emissions shall need to clear the Israeli standard (EURO V) because the equipment supply is via Israel. The supplied equipment to each JC is shown in **Table 2.41**.

(2) Waste treatment Facility / Sanitary Landfill

The Jericho JC has a plan to discharge into the sanitary landfill which will be built in Ramallah in future but during the interim term (approximately five (5) years), in order to reduce transportation cost and improve their financial status, an existing landfill expansion has been planned. The landfill will be built basically following the structure of the existing landfills - a semi-aerobic sanitary landfill. The capacity of the facility is approximately 5,000m^3 with about 1.2 hectare of area. This capacity is equal to the amount of solid waste generated in the governorate managed by the Jericho JC for 5 years.

(3) Waste Treatment Facility/ MRF and Waste Transfer Station

The Material Recovery Facility (hereinafter called “MRF”) is to be built in Jericho and the civil work for the waste transfer station is being implemented. These facilities are being implemented in order to reduce the amount of waste by recycling separated, collected waste and to cut the expenditure.

The plan has an integrated structure between MRF and the waste transfer station. In the MRF, recyclable material dumped into the stockyard is selected by hand sorting. The waste transfer station is operated to dump recycling resources into the stockyard of the MRF. In case of recycling resources increase, the space for an additional belt conveyor is being designed. The waste transfer station will be performing the intended function when the sanitary landfill will open in Ramallah, the compaction unit (mechanical equipment) for the facility will not be installed at this time. This is the reason why prevention of the machine during no use, the space for it is prepared in order to install by Jericho JC at the time required. MRF is the facility structuring steel framework and having area of approximately

250m^2 with the recycling resources receiving space, hand sorting space and storage space. This facility is planned to implement recycling activity for 1,000 kg a day (800 kg per day of plastics and 200 kg a day of metals) equals to 25 percent of recycling resources; plastics and metals from Jericho JC governorate.

(4) Soft Components

The five (5) JCs targeted in this project have the capabilities of equipment procurement, sustainable operation and maintenance, for further effective utilization, technical assistance by soft components shall be implemented in the field of separate collection, education for residents and collection and transportation planning. More specifically, information sharing among the more sophisticated JCs of Hebron, Jenin and Jericho, collection and transportation planning for the JCs of Saltit and Tulkarem, technical assistance for recycling promotion by separate collection in the Jericho JC are to be implemented.

(5) Others

The waste transfer station requested by the Salfit JC in order to improve their transportation capacity, is not included in this project because the land application has not been approved by Israel.

2-5-2 Components and Capacities

Summary of Supplied Equipment is shown in **Table 2.41**.

Table2.41 Summary of Supplied Equipment

Item	Purpose	Jenin	Hebron	Jericho	Salfit	Tulkarem	Total
1.Container							(2,365)
Container：1.1m³	Container for domestic waste	600	1,000	150	250	250	2,250
Container：4m³	Container for domestic waste	30	0	10	2	20	62
Container：8m³	Container for domestic waste	0	0	2	5	5	12
Container：10m³	Container for domestic waste and industrial waste	0	0	5	20	0	25
Container：40m³	For Transportation from the waste transfer station	4	5	0	1	6	16
2. Waste Collection Vehicle							(19)
Compactor：5 m³	Vehicle for solid waste collected into the container	2	1	2	2	0	7
Compactor：8 m³	Vehicle for solid waste collected into the container	1	1	0	0	0	2
Compactor：12 m³	Vehicle for solid waste collected into the container	0	2	0	4	0	6
Compactor：19 m³	Vehicle for solid waste collected into the container	0	3	0	0	1	4
3.Transporter							(12)
Dump Truck: 15 m³	For civil work/For waste collection and transportation	1	0	0	1	0	2
Dump Truck: 2 ton	Vehicle for recyclable waste collection	0	0	1	0	0	1
Backhoe loader: 1 m³	For civil work/For reloading at the waste transfer station	0	1	0	0	0	1
Grapple Crane: 19 m³	For waste transfer at the waste transfer station	0	1	0	1	0	2
Hook Lift: 10 m³	Collection vehicle for vegetable waste from market and industrial waste	0	0	0	1	1	2
Hook lift with Trailer: 32 m³	For waste transfer at the waste transfer station	1	1	0	1	1	4
4.Heavy Machine							(8)
Skid Steer Loader: 60HP	For reloading od waste / Cleanup of Scattering waste	1	1	1	1	1	5
Hydraulic Shovel	For civil work / For landfill expansion	1	0	0	0	0	1
Bulldozer: 180HP	For civil work / For landfill expansion	1	0	0	0	0	1
Wheel Loader: 185HP	For civil work / For landfill expansion	1	0	0	0	0	1

Chapter 3 Environmental and Social Considerations

3-1 Outline of the Project Area

3-1-1 Condition of Relevant Infrastructure

(1) Roads

The national highway and major roads with width between 11 to 14 meters in the city center are paved and generally well maintained. In residential areas with farmland, the road width is between seven (7) to 10 meters and only five (5) meters of the road center is paved. Farm roads with access to farmlands such as olive fields, are not paved or are partly paved, the majority of them have a width of between two (2) to three (3) meters, with sharp curves and gentle inclinations.

The access road to the waste transfer station and the landfill must be seven (7) meters at a minimum and be paved so it presents no obstacles to the transport vehicles but dust produced by traffic movement will persist until completion of the road is carried out. Therefore during this project suitable provision must be made during construction because of heavy vehicular traffic movements.

In Palestine, inspection by the military of Israel is rigorously implemented on route to Israeli residential areas, it may be of concern to transportation in cases of long distance transportation of solid waste.

(2) Electricity

The electric power supply in the West Bank of Palestine is stable and power failures by the electric company are not frequent. However the electric power supply is controlled by Israel.

(3)Water Supply and Sewage

Basic water supply systems have been developed in each city but each house nevertheless has a water storage tank on the roof which can store supplied water for a few days. With regard to the water supply this matter also needs to be approved by Israel as does the electricity supply.

The sewage system has not been developed except in major cities. It has been solved by evaporization and under seepage because of low rainfall.

3-1-2 Climate of the Project Sites

The West Bank that includes the project sites includes rugged hilly area around Nablus, Jerusalem and Hebron which are located at elevations of 800-1,000 m M. S. L while Jericho is located in the valley at minus 200-300 m M. S. L. The weather conditions of the project sites are shown in **Table 3.1**.

Table 3.1 Atmospheric Temperature and Rainfall in the Project Areas

Parameters	Jericho	Tulkarem	Nablus	Jerusalem
Mean Tem. (Spring)	22.5℃	19.2℃	17.0℃	15.9℃
Mean Temp. (Summer)	31.4℃	27.4℃	25.2℃	24.9℃
Mean Temp. (Autumn)	26.4℃	24.2℃	22.2℃	21.0℃
Mean Temp. (Winter)	15.5℃	14.6℃	11.7℃	9.5℃
Mean Rainfall (Spring)	39.9 mm	201.8 mm	257.3 mm	137.5 mm
Mean Rainfall (Summer)	-	-	-	-
Mean Rainfall (Autumn)	-	11.5 mm	4.9 mm	6.4 mm
Mean Rainfall (Winter)	54.2 mm	318.6 mm	294.6 mm	158.3 mm

Source： Statistical Abstract of Palestine No. 5, November 2004

3-2 Environmental and Social Considerations

3-2-1 Outline of Project Components

This Project consists of procurement of equipment and civil works covering transfer stations, a material recovery facility (MRF) and expansion of the Jericho sanitary landfill. Required project components of each JC is shown in **Table 3.2**. However, the land for transfer stations at Salfit, Tubas and Qalkilya have not been approved by the Israeli Authority, therefore the facilities are not included in the project.

Collection and transportation vehicles for supply to each JC are few in number, therefore environmental and social effects will be small. Factors for environmental and social effect shall be considered during the construction and operation of waste transfer stations, the MRF and the sanitary landfill.

Table 3.2 Outline of Project Component

	Jericho			Salfit	Tubas	Qalkilya
Type of Facility	Sanitary Landfill	Waste Transfer Station	Material Recycling Facility（MRF）	Waste Transfer Station	Waste Transfer Station	Waste Transfer Station
Type of Technology	Semi-Aerobic	Compaction Type	Hand Sorting	Compaction Type	Compaction Type	Compaction Type
Main equipment	-Net Fence -Rain Water Discharge Facility -Leachate Collection Facility -Gas discharge pipe -Leachate Treatment Pond	-Hopper -Compaction Unit	-Belt Conveyer	-Hopper -Compaction Unit	-Hopper -Compaction Unit	-Hopper -Compaction Unit
Area	Approx. 1.5 ha	Approx. 0.5 ha	Approx. 0.1 ha	Approx. 0.7 ha	Approx. 0.5 ha	Approx. 0.4 ha

3-2-2 Current Social and Environmental Situation of the Survey Areas

The social and environmental survey was carried out for the proposed four (4) transfer stations and the expansion of the final disposal site in Jericho. The project site of the proposed expansion of the final disposal facility in Jericho is adjacent to the site of the proposed transfer station project and there is no great difference with regard to the social and environmental situation between the two sites. The proposed sites in Jericho and Salfit are located respectively in an area adjacent to the existing final disposal area and an open dumping site. The project sites of the proposed transfer stations in Tubas and Qalqiliya, on the other hand, is close to an olive grove and an existing road, respectively, however no important species of flora and fauna have been identified in either of the sites.

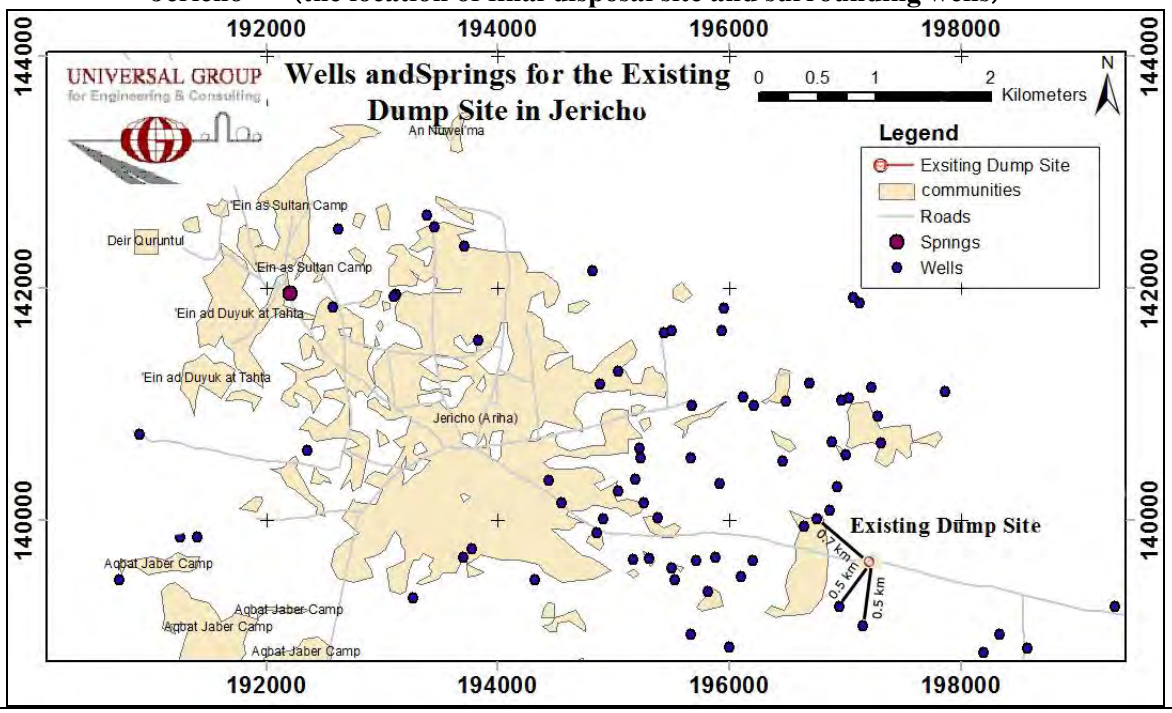
Table 3.3 Natural Environment

Item	Jericho	Salfit	Tubas	Qalqiliya
Meteorology	Annual average highest Temperature: 39.4℃ Annual average lowest Temperature: 9.3℃ Annual average rainfall: 150mm	Annual average highest Temperature: 30℃ Annual average lowest Temperature: 6.2℃ Annual average rainfall: 550 – 600 mm	Annual average highest Temperature: 34℃ Annual average lowest Temperature: 7.0℃ Annual average rainfall: 400 mm	Annual average highest Temperature: 29.6℃ Annual average lowest Temperature: 8.6℃ Annual average rainfall: 500 – 550 mm
Topography / Geology	The proposed site is located at a flat area with an elevation of – 320m. Its south part is close to a small scaled wadi. The geology of the site is mainly composed of Marl and Pleistocene Alluvial formations.	The proposed site is located at a hilly area with an elevation of 300m. The geology of the site is mainly composed of marine carbonate sediments such as limestone and dolomite.	The proposed site is located at a hilly area with an elevation of 500m and slopes gently in its west direction. The geology of the site is mainly composed of limestone and dolomite.	The proposed site is located at a flat area with an elevation of – 130m. The geology of the site is mainly composed of marine carbonate sediments such as limestone and dolomite.
Flora and Fauna	The project site is adjacent to the existing final disposal site. Important species of flora and fauna have not been identified.	The project site is adjacent to the existing open dumping site. Important species of flora and fauna have not been identified.	The surrounding area of the project site is used as an olive grove. Important species of flora and fauna have not been identified.	The project site is adjacent to an existing paved local road. Important species of flora and fauna have not been identified.
Utilization of water	The tree irrigation wells are distributed at the site. The distance from the site to the wells is 500 m – 700m. The site is next to wadi. (see Fig. 3.1)	The well is confirmed from around 3.5km far from the site. (see Fig.3.1)	The well is confirmed from around 3.0km far from the site. (see Fig.3.1)	The nearest well is located around 1.5 km distance from the site. The other well is located around 1.7 km from the site.

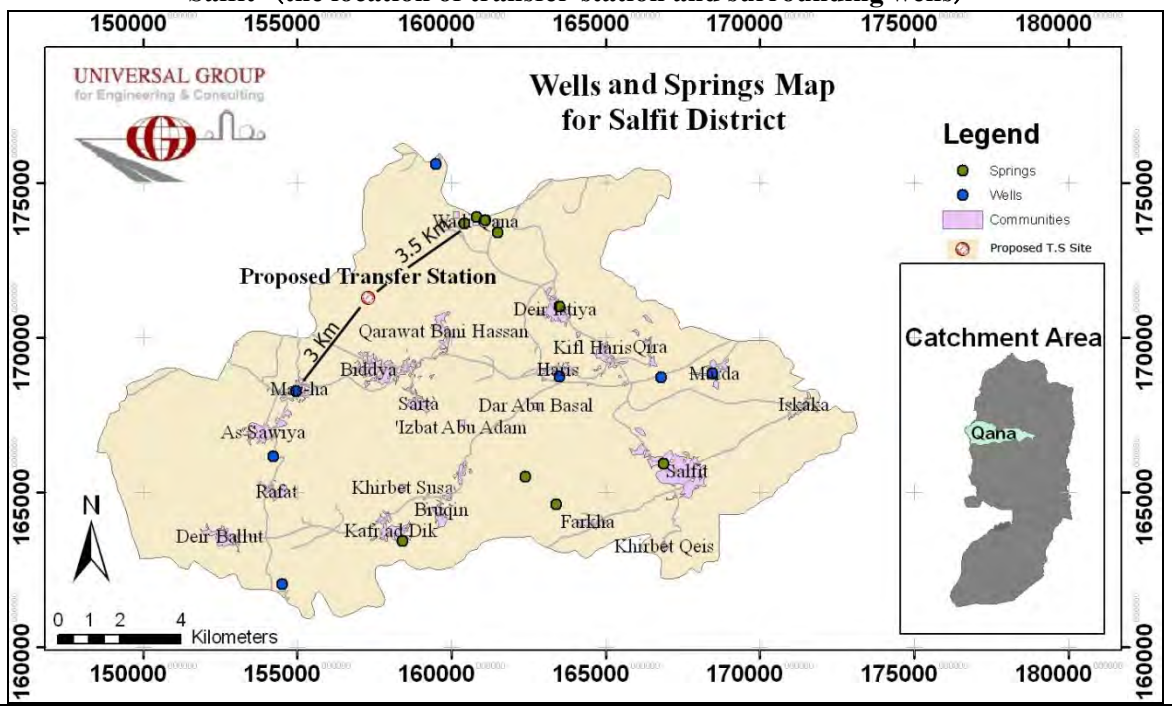
Table 3.4 Social Environment

Item	Jericho	Salfit	Tubas	Qalqiliya
Demography	Population of governorate (2010): 45,000 Average family size per household: 6	Population of governorate (2011): 64,600 Average family size per household: 5.6	Population of governorate (2011): 49,490 Average family size per household: 4.5 - 5.8	Population of governorate (2011): 90,120 Average family size per household: 6
Land use	Existing final disposal site with surrounding agricultural area.	Existing open dumping site. Surrounding area: field of olive grove.	Surrounding area: olive grove.	Vacant land adjacent to local paved road
Historical cultural Assets	Jericho city has some historical sites. Most of them are identified in the south-west of the city. However, no historical and cultural assets have been identified in and around the project site.	No historical and cultural assets have been identified in and around the project site.	No historical and cultural assets have been identified in and around the project site.	No historical and cultural assets have been identified in and around the project site.
Local Economy	Fabrication of construction materials such as building stones, cement and concrete. Food and food processing of meat, steel fabrication and production of pharmaceutical products.	Agriculture including products from olive.	Agriculture including olive, fruit and grain production.	Agriculture and quarry.
Land ownership	Land classification: Area A The proposed project site has already been acquired based on a lease agreement with the Arab Society.	Land classification: Area C There is a security problem for implementation of the proposed project. It will take another three (3) years is estimated to obtain an approval from Israeli government, which means that the project site cannot be used for the proposed JICA project.	Land classification: Area A A process for land acquisition with land owner is necessary.	Land classification: Area A The project site has already been acquired. A chicken farm is located about 70 m from the proposed facility.

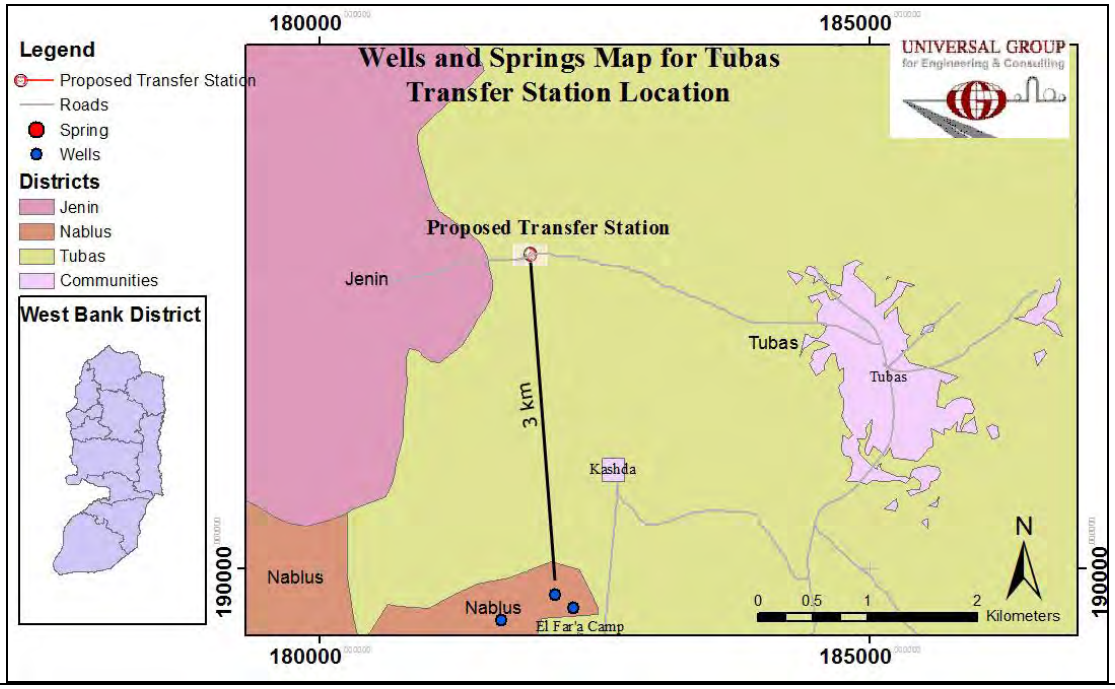
Jericho （the location of final disposal site and surrounding wells）



Salfit（the location of transfer-station and surrounding wells）



Tubas（the location of transfer-station and surrounding wells）



Qalqiliya（the location of transfer-station and surrounding wells）

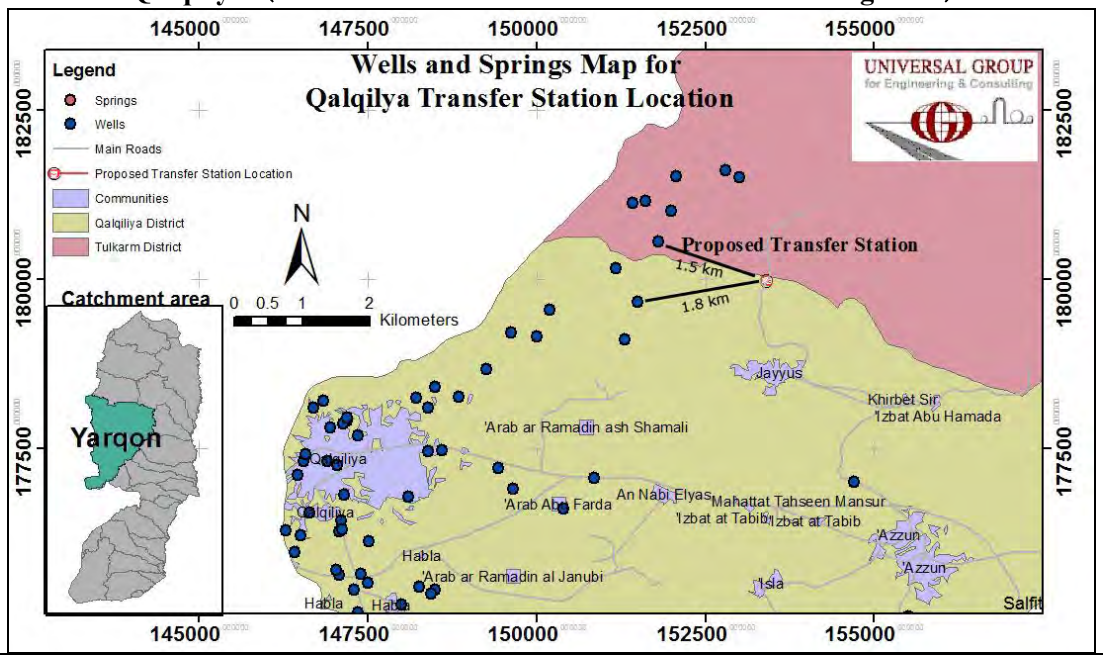
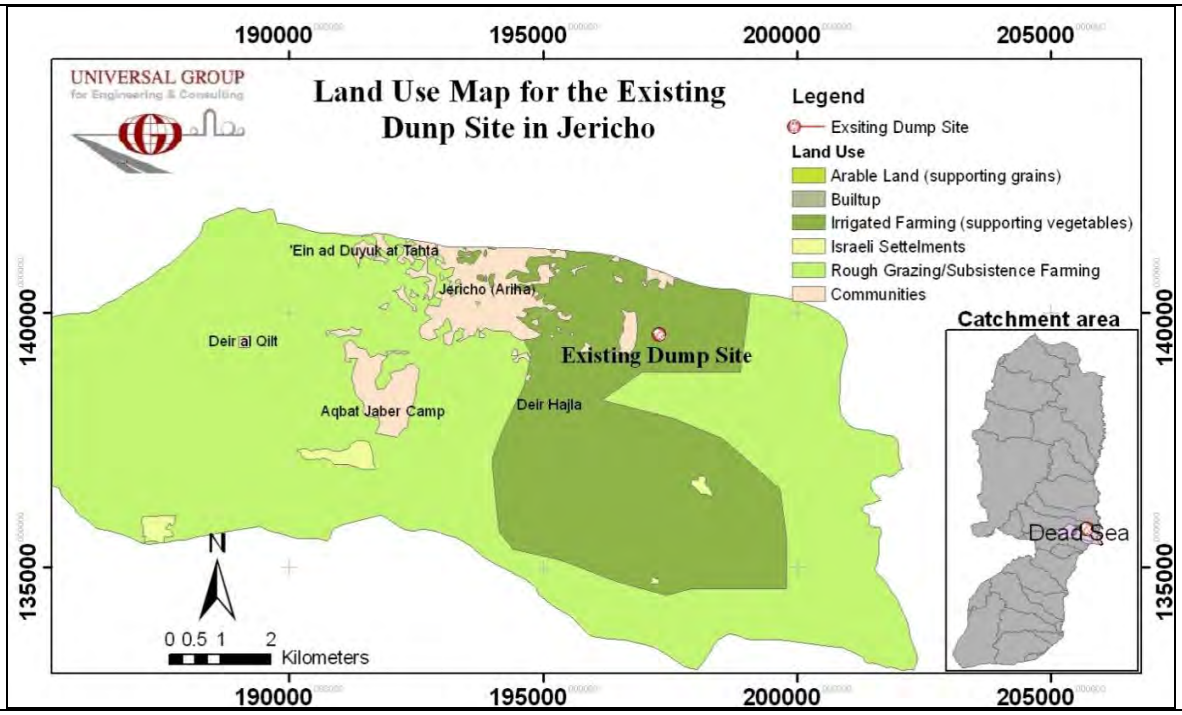
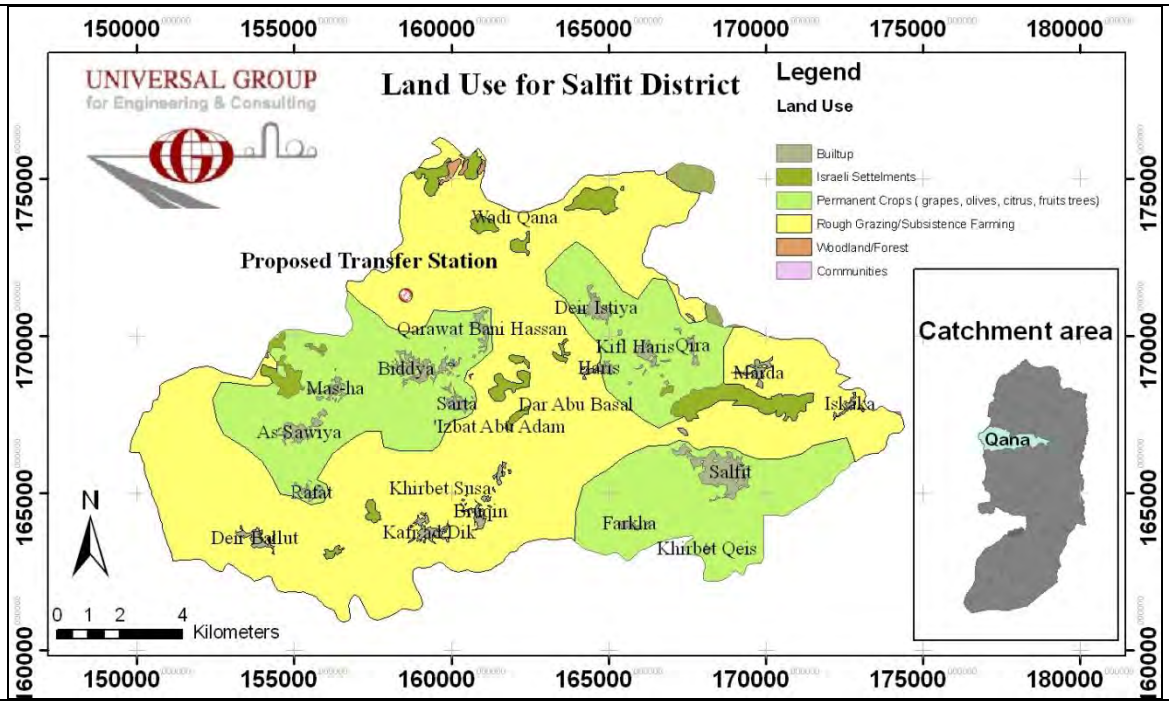


Figure 3.1　Wells and Spring Map of candidate sites

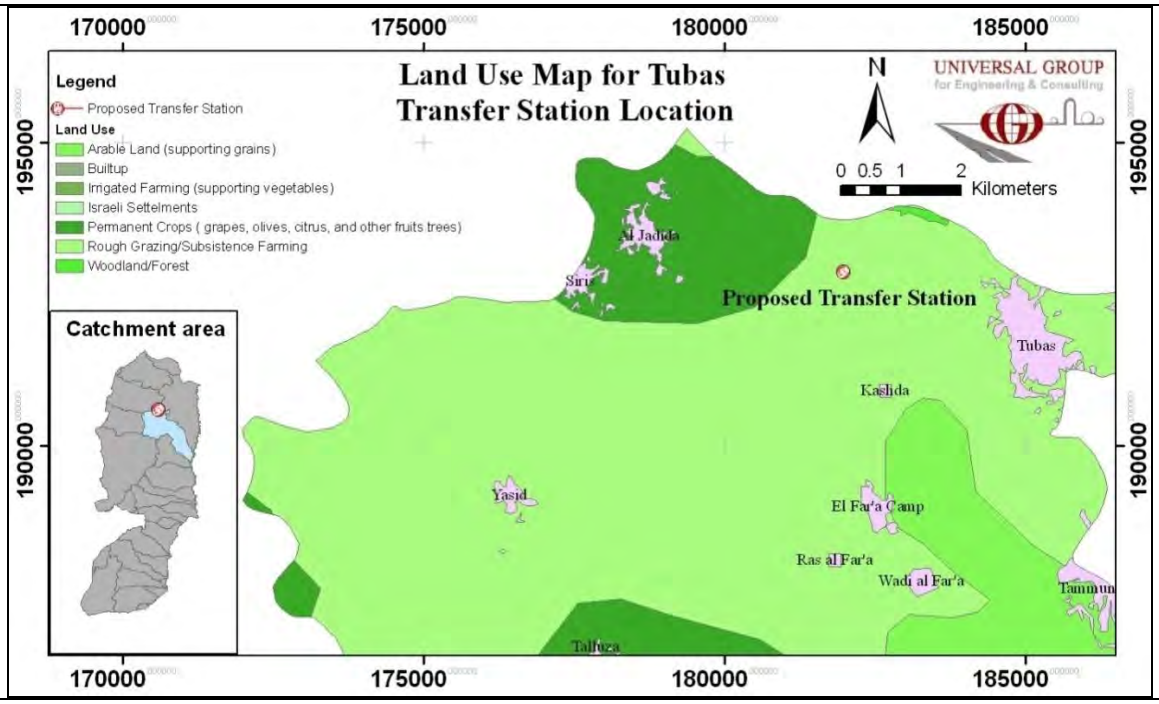
Jericho（landuse of surrounding area of landfill site）



Salfit（landuse of surrounding area of transfer station）



Tubas（landuse of surrounding area of transfer station）



Qalqiliya（landuse of surrounding area of transfer station）

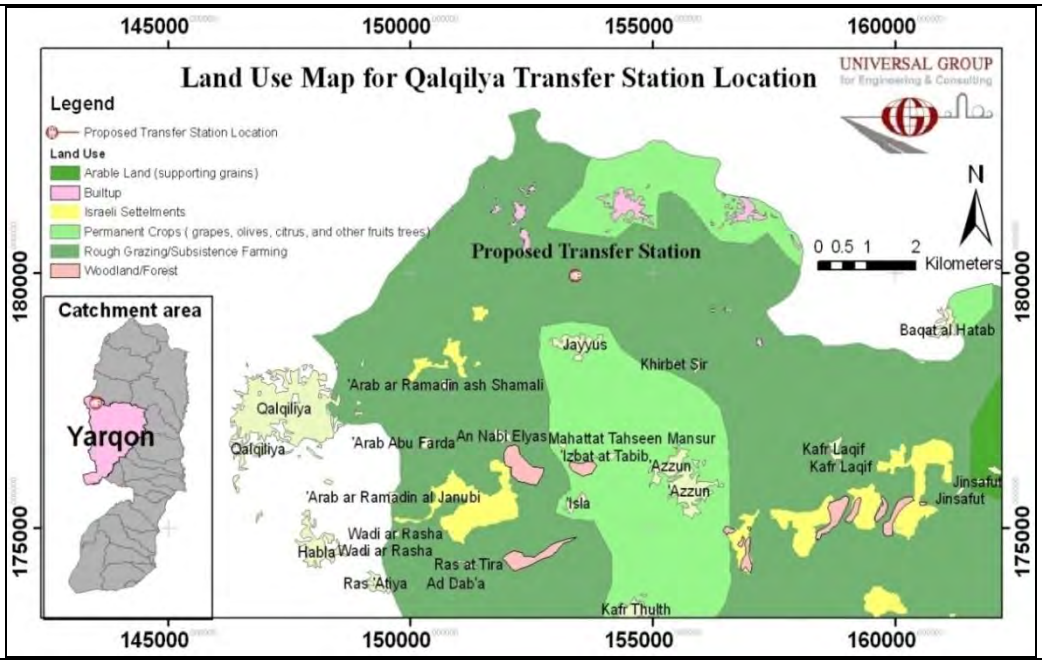


Figure 3.2 Land Use Map of candidate sites

3-2-3 System and Organization for Environmental and Social Considerations in Palestine

(1) Palestinian Environmental Law

The Palestinian Environmental Law (PEL) No. 7 was enacted in 1999 and it is quite comprehensive, covering the main issues relevant to environmental protection and law enforcement. Among the objectives of the PEL are:

Protecting the environment from all sorts and types of pollution

- Protecting public health and social welfare.
- Incorporating environmental resources protection in all social and economic development plans, and requirements to rehabilitate environmentally damaged areas and promote sustainable development to protect the rights of future generations;
- Conserving ecologically sensitive areas, protecting biodiversity, and rehabilitating environmentally damaged areas;
- Setting inter-ministerial cooperation regulations and standards on natural resource protection for various environmental protection areas and jurisdictions.
- Promoting environmental information collection and publication, public awareness, education and training.

The PEL addresses various environmental issues including:

- Management and protection of various resources. The issues covered are related to land environment, air environment, water resources and the aquatic environment, as well as natural, archeological, and historical heritage protection.
- Environmental Impact Assessment (EIA) and auditing, permitting of development projects, monitoring of environmental resources and their parameters.
- Penalties to be applied in case of violation of any article presented under the law.
- Other issues addressed by the legislation include emergency preparedness, public participation, research training and public education.

The Palestinian Environmental Assessment Policy (PEAP), through resolution No: 27-23/4, was also established in 2000. This Policy needs to be interpreted and implemented to support the sustainable economic and social development of the Palestinian people through assisting in meeting the following goals:

- Ensuring an adequate standard of life in all its aspects, and not negatively affecting the basic needs, and the social, cultural and historical values of people as a result of development activities.
- Preserving the capacity of the natural environment, including to clean and sustain it.
- Conserving biodiversity, landscapes and the sustainable use of natural resources.
- Avoiding irreversible environmental damage, and minimizing reversible environmental damage, from development activities.

(2) Environmental Approval

For the purpose of Environmental Approval for development projects, two main types of Environmental Assessment (EA) studies are required according to PEAP, which are as follows:

- An Initial Environmental Evaluation (IEE) for projects where significant environmental impacts are uncertain, or where compliance with environmental regulations must be ensured.
- An Environmental Impact Assessment (EIA) for projects which are likely to have significant environmental impacts. An EIA may also need to be carried out as a result of an IEE.

The PEAP has listed projects which require an EIA. The proposed projects are as follows:

- Power plants (including gas turbines, substations and super tension lines)
- Quarries and mines
- Waste water treatment plants including main sewers
- Cement plants
- Solid waste disposal sites
- Hazardous waste disposal sites
- Plants producing, storing or using hazardous substances
- Airports and landing strips
- Seaports, jetties and harbors
- Refineries
- Industrial estates
- Major dams and reservoirs
- Major roads
- Steel mills

From the above criteria solid waste disposal site applies in this instance to the proposed projects of expansion of final disposal facility and the transfer stations.

The new development of a final disposal facility will require an EIA as shown in the case of the recent case for development of final disposal facilities in Jericho and Hebron. However, for the proposed expansion project of a final disposal facility in Jericho and transfer stations, which will cause less environmental impact compared to the development of a new final disposal facility, whether an EIA should be prepared or only submission of an IEE can be approved only by the Environmental Quality Authority (EQA) and will be evaluated based on the following screening criteria on the surrounding environment of the proposed project sites;

- Use a natural resource in a way that pre-empts other uses of that resource
- Potential displacement people or communities
- Be located in or near environmentally sensitive areas such as natural reserves, wetlands, or registered archaeological and cultural sites

- Generate unacceptable levels of environmental impact
- Create a state of public concern, or
- Require further related development activities that may cause significant environmental impacts

After the above screening, the EQA will provide the TOR for the preparation of each type of environmental license for the project proponent.

The process of the EIA is shown in **Figure 3.3**. The process is almost the same as those of the Japanese EIA system right up to the preparation of a draft EIA document with regard to the points that a project proponent should prepare a draft EIA document through field surveys, public consultation, screening and scoping. However, there is a great difference between them after the preparation of the draft EIA report as its contents should be explained to 11 relevant ministries including the MOA (Ministry of Agriculture), the MoTA (Ministry of Tourism and Antiquities), the MoLG (Ministry of Local Government), the EQA and the PWA (Public Water Authority) for their agreement. After their agreement, a final EIA report needs to be submitted to the EQA for their final approval. The process terminates with the approval of the EIA report. Generally, the process requires a half year from the application to the final approval of an EIA report.

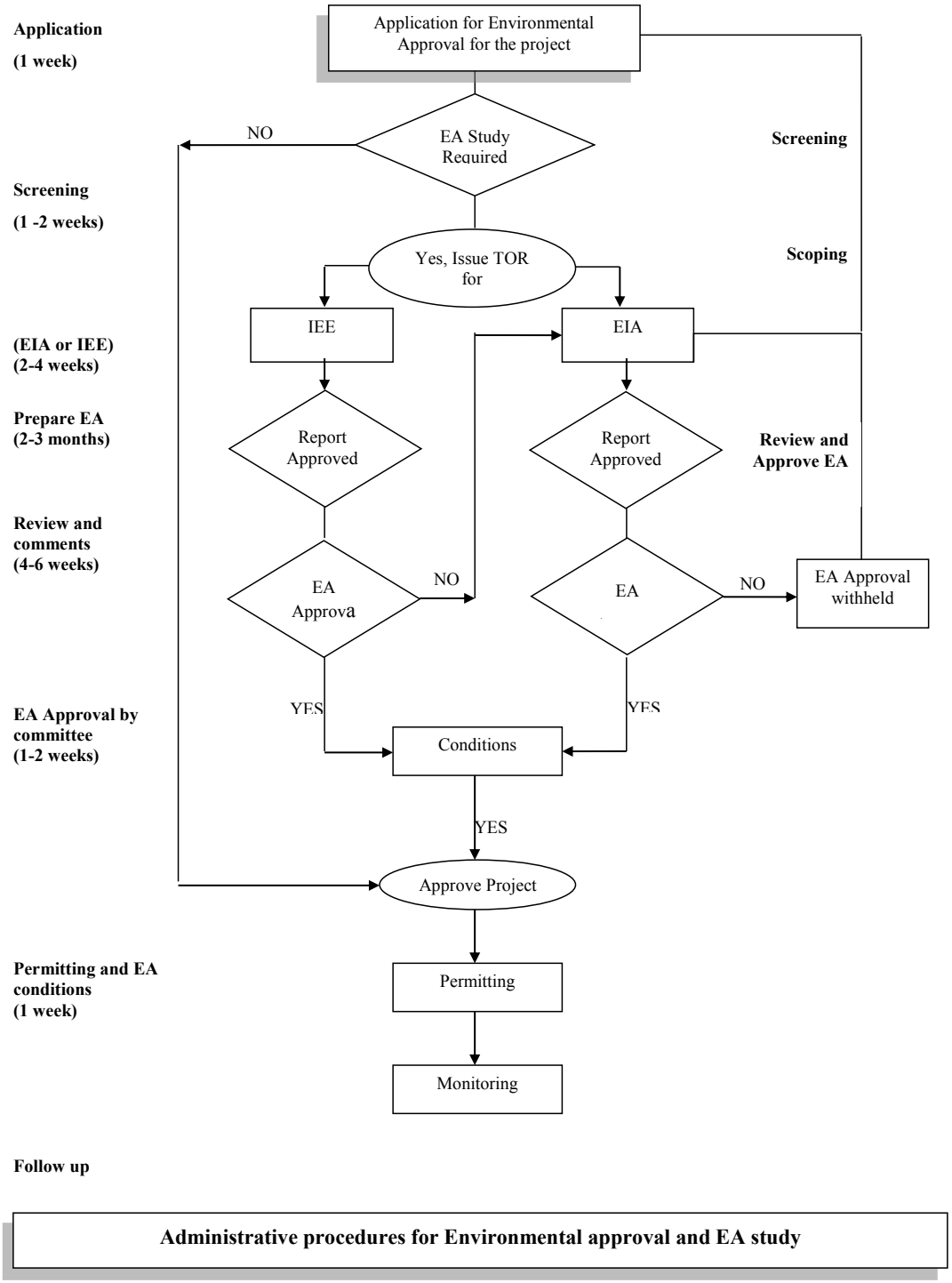


Figure 3.3 Flow scheme for the EIA Process

The process of the IEE is shown in **Figure 3.4**. The process is same as EIA, MEnA submits TOR to the development agency and then the agency needs to submit a draft IEE report to MEnA based on the TOR. MEnA will organize the evaluation team and prepare the comments for the report. The agency needs to prepare and submit the amendment report to MEnA. The environmental and social study which was carried out in this study will be used for the preparation of the draft IEE as the

baseline data.

The actual process of Jericho JC project is shown in **Table 3.5**.

Table 3.5 Actual Process of Jericho JC Project

Date	Activities
5, May 2012	Jerich JC submitted application documents to MEnA
9, July 2012	MEnA carried out site inspection and prepared TOR.
31, August 2012	MEnA requested to Jericho JC to submit IEE report based on the TOR.
3, October 2012	Jericho JC prepared and submitted draft IEE report to MEnA
26, October 2012	Jericho JC revised draft IEE report based on the comments of MEnA.
9, December 2012	Jericho JC submitted revised IEE report to MEnA.
20, December 2012	MEnA had internal evaluation meeting.
6, January 2013	Jericho JC received the approval from MEnA.

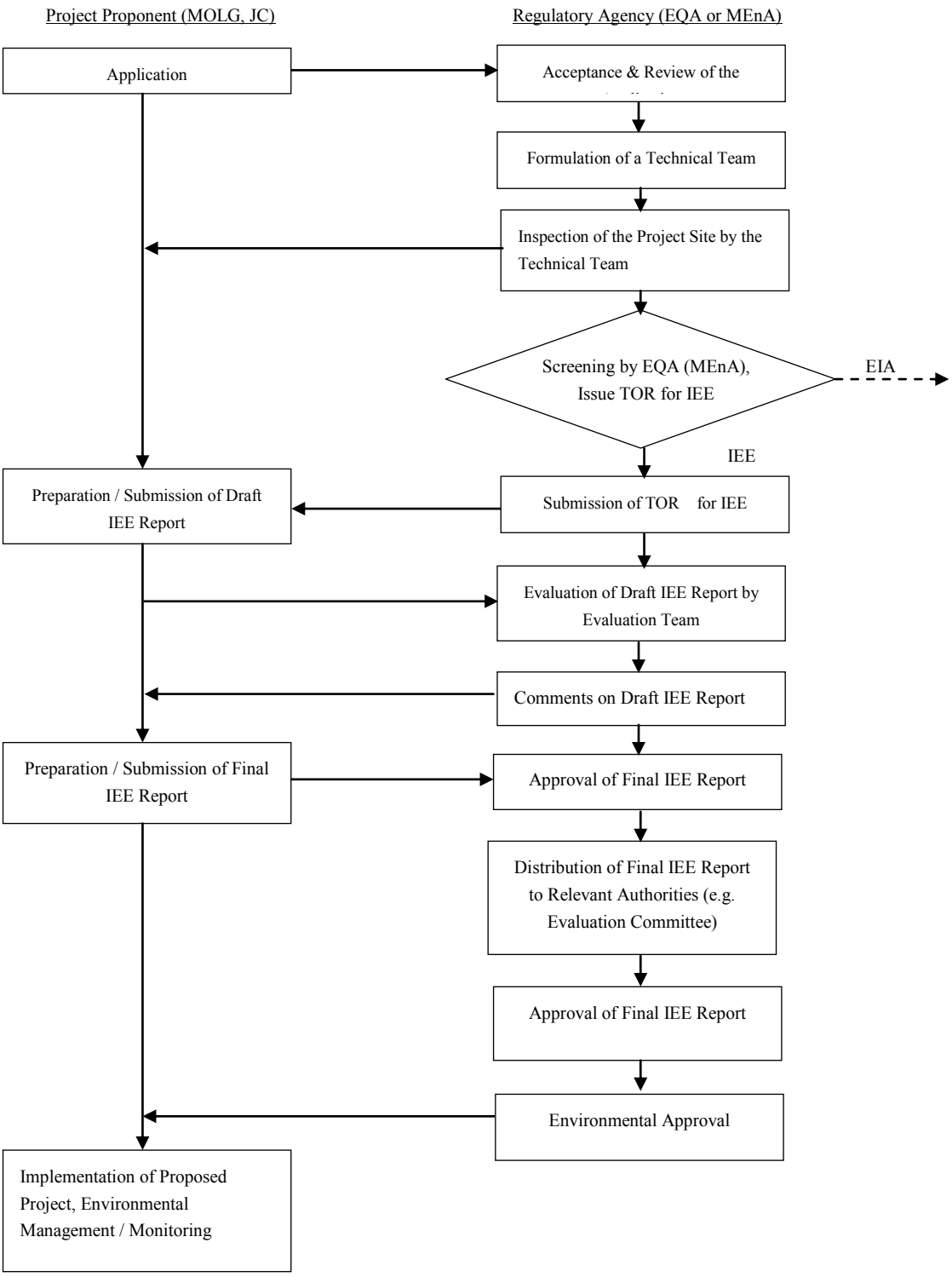


Figure 3.4 Flow scheme for the IEE Process

(2) Regulation of Pollution Control

In Palestine, effluent, emission and noise standards are regulated in relation to pollution control. However, there are no regulatory standards for vibration and odor in Palestine. In the proposed project, the water quality of leachate from the proposed expansion of the final disposal facility and the noise potentially to be generated by the operation of heavy equipment can be subject to the above Palestinian regulations. Mitigation measures should be taken for expected odor. The applied standard for noise is shown in **Table 3.6**. The proposed project sites are not included in regulated area. By the consideration of surrounding conditions of the site, permissible Noise level shall be regulated by industrial area.

The effluent standard of the leachate is under study for identifying which standards should be applied. However, there is no possibility of leachate generation by weather conditions. The design of leachate treatment is not required, because evaporation is over than rainfall water.

Table 3.6 Permissible Noise level by Area Type

Area	Permissible Noise Level	
	Day Time (dB)	Night Time (dB)
	7am-8pm	8pm-7am
Residential areas (Rural), hospital, schools	40	30
Residential areas (Urban)	50	40
Mixed area of commercial and residential housings	55	45
Commercial area	65	50
Industrial area	75	65
Public gatherings	85	75

3-2-4 Comparison Study of Development Options

Jericho JC has a plan to transport all residual waste to the new landfill site at Ramallah sanitary landfill site which is included in the national strategy. However, the construction of the new site is still under planning. Jericho JC has two alternatives, 1) to transport all collected waste to Jenin landfill site, 2) to develop own landfill site in Jericho. Jericho JC had decided that they will find out new landfill site until the open of the new site according to the management cost. The direct distance from Jericho to Jenin is more than 65km, it means transportation cost is expensive and turn for the worth of financial condition. The tentative landfill site shall be used several years. MoLG suggested that Jericho JC can expand the existing landfill and use the site for five years or until the new site opens.

The proposed project in Jericho is an expansion of the existing final disposal facility which is

planned to be developed in parallel with the existing final disposal facility. Therefore, the existing facilities and equipment such as the administration office, truck scales and the approach roads will be utilized. No environmental and social issues have been raised since 2005 when the existing final disposal facility was constructed.

Therefore, the alternative is the best option for less impact on the environment compared to the other alternatives.

3-2-5 Scoping

Scooping result is shown in **Table 3.7 – 3.10**.

Table 3.7 Scoping Results of Transfer station and Material Recovery Facility (Plan/Construction)

Category	NO.	Items	investigation	Evaluation	Note
Social Environment	1	Resettlement	Field survey	D	There is no houses and private land.
	2	Economic Activities (employment)	Field survey/Hearing	D	There is no impact for local economic activities.
	3	Land-use	Field survey/existing data	D	The candidate site is open space.
	4	Economic Activities (Business)	Field survey/Hearing	D	There is no impact for local economic activities.
	5	Existing infrastructure	Field survey/existing data	D	There is no impact for local existing infra structure.
	6	Poor, aborigines	Field survey/existing data	D	There is not residential area for poor and aborigines.
	7	Inequality of profit	Field survey/existing data	D	It is not possible unfair employment will be happened.
	8	Gender	Field survey/Hearing	D	There is no impact for local family-structure.
	9	Right of child	Field survey/Hearing	D	There is no impact for local family-structure.
	10	Remains, cultural assets	Field survey/existing data	D	There is not Remains, cultural assets in the project area.
	11	Infectious diseases such as HIV/AIDS	Field survey/existing data	B	It is possible to increase diseases by increasing of population.
	12	Water right, common right	Field survey/existing data	D	There is not surface water and common area.
	13	Solid waste	Field survey/Construction Plan	D	Solid waste is not generated in construction stage.
	14	Disaster Risk	Construction Plan	D	There is no risk in construction stage.
Natural Environment	15	Topography/Geology	Field survey/ Construction Plan	D	Land reclamation work will do small change topographical condition.
	16	Soil erosion	Field survey/ Construction Plan	D	Rainfall water will not occur soil erosion of development area.
	17	Ground water	Field survey/ Construction Plan	D	The construction work does not use ground water.
	18	Lakes and marshes	Field survey/existing data	D	There is not lakes and marshes in the project area.

	19	Coast/sea area	Field survey/existing data	D	There is not coast/sea area in the project area.
	20	Species/Wildlife	Field survey/ Construction Plan	D	Candidate site is disposal site and open space.
	21	Weather	Field survey/ Construction Plan	D	There is no risk.
	22	Geography	Field survey/ Construction Plan	D	There is few land reclamation work.
Pollution	23	Air pollution (construction)	Field survey/ Construction Plan	B	Heavy machines activities in construction stage will generate dusts.
	24	Water pollution	Field survey/ Construction Plan	D	Construction work does not use water.
	25	Soil pollution	Field survey/ Construction Plan	D	In construction stage, the oil is not used.
	26	Solid waste	Field survey/ Construction Plan	D	Solid waste will not be generated in construction phase.
	27	Noise/vibration	Field survey/ Construction Plan	B	Heavy machines activities in construction stage will generate noise and vibration.
	28	Ground sinkage	Field survey/ Construction Plan	D	The construction work not occur ground sinkage.
	29	Offensive odor	Field survey/ Construction Plan	D	There is no risk in construction stage.
	30	Sediment soil	Field survey/ Construction Plan	D	There is no risk in construction stage.
	31	Traffic accident	Field survey/ Construction Plan	C	It is possible to increase traffic accidents.

Note: Evaluation criteria：

A: Significant Impact

B: Moderately Impact (Impact can be decreased by mitigation.)

C: Minimal Impact (Impact can be minimal by mitigation.)

D: Insignificant

+: Good Impact

Table 3.8 Scoping Results of Transfer station and Material Recovery Facility (Operation)

Category	NO.	Items	investigation	Evaluation	Note
Social Environment	2	Economic Activities (employment)	Field survey/operation Plan	+	There is good impact for waste pickers.
	4	Economic Activities (Business)	Field survey/operation Plan	+	There is good impact for recycling industries.
	13	Solid waste	Field survey/operation Plan	D	Residual solid waste is disposed at the sanitary landfill site.
Pollution	23	Air pollution (construction)	Field survey/operation Plan	B	Heavy machines and collection vehicles will generate dusts.
	24	Water pollution	Field survey/operation Plan	D	Operation work does not use water.
	25	Soil pollution	Field survey/operation Plan	D	In operation stage, the oil is not used.
	27	Noise/vibration	Field survey/operation Plan	B	Heavy machines activities in operation stage will generate noise and vibration.
	29	Offensive odor	Field survey/operation Plan	B	Collected waste will generate odor.

Note: Evaluation criteria：

A: Significant Impact

B: Moderately Impact (Impact can be decreased by mitigation.)

C: Minimal Impact (Impact can be minimal by mitigation.)

D: Insignificant

+: Good Impact

Table 3.9 Scoping Results of Sanitary Landfill (Plan/Construction)

Category	NO.	Items	investigation	Evaluation	Note
Social Environment	1	Resettlement	Field survey	D	There is no houses and private land.
	2	Economic Activities (employment)	Field survey/Hearing	D	There is no impact for local economic activities.
	3	Land-use	Field survey/existing data	D	The candidate site is open space.
	4	Economic Activities (Business)	Field survey/Hearing	D	There is no impact for local economic activities.
	5	Existing infrastructure	Field survey/existing data	D	There is no impact for local existing infra structure.
	6	Poor, aborigines	Field survey/existing data	D	There is not residential area for poor and aborigines.
	7	Inequality of profit	Field survey/existing data	D	It is not possible unfair employment will be happened.
	8	Gender	Field survey/Hearing	D	There is no impact for local family-structure.
	9	Right of child	Field survey/Hearing	D	There is no impact for local family-structure.
	10	Remains, cultural assets	Field survey/existing data	D	There is not Remains, cultural assets in the project area.
	11	Infectious diseases such as HIV/AIDS	Field survey/existing data	B	It is possible to increase diseases by increasing of population.
	12	Water right, common right	Field survey/existing data	D	There is not surface water and common area.
	13	Solid waste	Field survey/ Construction Plan	D	Solid waste is not generated in construction stage.
	14	Disaster Risk	Field survey/ Construction Plan	D	There is no risk in construction stage.
Natural Environment	15	Topography/Geology	Field survey/ Construction Plan	D	Land reclamation work will do small change topographical condition.
	16	Soil erosion	Field survey/ Construction Plan	D	Rainfall water will not occur soil erosion of development area.
	17	Ground water	Field survey/ Construction Plan	D	The construction work does not use ground water.
	18	Lakes and marshes	Field survey/ Construction Plan	D	There is not lakes and marshes in the project area.
	19	Coast/sea area	Field survey/existing data	D	There is not coast/sea area in the project area.
	20	Species/Wildlife	Field survey/existing data	D	Candidate site is disposal site and open space.
	21	Weather	Field survey/existing data	D	There is no risk.
	22	Geography	Field survey/ Construction Plan	D	There is few land reclamation work.
Pollution	23	Air pollution (construction)	Field survey/ Construction Plan	B	Heavy machines activities in construction stage will generate dusts.
	24	Water pollution	Field survey/ Construction Plan	D	Construction work does not use water.

	25	Soil pollution	Field survey/ Construction Plan	D	In construction stage, the oil is not used.
	26	Solid waste	Field survey/ Construction Plan	D	Solid waste will not be generated in construction phase.
	27	Noise/vibration	Field survey/ Construction Plan	B	Heavy machines activities in construction stage will generate noise and vibration.
	28	Ground sinkage	Field survey/ Construction Plan	D	The construction work not occur ground sinkage.
	29	Offensive odor	Field survey/existing data	D	There is no risk in construction stage.
	30	Sediment soil	Field survey/existing data	D	There is no risk in construction stage.
	31	Traffic accident	Field survey/existing data	C	It is possible to increase traffic accidents.

Note: Evaluation criteria：

A: Significant Impact

B: Moderately Impact (Impact can be decreased by mitigation.)

C: Minimal Impact (Impact can be minimal by mitigation.)

D: Insignificant

+: Good Impact

Table 3.10 Scoping Results of Sanitary Landfill (Operation)

Category	NO.	Items	investigation	Evaluation	Note
Social Environment	2	Economic Activities (employment)	Field survey/operation Plan	+	There is good impact for waste pickers.
	6	Poor, aborigines	Field survey/operation Plan	+	There is good impact for waste pickers. They will be employee at MRF.
	14	Disaster Risk	Field survey/operation Plan	B	There is fire risk in operation stage.
Pollution	23	Air pollution (construction)	Field survey/operation Plan	B	Heavy machines and collection vehicles will generate dusts.
	24	Water pollution	Field survey/operation Plan	B	It is possible leachate will contaminate ground water.
	25	Soil pollution	Field survey/operation Plan	D	In operation stage, the oil is not used.
	27	Noise/vibration	Field survey/operation Plan	B	Heavy machines activities in operation stage will generate noise and vibration.
	29	Offensive odor	Field survey/operation Plan	B	Collected waste will generate odor.

Note: Evaluation criteria：

A: Significant Impact

B: Moderately Impact (Impact can be decreased by mitigation.)

C: Minimal Impact (Impact can be minimal by mitigation.)

D: Insignificant

+: Good Impact

The potential environmental impacts to be caused by the proposed project will be estimated for project stages of construction and operation.

(1) Potential Impact at Construction Stage

(a) Development of Transfer Station/Material Recovery Facility

1) It is possible to increase diseases by increasing of construction workers,
2) Noise, vibration and dust are estimated by the construction works of excavation work, as well as concrete placing for the development of the transfer station.

No important species of flora & fauna or any historical heritage sites have been identified, which will cause less adverse environmental and social impacts. The small size of the facility buildings of the proposed project will not have adverse impacts on the surrounding landscape.

(b) Expansion of Final Disposal Facility

No important species of flora & fauna or any historical heritage sites have been identified, which will cause less adverse environmental and social impacts. The small size of the facility buildings of the proposed project will not have adverse impacts on the surrounding landscape.

1) It is possible to increase diseases by increasing of construction workers,
2) Noise, vibration and dust are estimated by the construction works of excavation work, as well as concrete placing for the construction of the disposal facility.

There is no residential housing near the project site, therefore the project will not be expected to have any significant noise impacts caused by construction vehicles and works. However, dust problems will be generated due to the dry climate and the geology of the surrounding soils.

Fewer environmental issues will be expected since no important flora, fauna or historical heritage sites have been identified. The adverse impact on the existing landscape also will be negligible since the excavated soil will be backfilled in the ground of the planned landfill area in a few years.

(2) Potential Impact at Operation Stage

(a) Development of Transfer Station

The operation of collection vehicles and transfer transport vehicles will cause some traffic noise and vibration. The scattering and odor of piled waste is expected if the solid waste is collected and accumulated even for a short period. The generation of waste water and used water after washing vehicles and equipment from the transfer station is also to be expected.

(b) Expansion of the Final Disposal Facility

Noise and vibration potentially caused by the operation of heavy equipment and the odor problems due to the accumulated waste, the potential impact due to the operation of collection vehicles and the water pollution due to any leachate water may have to be estimated.

① Noise, vibration and odor:

The impact of noise and vibration on the surrounding environment due to operation of heavy equipment needs to be estimated. The generation of odor on the surrounding environment also needs to be estimated

② Impact due to operation of collection vehicles:

The estimated number of collection vehicles is about 10 per day, and this figure may not cause any significant impact with respect to traffic, noise and vibration on the surrounding environment.

③ Leachate water from the final disposal site:

The generation of leachate water from rain fall will need to be considered at the final disposal facility.

3-2-6 Recommended TOR for Environmental and Social Consideration

The Palestinian legislative framework on EIA, the existing social and environmental situation of the proposed project sites, assistance in the preparation of the EIA license and preparation of mitigation plans to minimize adverse impact by the proposed project should be studied and duly considered.

Table 3.6 shows the recommended scope of work on the environmental and social considerations on the Palestinian side. **Table 3.11** covers the current social and environmental baseline, Palestinian legal and institutional framework, scoping, environmental monitoring plans and assistance to the acquisition of environmental licenses of the counterparts.

Table 3.11 Scope of Work of Environmental & Social Consideration

Study Item	Content	Output
Current Social and Environmental Baseline	Topography, geology, meteorology, hydrology	Report
	Population, population distribution, land use in and around project site, water use, waste / sewage water treatment, traffic and historical assets.	Report
EIA Process	Legislative framework, EIA process	Report
	Effluent, emission standards, environmental standards and relevant authorities	Report
Screening	Categorization for proposed projects above category B	Report
Scoping	Potential impacts during construction stage	Report
	Potential impacts at operation stage	Report
Assessment	Results of baseline survey	Report
	Results of environmental impacts	Report
	Mitigation measures for adverse impacts	Report
	Necessity for an Environmental Management Plan and Preparation of a Solid Waste Management Plan	Report
	Preparation of an environmental check sheet	Check Sheet
Monitoring Plan	Preparation of an Environmental Monitoring Plan (EMP) at the preparation stage, launching of construction work, under construction, at test operation and at operation stages	Report
	Preparation of a monitoring sheet	Monitoring sheet

3-2-7 Mitigation Measures

The following mitigation measures should be taken at the project stage of construction and operation based on the scoping results.

Mitigation measure is shown in **Table 3.12– 3.15**.

Table 3.12 Mitigation Measures of Transfer Station and Material Recovery Facility (Plan/Construction)

Category	NO.	Items	Evaluation	Note
Social Environment	11	Preservation of health	C	Constructor shall carry out sufficient Labor management
Pollution	23	Air pollution (construction)	B	Water spray system shall be introduced for construction area.
	27	Noise/vibration	B	The working out of heavy machines activities in construction stage will be regulated as only daytime.

Table 3.13 Mitigation Measures of Transfer station and Material Recovery Facility (Operation)

Category	NO.	Items	Evaluation	Note
Social Environment	2	Economic Activities (employment)	+	There is good impact for waste pickers.
	4	Economic Activities (Business)	+	There is good impact for recycling industries.
Pollution	23	Air pollution (construction)	B	Water spray system shall be introduced for construction area.
	27	Noise/vibration	B	The working out of heavy machines activities in construction stage will be regulated as only daytime.
	29	Offensive odor	B	Collected waste shall be moved to landfill site within maximum one day.

Table 3.14 Mitigation Measures of Sanitary Landfill (Plan/Construction)

Category	NO.	Items	Evaluation	Note
Social Environment	11	Preservation of health	C	Constructor shall carry out sufficient Labor management
Pollution	23	Air pollution (construction)	B	Water spray system shall be introduced for construction area.
	27	Noise/vibration	B	The working out of heavy machines activities in construction stage will be regulated as only daytime.

Table 3.15 Mitigation Measures s of Sanitary Landfill (Operation)

Category	NO.	Items	Evaluation	Note
Social Environment	2	Economic Activities (employment)	+	There is good impact for waste pickers.
	6	Poor, aborigines	+	There is good impact for waste pickers. They will be employee at MRF.
	14	Disaster Risk	B	Water spray system shall be introduced for construction area.
Pollution	23	Air pollution (construction)	B	Water spray system shall be introduced for construction area.
	24	Water pollution	B	Lining system shall be introduced at landfill site.
	27	Noise/vibration	B	The working out of heavy machines activities in operation stage will be regulated as only daytime.
	29	Offensive odor	B	Collected waste shall be covered by soil day by day.

Note: Evaluation criteria：

3-2-8 Environmental Management Plan and Environmental Monitoring Plan

The proposed project will not cause significant social impacts since it does not require involuntary resettlement nor land acquisition of private lands. However, environmental monitoring at each project stage namely that of pre-construction, construction and operation will be necessary to identify the actual situation of the environmental elements which may cause adverse impacts. Baseline social and environmental data should be acquired when the EIA is actually implemented.

Mitigation measures towards the adverse impacts should be covered in the construction plan. However, the actual examination of these mitigation measures and recommendations of any suitable changes will be necessary.

During the commencement of actual construction, monitoring responding to the progress of actual construction works should be carried out for a wide range of social and environmental elements. At the operations stage, monitoring should be continued although not much adverse impacts are expected at this stage. The monitoring results should be reported to the EQA every six months and also to JICA once a year at a minimum. **Table 3.16** shows the recommended social and environmental elements which should be monitored at each project phase. The monitoring method is shown in **Table 3.17**.

Table 3.16 Social and Environmental Elements to be monitored

Social and Environmental Elements	Montoring	Pre-construction	Construction	Operation
Transfer Station/ Material Recovery Facilty				
Preservation of health	Periodical medical examination	✔	✔	
Air pollution (construction)	Surrounding conditions from heavy machines and collection vehicles activities.	✔	✔	✔
Noise/vibration	Surrounding conditions from heavy machines and collection vehicles activities.	✔	✔	✔
Offensive Odor	Surrounding condition of offensive odor.	✔		✔
Final Disposal Site				
Preservation of health	Periodical medical examination	✔	✔	
Air pollution (construction)	Surrounding conditions from heavy machines and collection vehicles activities.	✔	✔	✔
Noise/vibration	Surrounding conditions from heavy machines and collection vehicles activities.	✔	✔	✔
Water pollution	Water pollution from Leachate	✔		✔
Offensive Odor	Surrounding condition of offensive odor.	✔		✔
Others				
Social environment	Employment of waste pickers.	✔		✔

Table 3.17 Monitoring Method

Social and Environmental Elements	Montoring	Pre-construction	Construction	Operation
Transfer Station/ Material Recovery Facilty				
Preservation of health	Periodical medical examination	Constructor shall have responsibility.		
Air pollution (construction)	Surrounding conditions from heavy machines and collection vehicles activities.	Field inspection and complaints survey.		
Noise/vibration	Surrounding conditions from heavy machines and collection vehicles activities.	Field inspection and complaints survey.		
Offensive Odor	Surrounding condition of offensive odor.	Field inspection and complaints survey.		
Final Disposal Site				
Preservation of health	Periodical medical examination	Constructor shall have responsibility.		
Air pollution (construction)	Surrounding conditions from heavy machines and collection vehicles activities.	Field inspection and complaints survey.		
Noise/vibration	Surrounding conditions from heavy machines and collection vehicles activities.	Field inspection and complaints survey.		
Water pollution	Water pollution from Leachate	Periodical water quality survey.		
Offensive Odor	Surrounding condition of offensive odor.	Field inspection and complaints survey.		
Others				
Social environment	Employment of waste pickers.	Actual situation survey.		

3-2-9 Stakeholder Meetings

Stakeholders related to this project are the MoLG, each city, the JC and the land owners in case the project site belongs to private individuals and farmers who have farmland near the site. This project is a public project relevant to solid waste treatment, thus the relocation of inhabitants is not necessary because the project sites are not located among private houses or offices, almost all the project sites are located near existing facilities, open dumping sites or vacant lands neighboring farmland, therefore the stakeholder meeting had not been implemented during the survey. The stakeholder meeting will be discussed when considering environmental approval based on the EIA process in Palestine which will be determined by the EQA who is the supervisory authority on environmental approval.

3-2-10 Land Acquisition and Inhabitants Relocation

According to the land classification based on the Oslo Accords, Salfit is defined as Area C and required to have approval from Israel but the other sites are in area A or B, which does not require Israel's approval. Regarding land acquisition, the Jericho JC and the Qalkilya JC have already acquired land (the Jericho JC has made a leasing agreement with the Arab Society, the Qalkilya JC has acquired its land from private land owners), the Tubas JC will be required to acquire land hereafter. Inhabitant relocation is not required because the project sites are located near existing facility, open dumping site, vacant land or neighboring agricultural lands, no private houses and office buildings exist near the identified sites.

Table 3.18 Land Classification and situation of land acquisition

	Jericho	Salfit	Tubas	Qalkilya
Situation of land acquisition	Area A Already acquired based on leasing agreement with the Arab Society. Claimed by a farmer who has farmland nearby project site during geology urvey but his agricultural activity had not been approved. Already agreed with relevant people included in city office to use for expansion.	Area C Concerned Safety issue. Estimated three (3) years to get approval by Israel. Hard to use for this project.	Area A Private land. Required to acquire.	Area B Already acquired. Chicken yard is located at 70m east side from the project site.

Chapter 4 Schematic Design Conditions of the Project

4-1 Design, Supply and Maintenance Policy

4-1-1 Design Policy

(1) Fundamental Policy

The Project provides suitable capacity and appropriate use of supplied equipment as well as construction of facilities for solid waste management of the JCs in the West Bank of Palestine to achieve both cost reduction and positive contributions towards environment and climate change.

(2) Basic Policy for Natural Environmental Condition

The Project sites are located between 31°N and 32°N latitude, and between 34°E and 35°E longitude, as well as altitude ranging from -250 meters and 900 meters. The longitude is equivalent to that of the Kyushu area in Japan and the altitude has little bearing on any special conditions in the area, therefore any special temperature conditions do not need to be considered.

(3) Policy for Society and Economy

Despite a predominant Islamic society, special consideration is not required about religion, history, culture and economic conditions regarding equipment procurement and facility construction for the solid waste management project.

(4) Project Site

This project targets five (5) JCs evaluated due to the fact that their capabilities are higher than average, namely the Jenin, Hebron, Jericho, Salfit and Tulkarem JCs by the results obtained through an evaluation of the benefits, technical capability levels, financial capacity and organizational capacity of each JC in the West Bank.

(5) Target Year

The target year of the project start-up is set as 2015.

(6) Solid Waste Collection Equipment

A number of solid waste collection equipment and industrial machines shall be selected by estimating the amount of solid waste to be managed in the target year following the request for components and amounts requested by the PNA, and also considering the numbers of equipment being supplied by other donors (mainly the EU).

Exhaust standards applicable in Israel (Euro V) shall be applied to the relevant equipment because they will be supplied via Israel.

(7) Solid Waste Treatment Facility

1) Sanitary Landfill

Basic Policy

The project plans to expand the existing landfill in Jericho which was built through a technical cooperation project of JICA and is being used currently. This sanitary landfill will be used for approximately five (5) years more until the completion of the new landfill to be constructed in Ramallah. The sanitary landfill to be newly built by the project is designed as a semi-aerobic sanitary landfill following the existing structure.

Semi-aerobic sanitary landfills allow ease of decomposition of the solid waste by passing air into the landfill layers and also enables methane gas production to be reduced.

Basic Structure

The sanitary landfill achieves its dumping capacity by excavation of flat land and piling the excavated soil to a final height of two (2) meters. By installation of an impermeable liner at the bottom, leachate from the solid waste is prevented from penetrating underground. The collected wastewater utilizing leachate collection equipment is transferred to a leachate storage pond and evaporated. The generated carbon dioxide and methane gas from the solid waste is discharged into the air through exhaust pipes. Sufficient pipe size for leachate collection and exhaust discharge shall be considered in order to maintain semi-aerobic conditions.

Basic Equipment

The basic equipment required consists as follows;

- Storage Equipment：Main Equipment for landfill which has an impermeable liner at the bottom
- Leachate Collection Equipment: located at the bottom of the storage equipment, which collects leachate from the solid waste
- Leachate Storage Pond: Stores leachate obtained by the leachate collection equipment which is then evaporated
- Rainwater Discharge Equipment: Located surrounding the storage equipment, and prevents rainwater flow into the storage area
- Road: For maintenance, built around the storage area
- Gate and Fence: To keep out intruders and prevent scattering of the solid waste

Operation and Maintenance

In order to prevent any secondary pollution from the landfill, such as solid waste scattering and odor diffusing a soil covering will be carried out every day. Also scheduled monitoring will be carried out during operations.

2) Waste Transfer Station / Material Recycling Facility (MRF)

Basic Policy

The civil work for the waste transfer station and construction of the MRF are to be implemented in Jericho. These facilities are planned so that the structures can unify these functions. The waste transfer station will be fully functional after the completion of the sanitary landfill construction in Ramallah but the compaction unit (mechanical equipment) for this facility will not be installed during this project. The reason is to prevent mechanical deterioration of the equipment which will be unused, so that only the installation area will be set aside so that Jericho can install it at the appropriate time when it is prepared to do so. The facility is to be only used for recyclable material being separately dumped into the stockyard of the MRF at this stage. In addition, it shall be designed to also accommodate the installation of a belt conveyor by Jericho when the amount of material to be recycled increases.

Basic Structure

The area of the waste transfer station is being prepared with sufficient space being set aside to accommodate collection vehicles with bumping posts being installed for safety during unloading. Also the area considered for the transportation trailers in the future will be set aside with sufficient space for the to move about. The structure of the MRF will consist of a steel framework with a roof in order to prevent rainwater entry, also retaining walls will be installed along with working traffic lanes.

Basic Facility

The waste transfer station will be divided into unloading and loading areas. No mechanical equipment is being installed by this project. The MRF will be divided into a stockyard, a sorting area and a storage area. Electricity will be supplied for lighting as well as in anticipation of the belt conveyor and compaction unit to be installed in the future.

4-1-2 Basic Policy of Supply Conditions

(1) Supply of replacement parts

The supplied equipment is being transferred via Israel to Palestine, this is a special circumstance and the time required for inspection and approval by the Israeli government is hard to estimate.

Therefore replacement parts which are difficult to procure at the site shall be obtained only for one (1) year. On the other hand, any consumable items which can be alternatively found in the region will not be supplied by the project.

(2) Policy of Manufacturing Country and the Supplying Country

This project is a grant aid project funded by JICA, hence the supplying country should be Japan or the donor country. However any EU country also should be considered due to expectation that there will be no manufacturing in the recipient country and in case of difficulty of supply by any Japanese company.

(3) Policy of Separate Orders

It is also possible to consider separate orders because the project also includes equipment supply of collection vehicles and construction work. However, no benefit can be found in utilizing separate orders because the main costs come from equipment supply, thus successful tendering may be carried out by the participating companies. The construction work is not included in any special work, and it is possible to have this work done by any sub-contractor under the equipment supplying company. Therefore this project is not considered as needing a separate order policy.

4-1-3 Policy of Operation and Maintenance

The equipment and facilities procured by the project are to be supplied to the five (5) JCs managing solid waste through the MoLG. The project does not supply assistance for operation and maintenance because it is to be implemented by the JCs themselves. In fact maintenance of vehicles for solid waste collection is being implemented currently, even for some vehicles that are over 10 years old but are still being used.

4-1-4 Policy of Equipment Grade

The operation and maintenance capacities of the staff have been evaluated as high as shown in the section above which indicates that each JC is still using vehicles which have passed the 10 years age period. Higher grade and more efficient numbers of equipment are also possible to be supplied noting the fact, that equipment specifications which are difficult to maintain or have a lot of electronic devices should be minimized, considering the special circumstance involving procurement in Palestine.

4-1-5 Policy of Procurement Method and Construction Schedule

The procurement procedure in this project, following the usual policy of grant aid projects, shall be based on the implementation of open tendering by Japanese companies. However, it is also

possible to affect procurement by international tendering especially considering the EU because of the special circumstances in Palestine. The project schedule shall be determined by duly considering manufacturing period, transportation, approval and the permission procedures in Palestine, including inspection, commissioning and initial operation instructions.

4-1-6 Soft Components

The five (5) JCs targeted by this project have the capacity to use the equipment and facilities sustainably but soft components need to be also considered for greater efficiency especially separate collection of solid waste, awareness education for inhabitants, planning of solid waste management which should be implemented in order to contribute to "The National Strategy for Solid Waste Management (2010-2014)" in the West Bank of Palestine.

4-2 Outline of Specifications and Numbers of Unit

4-2-1 Specifications of Equipment

(1) 5m^3 Compactor Vehicles

1) Type: Plate type compactor
2) Number of Units: 7
3) Capacity: more than 5m^3
4) Loading weight: more than 4 tons
5) Container pick up: Hydraulic cylinder type
6) Container: 1.1 m^3
7) Hydraulic Operation: manual operation
8) Wastewater Tank: Required
9) Operation: Left hand drive, Manual Transmission
10) Drive: 4x2 Rear Wheel Drive
11) Engine capacity: More than 220HP
12) Exhaust Standard: Passes EURO V

(2) 8m^3 Compactor Vehicles

1) Type: Plate type compactor
2) Number of Units: 2
3) Capacity: more than 8m^3
4) Loading Weight: more than 6tons
5) Container pick up: Hydraulic cylinder type
6) Container: 1.1 m^3
7) Hydraulic Operation: Manual operation

8) Wastewater Tank: Required
9) Operation: Left hand drive, Manual Transmission
10) Drive: 4x2 Rear Wheel Drive
11) Engine capacity: more than 220HP
12) Exhaust Standard: Passes EURO V

(3) 12m^3 Compactor Vehicles

1) Type: Plate type compactor
2) Number of Units： 6
3) Capacity: more than 12m^3
4) Loading Weight: more than 6.0 tons
5) Container pick up: Hydraulic cylinder type
6) Container: 1.1 m^3
7) Hydraulic Operation: Manual operation
8) Wastewater Tank: Required
9) Operation: Left hand drive, Manual Transmission
10) Drive: 4x2 Rear Wheel Drive
11) Engine capacity: more than 250HP
12) Exhaust Standard: Passes EURO V

(4) 19 m^3 Compactor Vehicles

1) Type: Plate type compactor
2) Number of Units： 4
3) Capacity: more than 19m^3
4) Loading Weight: more than 10.0 tons
5) Container pick up: Hydraulic cylinder type
6) Container: 1.1 m^3
7) Hydraulic Operation: Manual operation
8) Wastewater Tank: Required
9) Operation: Left hand drive, Manual Transmission
10) Drive: 4x2 Rear Wheel Drive
11) Engine capacity: more than 250HP
12) Exhaust Standard: Passes EURO V

(5) 15m^3 Dump Trucks

1) Type: Rear Unloading Type Dump Truck
2) Number of Units: 2
3) Capacity: more than 18 m^3
4) Loading Weight: more than 11.5 tons
5) Hydraulic Operation: Manual operation
6) Operation: Left hand drive, Manual Transmission
7) Drive: 4x2 or 6x2 Rear Wheel Drive
8) Engine capacity: more than 250HP
9) Exhaust Standard: Passes EURO V

(6) 2 ton Dump Trucks

1) Type Rear Unloading Type Dump Truck
2) Number of Unit(s): 1
3) Capacity: more than 4 m^3
4) Loading Weight: more than 2.0 tons
5) Hydraulic Operation: Manual operation
6) Operation: Left hand drive, Manual Transmission
7) Drive: 4x2 or 6x2 Rear Wheel Drive
8) Engine capacity: more than 250HP
9) Exhaust Standard: Passes EURO V

(7) 1 m^3 Backhoe Loaders

1) Type: 1 m^3 class Back hoe loader 1 m^3
2) Number of Unit(s): 1
3) Loader Bucket Capacity: more than 1.0m^3(SAE Pile)
4) Engine Capacity: more than 90HP
5) Unloading Height: more than 2,600mm
6) Operation Room: ROPS type

(8) 19m^3 Grapple Cranes

1) Type: 19m^3 class Grapple Crane
2) Number of Units: 2
3) Dump Capacity: 18-19m^3
4) Engine Capacity: more than 90HP
5) With Hydraulic Crane
6) Operation Room: Left hand Drive

7) Exhaust Standard: Passes EURO V

(9) $10m^3$ Hook Lifts

1) Type: $10m^3$ class Hook Lift
2) Number of Units: 2
3) Engine Capacity: more than 90HP
4) With Hydraulic Crane
5) Operation Room: Left hand Drive
6) Exhaust Standard: Passes EURO V

(10) $32m^3$ Trailer and Hook Lifts

1) Type: $32m^3$ Container and Hook Lift
2) Capacity: 22-26 tons
3) Number of Units: 4
4) Engine: 4 Cycle, 6 cylinders
5) Operation Room: Left hand Drive
6) Exhaust Standard: Passes EURO V

(11) Skid Steer Loaders 60HP

1) Capacity: 680 kg
2) Maximum Hydraulic Pressure: 23,000 kPa
3) Maximum Hydraulic Flow: 104L/min
4) Number of Units: 5
5) Bucket Capacity: more than 2.0m3(SAE pile)
6) Engine capacity: more than 140HP
7) Operation Room: ROPS type

(12) Truck Excavators

1) Type: Hydraulic Hammer Type Excavator
2) Number of Unit(s): 1
3) Engine Type：Diesel
4) Output Power(Net)：more than 240HP
5) Weight in Operation: 35,000 kg

(13) Truck Loaders 180HP

1) Type: Multi-Purpose Truck Loader with Bucket
2) Number of Unit(s): 1
3) Engine type: Diesel with turbo Charger
4) Output Power (Net): more than 180 HP
5) Weight in Operation：20,000 kg

(14) Wheel Loaders 185 HP

1) Type: Multi-Purpose Wheel Loader with Bucket
2) Number of Unit(s): 1
3) Bucket: Multi- Purpose
4) Engine type: 4 cycle, 4-6 cylinders
5) Operation: Power Assisted Steering

(15) 1.1m^3 Containers

1) Type: DIN/European Standard Container Mild Steel, welding structure, without roof
2) Number of Units： 2,250
3) Thickness: 3 mm
4) Capacity: 1.1m^3 of Nominal capacity
5) Painting: Antirust Coating + Exterior Finish Painting
6) Wheel: 4 units
7) Attachment: Wheel - 2 units

(16) 4m^3 Containers

1) Type: DIN/European Standard Container Mild Steel, welding structure, without roof
2) Number of Units： 62
3) Thickness: 3 mm
4) Capacity: 4.0m^3
5) Painting: Antirust Coating + Exterior Finish Painting

(17) 8m^3 Containers

1) Type: Mild Steel, welding structure
2) Number of Units： 12
3) Thickness: 3 mm
4) Capacity: 8.0m^3
5) Painting: Antirust Coating + Exterior Finish Painting

(18) $10m^3$ Containers

1) Type: Mild Steel, welding structure
2) Number of Units： 25
3) Thickness: 3 mm
4) Capacity: $10m^3$
5) Painting: Antirust Coating + Exterior Finish Painting

(19) $40m^3$ Containers

1) Type: Mild Steel, welding structure
2) Number of Units： 16
3) Thickness: 3 mm
4) Capacity: $40m^3$
5) Painting: Antirust Coating + Exterior Finish Painting

4-3 Amounts of Equipment

Amounts of the equipment above are shown in **Table 2.41**.

4-4 Content of Construction Work and Specifications

Content of civil work and specifications are shown in **Table 4.1**.

Table 4.1 Outline of Civil Facility

Name of Facility	Specification, Size/Dimension
1. Sanitary Landfill(Jericho JC)	
1.1 Type or Landfill	Semi-Aerobic Sanitary Landfill Capacity: Approx. 50,000 m^3
1.2 Road in the site	Width：Five (5) meters Paving：Asphalt paving
1.3 Fence	Net Fence: Height=1.8 meters
1.4 Rainwater Discharge	U-shaped gutter：30 cm
1.5 Water Sealing	HDPC 1.5 mm
1.6 Leachate Collection	Main Pipe：400 mm(perforated), PVC Branch pipe：200 mm(perforated), PVC
1.7 Gas Exhaust	Drum Rubble Wall, PVC200mm
1.8 Leachate Treatment	Leachate Storage Capacity: Approx. 1,400 m^3 Water sealing：HDPC Two (2) mm
2. Material Recycling Facility (MRF)	
2.1 Structure	Steel Frame, RC
2.2 Building Area	Approx. 250 m^2
2.3 Sorting System	Hand Sorting
3. Waste transfer Station	
3.1 Structure	RC（height：four (4) meters、Width：18 meters）
3.2 Dumping Stage	RC Wall：Height: four (4) meters, Width: 18 meters
3.3 Working Area	Asphalt Paving: Approx.700 m^2

4-5 Outline Design Drawings

Outline design drawings are shown in **Figure 4.1** to **Figure 4.7**.

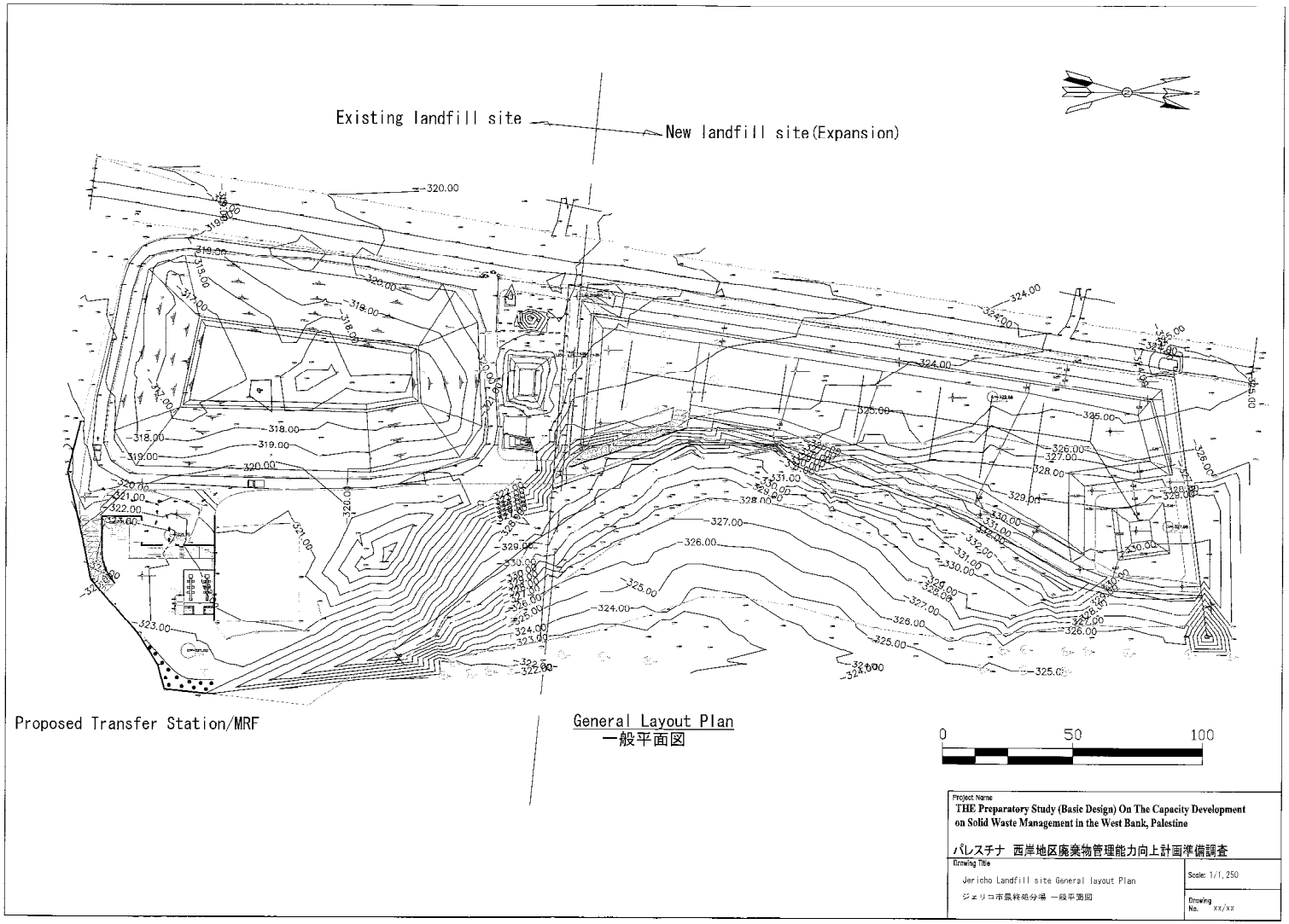


Figure 4.1 General Plan of Sanitary Landfill Expansion in Jericho

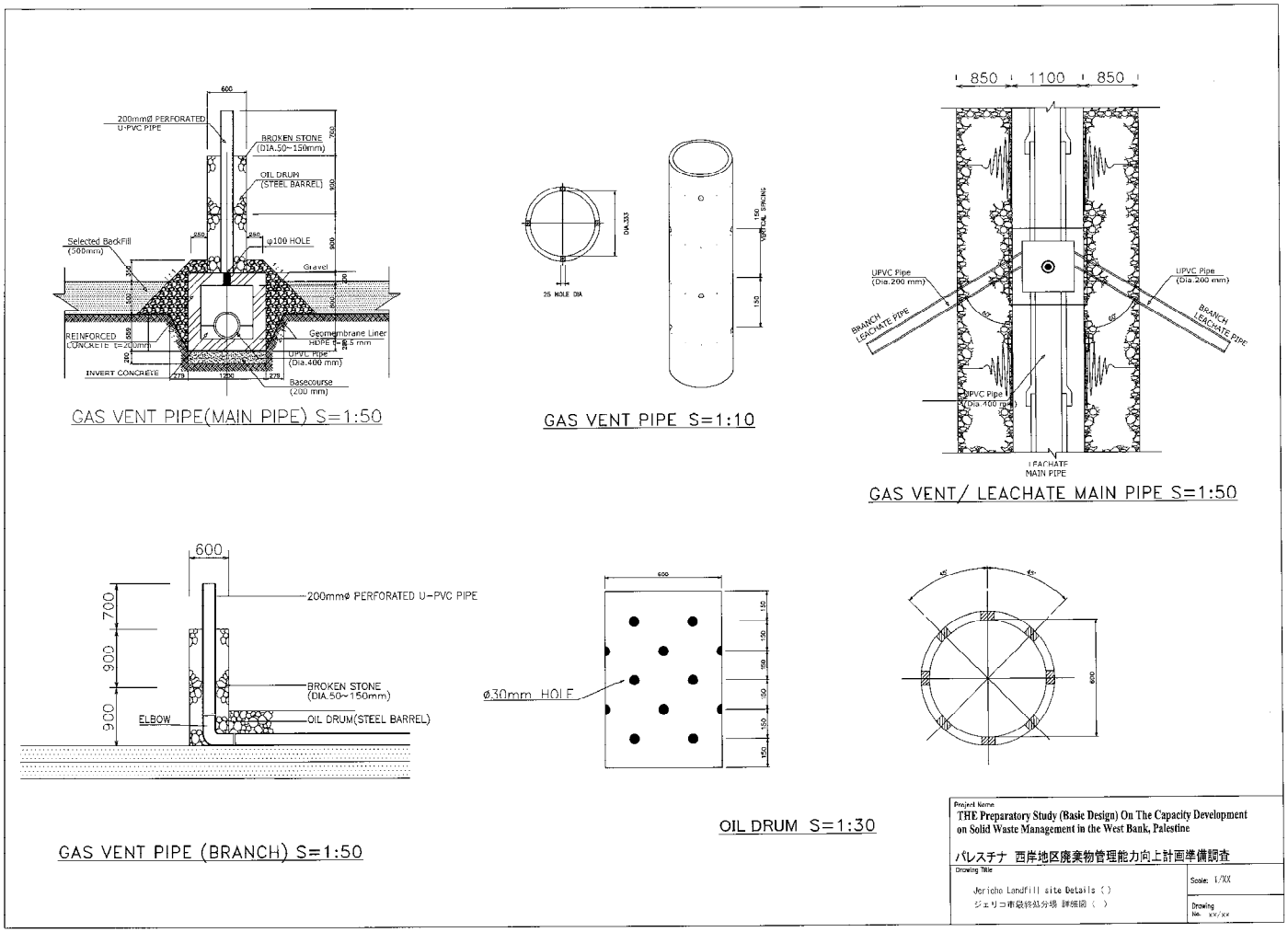


Figure 4.2 Detail Drawing 1 for Sanitary Landfill Expansion in Jericho

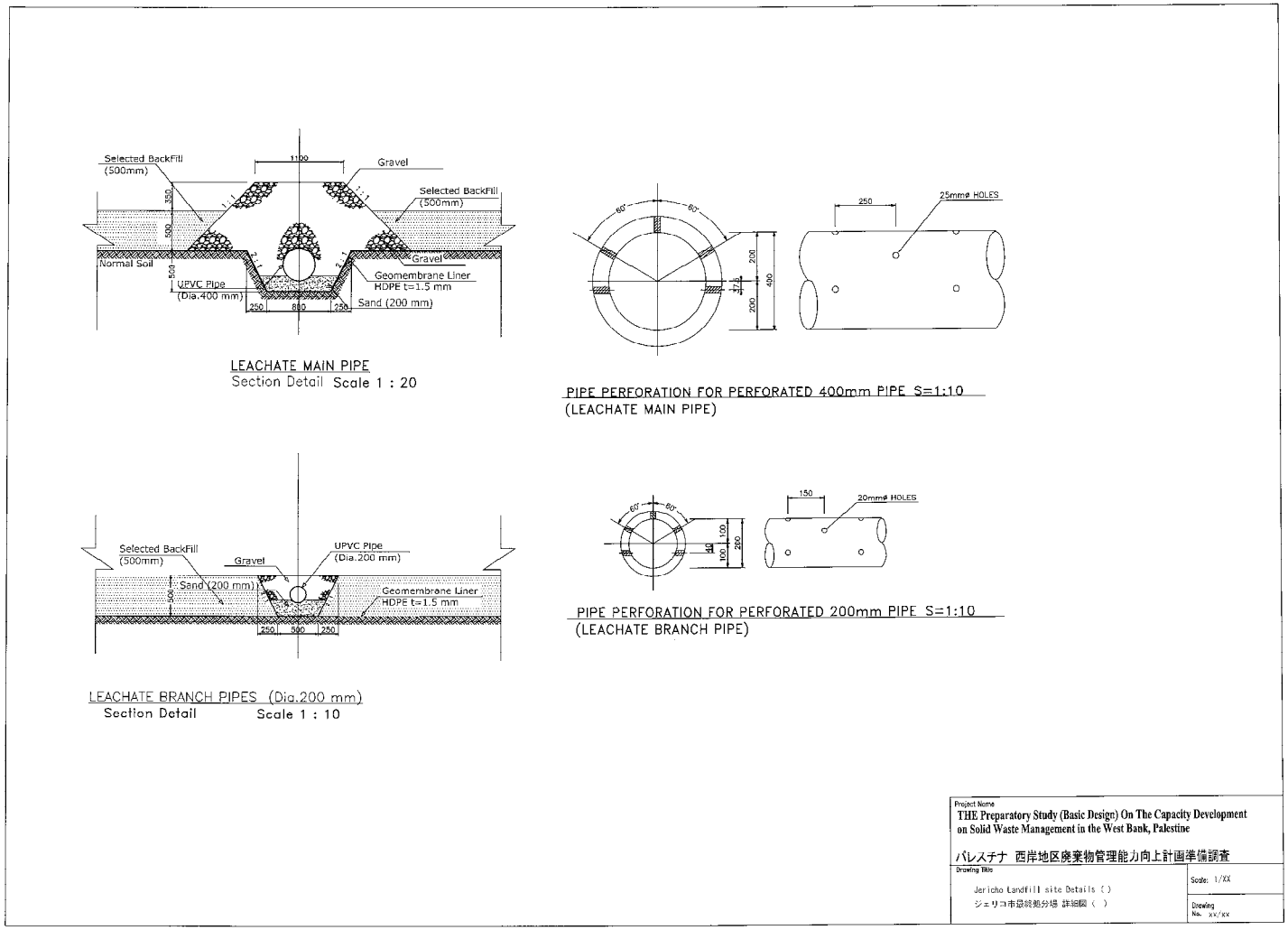


Figure 4.3 Detail Drawing 2 for Sanitary Landfill Expansion in Jericho

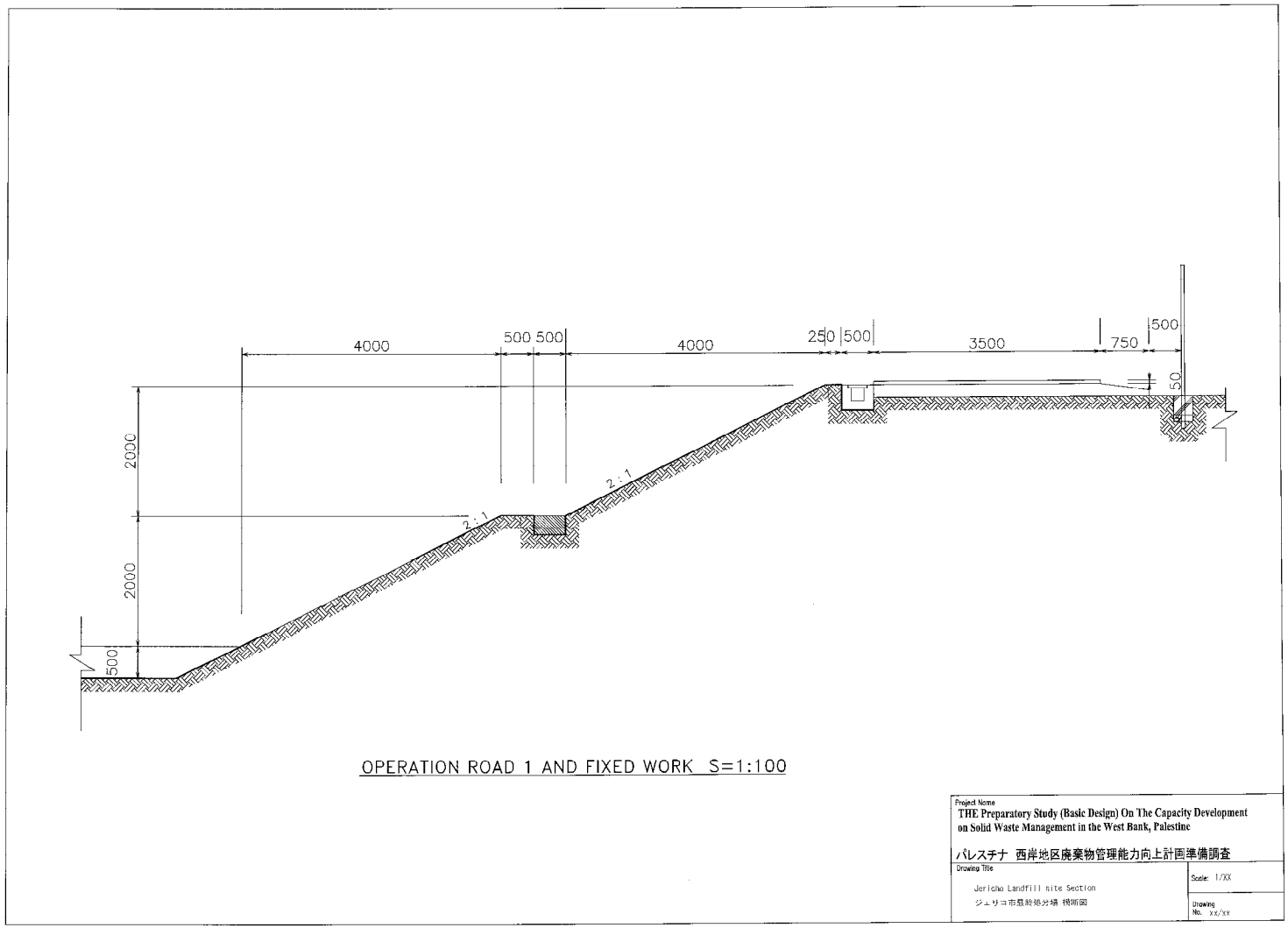


Figure 4.4 Detail Drawing 3 for Sanitary Landfill Expansion in Jericho

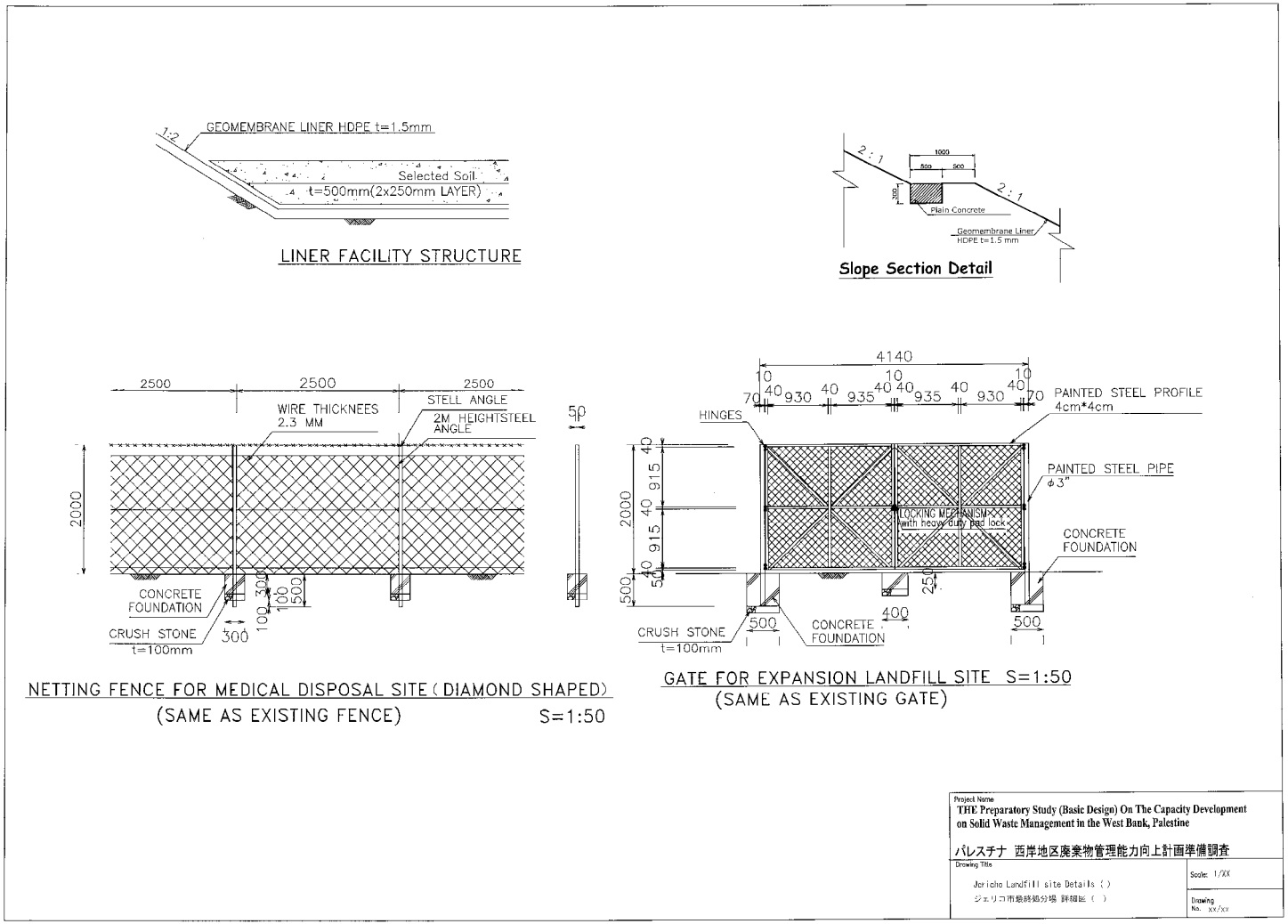


Figure 4.5 Detail Drawing 4 for Sanitary Landfill Expansion in Jericho

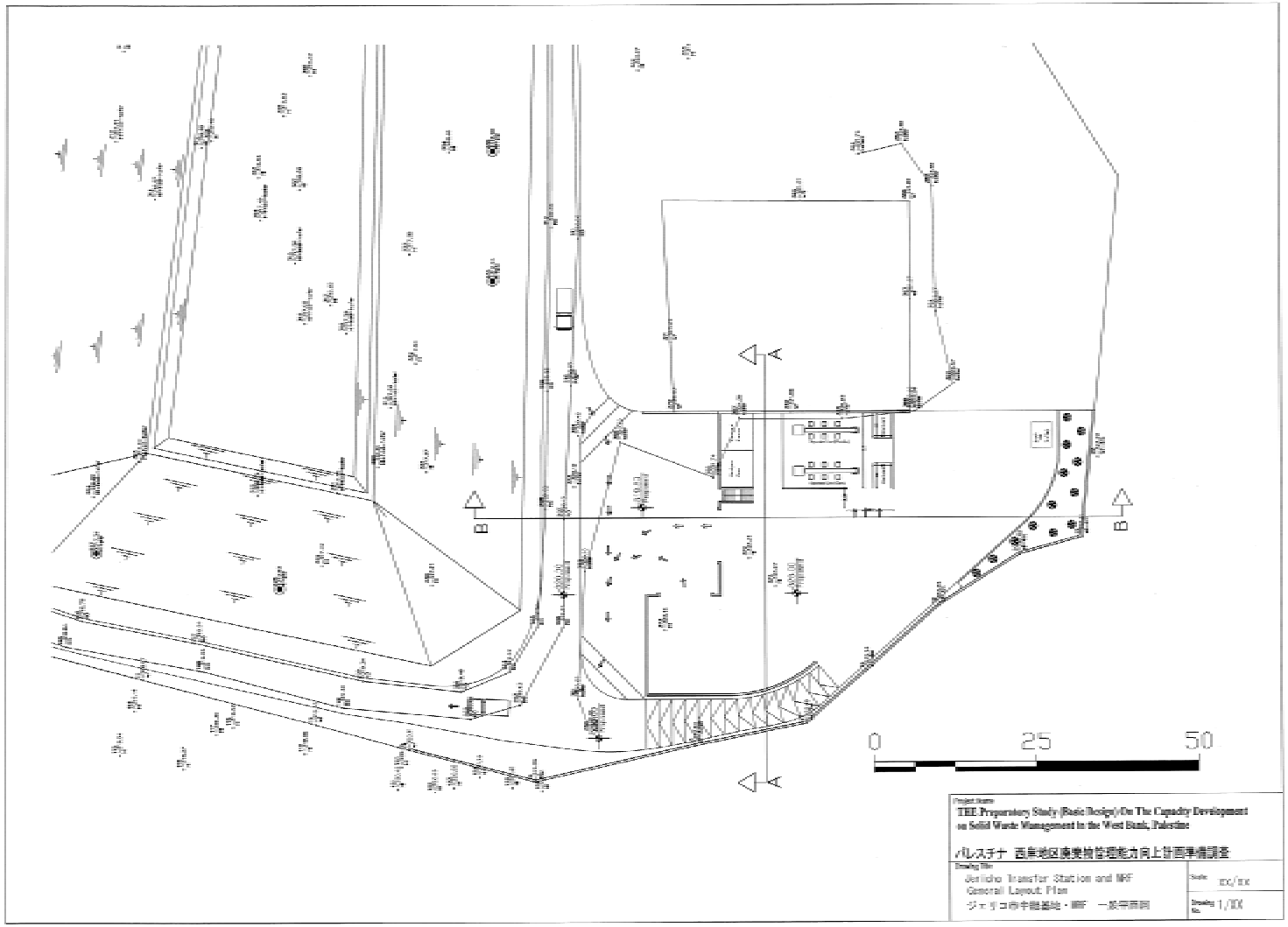


Figure 4.6 Layout Plan of Waste Transfer Station and MRF in Jericho

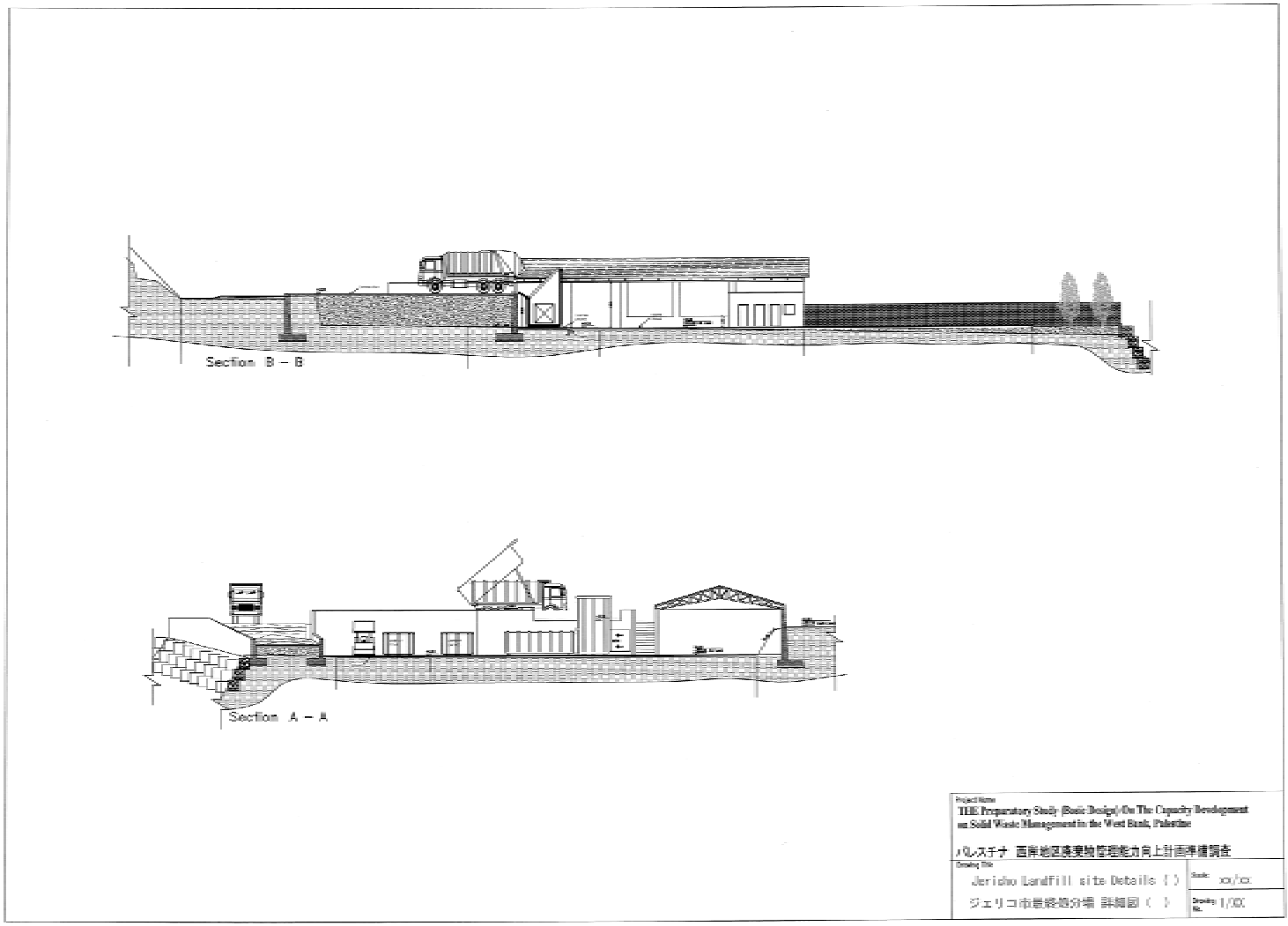


Figure 4.7 Cross Section Plan of Waste Transfer Station and MRF in Jericho

4-6 Work Plans / Supply Plans

4-6-1 Work Policy / Supply Policy

This project implementation follows the usual scheme of Grant Aid Projects by the Japanese government. The cooperation plan comes into effect after approval by the Japanese government and E/N conclusion by both countries. Subsequently, a Japanese consultant firm will be selected by Palestine and the detail design work starts. After completion of tender documents based on detail designs, a Japanese contractor selected by tender will carry out the equipment procurement and the civil work. Basic points and special considerations of project implementation are as follows.

(1) Project Operation Body

The responsible body for this project in Palestine is the MoLG. The MoLG as the responsible body for this project shall communicate and hold discussions with the Japanese consultant and contractor, making sure that the structure and total control organization for project implementation operates smoothly.

The direct implementation bodies for this project are the five (5) JCs doing solid waste management; namely Jenin, Hebron, Jericho, Salfit and Tulkarem. Each JC shall work for the project through communication and cooperation with each other and with the MoLG.

(2) Consultant

For equipment procurement by the Grant Aid project, the Japanese consultant, who is familiar with the standards and procedures for Grant Aid Projects, shall formulate and conclude a contract agreement for the project design and supervision with the Palestinian government and implement the detailed design work and supervision for the procurement. The consultant will also produce the tender documents and manage the tendering procedure as an agent.

(3) Contractor

As is normal for Japanese Grant Aid projects, the Japanese contractor who will be selected by open tender also supplies the equipment. The selected contractor should be chosen based on suitability after equipment supply because of the need for spare parts supply and repairing services in case of equipment malfunction.

(4) The Necessity for Engineer Dispatch

This Grant Aid project includes equipment supply and civil work for the waste transfer station for solid waste treatment. Therefore a construction supervision engineer shall be dispatched when the site work starts.

(5) Civil Work Policy for Natural Conditions

Jericho is an area within Palestine having little rainfall, the rainy season is in the winter season from December to February, and it hardly rains during the summer dry season from June to August. Reduction of work efficiency due to weather conditions does not need to be a factor to be considered because of the minimal rainfall experienced even during the rainy season.

(6) Civil Work Policy for Social and Economic Conditions

The holiday for public bodies in Palestine is only on Friday every week, working hours on other days is regularly from 8:00 to 14:30. Private companies also have their holiday on Friday but basically work for eight (8) hours a day. No regulations regarding working hours have been established, each company sets their own working hours; however compensation for actual hours worked is duly paid. Almost all the people are Muslim invariably going to mosque regularly, and praying several times a day even when it is impossible to go to mosque and this has not seemed to have any influence upon a company's work efficiency. However days of fasting and holidays after fasting shall be considered when the work plan is being formulated.

(7) Policy for Legal System and Standards

The sanitary landfill expansion work must be implemented only after the Initial Environmental Evaluation (IEE) has been approved by the Ministry of Environment Affairs (MEnA), the MoLG will implement the necessary work plan for the EIA and give the approvals after completion of detail designs.

(8) Utilization Policy of Local Contractors and Materials from the Local Market

Many construction works have been implemented in Palestine and local contractors have the necessary capabilities to build the sanitary landfill. Also materials required for the sanitary landfill construction work can be readily purchased in Palestine.

(9) Policy of Construction Methods, Procurement and Schedule

Based on the prevailing natural conditions, as well as the social and economic conditions mentioned above, the work schedule shall be established after considering organization of sufficient working groups and after adequate measures have been planned to address both quality control and safety controls.

4-6-2 Important Notices on Execution of Work and on Procurement Procedures

(1) Procurement Situation in the Region（Equipment）

The procurement situation for solid waste collection, transportation and sanitary landfill

equipment in the region is as follows.

- In the West Bank, no manufacturer of equipment for solid waste collection, transportation and material handling for sanitary landfills currently exists.
- In the West Bank, a solid waste container manufacturer having sufficient experience does exists.
- Israeli law and standards (essentially European standards) regarding automobiles is applicable in the region, therefore suitable vehicles must be provided.
- It may be a major consideration as to whether necessary spare parts are easy to acquire.

(2) Procurement Situation in the Region (Facilities)

Construction works to be executed in the local area will be as follows.

- It shall have to take into consideration public holidays (every Friday), national holidays established in Palestine and several holidays after fasting is over because the majority of the inhabitants are Muslim.
- Vehicular transportation shall be used in Palestine due to the fact that no railways have been developed.
- Value added tax (VAT) regarding import items and import tax can be exempted by predetermined procedures. However basically a tax refund will need to be applied for locally procured items.
- Recent price escalations in Palestine shall also have to be considered.
- No structural standards regarding the sanitary landfill and waste transfer stations have been established, the landfill is designed as a semi-aerobic type. The waste transfer station is designed with reference to the existing facility.

(3) Important Notices on Procurement Planning (Equipment Procurement)

All equipment for the project (except containers) not manufactured in the region must be imported from Japan or a third country. In particular vehicles, automobiles and related parts must meet Israeli laws such as their automobile approval standards, the supplying country shall be decided considering each manufacturer's supply capability.

Decisions about making the supplying country, responsible for maintenance after the project implementation, shall be considered if their products are in use in the West Bank, and the agent handling the products also exists in the West Bank. Vehicle types should be similar as possible in order to facilitate easy maintenance after project completion.

4-6-3 Sharing Responsibilities in Construction/Procurement/Installation

Sharing responsibilities between Japanese Government and Palestinian Authority are shown in

Table 4.2. The table is arranged for this construction work and necessity procedure, and is shown in **Table 4.3**. For implementing the project, the project shall be followed by the policy of 'Grant Aid program' of Japanese government.

Table 4.2 Major Undertakings to be taken by Each Government（General Items）

No.	Items	To be covered by Grant Aid	To be covered by recipient side
1.	To secure [a lot]/[lots] of land necessary for the implementation of the Project and to clear the [site]/[sites]		●
2. Construction(Sanitary Landfill Expansion, Transfer Station and MRF			
	1) The building	●	
	2) The gates and fences in and around the site	●	
	3) The road within the site	●	
	4) The road outside the site		●
3. Equipment			
	1) Containers, Compactors, Dump Truck, Grapple Transfer vehicles, Backhoe Loader, Wheel Loader etc	●	
4. To provide facilities for distribution of electricity, water supply and drainage and other incidental facilities necessary for the implementation of the Project outside the [site]/[sites]			
	1) Electricity		
	The distributing Power Line to the site		●
	The drop wiring and internal wiring within the site	●	
	The main circuit breaker and transformer	●	
	2) Water Supply		
	The city water distribution main to the site		●
	The supply system within the site（receiving and elevated tanks）	●	
	3) Drainage		
	The city drainage main (for storm sewer and others) to the site		●
	The drainage system (for toilet sewer, common waste, storm drainage and others) within the site	●	
5. To ensure prompt unloading and custom clearance of the products at the ports of disembarkation in the recipient country and to assist internal transportation of the products			
	1)Marine (Air) transportation of the Products from Japan to the recipient country	●	
	2)Tax exemption and custom clearance of the Products at the port of disembarkation		●
	3)Internal transportation from the port of disembarkation to the project site		●
6. Taxes and Duties			
	To ensure that custom duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the purchase of the products and the services be exempted		●
7. Others			
	1) To accord Japanese nationals 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 the recipient country and stay therein for the performance of their work		●
	2) To ensure that the facilities be maintenance and used properly and effectively for the implementation of the Project		●
	3)To bear all the expenses, other than those covered by the Grant, necessary for the implementation of the Project		●
8. To bear the following commissions paid to the Japanese bank for banking services based upon the B/A			

	1) Advising commission of A/P		●
	2) Payment commission		●
9. To give due environmental and social consideration in the implementation of the Project			
	1) Stake Holder meeting(if necessary)		●
	2) Implementation of IEE		●

(B/A: Banking Arrangement, A/P: Authorization to pay)

Table 4.3 Works to be undertaken by Each Government

Item	Type	Palestine	Government of Japan
Construction Work for Transfer Station, MRF and Sanitary Landfill Expansion	Procurement of Equipment and Materials		○
	Transportation in Palestinian Authority	○	
	Construction		○
	Land Acquisition	○	
	Installation of External Fence		○
	Installation of Power Line and Water supply	○	
Common	Improvement of Access Road (on site)	○	
	Attaining required approvals	○	

4-6-4 Plan for Work Execution Supervision and Procurement Supervision

(1) Plan for Supervision

This project must be implemented within the framework of Grant Aid projects by Japan. Therefore rules and standards required by the Japanese Grant Aid project shall be respected and it is the basic policy that the equipment shall be supplied in order to improve solid waste management capacity in the project site within the framework

(2) Work Content of Supervision

The consultant shall implement work execution by structuring a project team consistent with the requirements of the tender documents and supervision work based on the basic design policy. The work execution is shown in **Table 4.4** and shall be implemented following the equipment supply obtained through the Grant Aid project scheme.

The consultant is required to make arrangements for the identification of the personnel shown in **Table 4.5** in order to implement the execution of the work above.

Table 4.4 Work Content of the Consultant

Work Stage	Work Contents
Before Procurement Contract	- Production of Tender Documents - Tender Execution as the agent - Evaluation of Tender Results - Contract Procedure Support
After Procurement Contract	- Supervision of Schedule and Quality Control for Procured Equipment - Confirmation of Equipment Quality - Inspection before Shipping By Third Party - Confirmation of Contractor's contract procedure - Production of Work Report etc.

Table 4.5 Personnel Assignment Plan of the Consultant

Work Contents	Personnel Assignment
Preparation of Tendering Document	Project Manager Equipment Planning Engineer
Tender Execution as Agent	Project Manager Equipment Planning Engineer Quotation Engineer
Evaluation of Tender Results	Project Manager Equipment Planning Engineer
Contract Procedure Support	Project Manager Equipment Planning Engineer
Supervision of Schedule and Quality Control for Procured Equipment	Procurement Supervision Engineer
Confirmation of Equipment Quality	Inspection Engineer
Inspection before Shipping by Third Party	Inspection Engineer
Confirmation of Contractor's contract procedure	Procurement Supervision Engineer
Generation of Work Reports etc.	Procurement Supervision Engineer Inspection Engineer

(3) Plan for Work Execution Supervision

The project shall be implemented within the scheme of the Grant Aid project by Japan. Therefore will be observing the relevant regulations and the standards required of Grant Aid schemes in Japan., The basic policy is defined as the procurement of necessary equipment to improve solid waste management capacity in the project site within this scheme.

The consultant shall implement the work execution by structuring a project team consistent with the production of tender documents and supervision work based on the basic design policy.

4-6-5 Quality Control Plan

(1) Quality Management Plan (Equipment Supply)

As a quality management plan, the relevant schedule control and quality control are described below.

1) Schedule Control (Equipment Supply)

As schedule control based on the factory management of the equipment suppliers, the consultant shall confirm the working process by means of the suppliers' reports, and caution about the work schedule, if necessary. The schedule control of equipment supply by the consultant is planned for implementation as follows.

- Considering the time required from the Grant Aid scheme and the time required for any manufacturing of the equipment, the work schedule plan will allow for the necessary period and set sufficient time duration for equipment supply conditions. The work schedule will be shown in the tender documents.
- The schedule proposed by the supplier during the tender shall be confirmed enabling sufficient time to meet the schedule deadlines.
- The progress situation of the work will be confirmed through comparison between the planned schedule and actual result met by the supplier.
- In case the work schedule of the supplier is significantly delayed, due warning will be given to the supplier to meet the established deadline. In addition suitable countermeasures to meet this eventuality will be studied and proposed if necessary.

2) Quality Control (Equipment Supply)

The equipment supplied by the Grant Aid project will be manufactured at the supplier's factory. Therefore quality control will be based on the supplier's factory control. The consultant will confirm the quality by the performance inspection at completion of supply. The quality control by the consultant is planned to be implemented as follows.

- The mechanical specifications based on the basic design will be described in the tender documents.
- The equipment proposed by the supplier is confirmed to meet with and satisfy the specifications defined by the tender document.
- Any detailed part of the specifications which are not described in the tender document may be confirmed by approval documents given by the supplier.
- The equipment quality is confirmed before delivery to the site through the quality inspection at completion in the factory and/or the reviewing of the inspection result report. Any modification of the equipment may be suggested to the supplier.

(2) Quality Management（Facilities Construction）

As a quality management plan, the schedule control and quality control are described below.

1) Schedule Control（Facilities Construction）

This Grant Aid project will include the construction work for the landfill and the MRF. Therefore the function of the consultant is classified as supervision over the construction work. The consultant shall confirm the progress of the working process by the contractor's reports, and caution about any deviations of the work schedule if necessary. The supervision over the construction work by the consultant is planned through the following implementations.

- Considering the time required from the Grant Aid scheme and the time required for manufacturing the equipment, the work schedule plan will set necessary and sufficient time durations that need to be made for the equipment supply conditions. The work schedule will be shown in the tender documents.
- The schedule proposed by the contractor at the time of the tender shall confirm whether sufficient time has been set to meet the schedule deadlines.
- The progress situation of the work will be confirmed through the comparison between the planned schedule and the actual result met by the contractor.
- In case the work schedule of the contractor is significantly delayed, due warning will be given to the supplier to ensure meeting the established deadline. In addition suitable countermeasure to meet this eventuality will be studied and proposed if necessary.

2) Quality Control（Facilities Construction）

The quality control by the consultant is planned through the following implementations.

- The design document based on the basic design will be described in the tender document.
- Any detailed part of specification which is not described in the tender document may be confirmed by the approval document supplied by the contractor.
- At the construction site, attention to quality inspections will be implemented in addition to daily supervision work.
- The final quality will be confirmed through a completion inspection, any modification of the equipment may be suggested to the contractor.

(3) Safety Management（Facilities Construction）

Safety information in the West Bank of Palestine will be collected from the JICA office in Palestine and the Japan Embassy. Safety measures for the construction work are taken as follows.

- To obtain advice from suitable counterparts for safety and smooth construction work.
- To share the safety information with any donor operating in the West Bank of Palestine.

- Generally security in the West Bank of Palestine is good. There will be no problem for activities taking place during the day. However accommodation of workers in Palestine needs to pay particular attention to safety. Therefore it is required that workers live in an apartment or a hotel with sufficient guards. Living in common individual housing will not be recommended.
- To attach a suitable mark like a logo on the supplied vehicles in order that they be identified as part of the Japanese assistance project.
- At present, in some parts of Israel and Palestine there is a state of tension, so it may be assumed that unforeseen situations may occur. In anticipation of such a situation, preparation of suitable evacuation routes and availability of satellite phones shall be considered during the construction work.
- To prepare for such contingencies, these will be part of the Basic Operating Guidelines (BOG) given to construction workers.

4-6-6 Equipment Supply Plans (Equipment Supply)

4-6-6-1 Equipment Selection

(1) Equipment supply Plan

Considering the difficulty of procurement in Palestine and state of after-sales service by the supplier, equipment procurement plan is as follows. Since solid waste collection/ transportation equipment and heavy machinery are not produced in the Palestine Authority area, they need to be procured from a third country. For procuring vehicles (chassis) for this project, there is no Japanese automobile distributor presently operating in the West Bank. For this reason, the vehicles are planned to be procured from a third county. Gas emission standards for vehicles in Israel comply with the ones in the EU. For this reason, the EU area is considered as a suitable third country where vehicles will be procured. For procuring of vehicles (auto bodies), as there is no distributor for auto bodies for compactors and procured vehicles they are expected to be procured from a third county with whom local chassis distributors are able to make contact with.

For dump trucks which have a relatively simple auto body structure it is planned to procure such vehicles through a combination use of local supplier and third country procurement. If Japanese manufactures establish a distributor in the West Bank, these manufacturers will be one of the candidates who will be considered under this project.

With respect to procuring construction machinery, there are few Japanese manufacturers in the West Bank. In the interests of having fair competition on this project, procurement from a third country is also being considered in this project. Containers for solid waste can be fabricated and may be procured in the West Bank. Consequently, containers are designed to be procured in the local market.

Expected equipment procurement country for this grant aid project is shown on **Table 4.6**.

Table 4.6 Equipment Procurement Country

Procured equipment	Procurement country		
	P.A	Japan*	Third Country
1. Collection vehicle/ conveyer of solid waste			
Container： 1.1m^3	○		
Container： 4.0m^3	○		
Container： 8.0m^3	○		
Container： 10m^3	○		
Container：40m^3	○		
Compactor：5m^3		○	○
Compactor：8m^3		○	○
Compactor：12m^3			○
Compactor：19m^3			○
Dump Truck：15 m^3			○
Dump Truck：2 ton		○	○
2. Heavy Machineries			
Backhoe Loader：1m^3		○	○
Gfrapple crane：19m^3		○	○
Hook lift：10m^3		○	○
Trailer and hook lift：32m^3		○	○
Skid steer loader：60HP		○	○
Truck excavator：240HP		○	○
Truck loader：180HP		○	○
Wheel loader：185HP		○	○

Note* in case any Japanese manufacturers establish branches in West Bank.

Containers and a portion of compactors will be procured in the local market. Other compactors, transfer vehicles, heavy machinery and other equipment will be procured in the local market or from Japan. However, vehicle procurement from a third country will be considered if needed in the light of gas emission regulations in Palestine. Necessary quantities for each item are determined by taking into account investigations and studies carried out by the MoLG and each JC, as well as quantities of equipment procured in the past by foreign donors.

Quantities of equipment procurement are determined as follows.

1) Containers

Investigations and studies carried out by the MoLG and each JC were taken into account. Considering necessary containers for each JC the volume of solid waste in future was considered and necessary quantities of containers have been determined. Specifications of container's volume for this project were decided as 1.1m^3, four (4) m^3, eight (8) m^3, 10 m^3 and 40 m^3.

Each volume and quantity of container is shown in **Table 4.7**.

Table 4.7 Volume and Quantity of Required Container

Container Volume	Quantities
1.1m^3	2,250
4 m^3	62
8 m^3	12
10 m^3	25
40 m^3	16

2) Compactors

Japanese compactors have been provided in past Grant Aid projects. However, the volume of these compactors is categorized as relatively small. The respective volumes of compactors supplied by this project are planned to be five (5) m^3, eight (8) m^3, 12 m^3 and 19 m^3. Exhaust standards in Israel are identical to the ones in the EU. Since it is difficult for Japanese manufactures to produce vehicles that comply with the EU exhaust standards, the vehicles are needed to be procured from the local market or a third country. Procured numbers and volumes of the necessary compactors are shown on **Table 4.8**.

Table 4.8 Required Numbers and Volumes of Compactors

Compactor Volume	Quantities
5 m^3	7
8 m^3	2
12 m^3	6
19 m^3	4

3) Transfer Vehicles

Transfer vehicles and heavy machinery are planned to transship collected solid waste by compactors to large containers. A Dump truck (15m^3) and a two (2) ton truck will be procured in this project. The purpose of the dump trucks (15m^3) is to transfer solid waste, and the purpose of the two (2) ton truck will be to collect recyclable wastes such as cans and plastics in Jericho. A backhoe loader and a grapple crane are also to be procured for trans-shipping solid waste from the transfer station. In addition a 10 ton Hook lift will be procured for collecting garbage from vegetable markets And a 32 ton hook lift will be procured for transferring solid waste from the transfer station to the final landfill site. These vehicles are to be procured from a third country as will the procured compactor.

The quantities and specification of procured transfer vehicles are shown in **Table 4.9**.

Table 4.9 Quantities of Procured Transfer Vehicle

Item	Quantities
Dump Truck：15 m^3	2
Dump Truck：2 ton	1
Backhoe Loader：1m^3	1
Grapple crane：19m^3	2
Hooklift：10m^3	2
Trailer and hook lift：32m^3	4

4) Heavy machinery

Heavy machinery will be procured in this project. Mainly, Skid steer loaders are to be procured for cleaning up scattered garbage on the final landfill site and the transfer station. A wheel loader and an excavator is to be procured for expanding the final landfill site by one of the JSspds. Procurement for these heavy machineries is considered to be from a third country. This also applies to the procuring of compactors. Quantities and specification of procured machinery vehicles are shown in **Table 4.10**.

Table 4.10 Quantities and Specifications of Procured Machinery Vehicles

Item	Quantity
Skid steer loader：60HP	5
Truck excavator：240HP	1
Truck loader：180HP	1
Wheel loader：185HP	1

(2) Spare Parts and Consumable Items

Spare parts of containers, compactors, transfer vehicles, heavy machinery are to be procured in this project. This will service equipment needed for collection and transfer the garbage which will be utilized almost every day. Spare parts will need to be provided and the initial spare parts for each vehicle will be procured in this project. However, spare parts for other equipment are not planned in this project.

(3) Coverage of Procured Spare Parts

Necessary consumables and annual spare parts for machinery working will be procured in this Grant Aid project. Spare parts needed after the finishing of the Grant Aid project are not covered in the project, and they will need to be procured by the Palestinian side through their own efforts.

(4) Supplier's Guarantee

The causes of some defects seen in utilized equipment after one year are difficult to specify. Therefore, some defects arising within a year after procuring machines from the supplier and

manufacturers are guaranteed to be fixed free and/or exchanged by the supplier and manufacturer except when caused by inappropriate operation, management and accident. After procuring equipment, obtaining spare parts in the future would be difficult when models are changed by manufacturers. The supplier is obliged to supply adequate spare parts at general commercial prices at least for 10 years after delivery of the equipment.

4-6-6-2 Transportation Plan

The West Bank is located inland and there is no trading port. Procured equipment from Japan or a third county will be discharged at the trading port in Israel. Typical trading ports in Israel include the Ashdod Port, which faces the Mediterranean Sea or the Eilat Port which faces the Red Sea. Usage of both ports is needed to be considered based on the transport boat schedules and location of the country of origin.

After discharging equipment from Japan / third country at Israeli ports, they will be transferred by cargo trucks. Containers will be delivered from the manufacturer's factory to each of the JCs in the West Bank.

4-6-6-3 Installation Plan

This project does not include any kind of installation work.

4-6-7 Construction Plan (Civil Work)

4-6-7-1 Work Policy

The implementation agent in Palestine for this project is the Ministry of Local Government but the Jericho JC is responsible for the civil works.

The Consultant will hold discussions with the Jericho JC from the detailed design stage and will select a suitable person as a counterpart.

Roles of the counterpart are as follows;

a. coordinating with the Jericho JC on this project
b. communicating and coordinating with the relevant departments in Palestine
c. communicating and coordinating with the external agencies related to this project.
d. coordinating approval of the design works, and tenders as the counterpart for the Consultant
e. Coordinating any additional investigations or tests, if necessary

The consultant will conduct detail design, tenders and supervision on this project for promoting the smooth progress of the project, and will ensure completion of the work within a certain period of time. Therefore, the consultant will dispatch a supervisor on site to work as a representative for the MoLG. Technical specialists such as civil, mechanical and electrical engineering fields will also be dispatched for supervising the construction work at certain periods.

In implementing the construction work, a Japanese contractor will work on this project and engineers from Japan will be dispatched and supervise the construction work. The capacity of the construction industry in Israel, adjacent to Palestine is relatively high and the capability level of the industry is the same as in developed countries. Due to these circumstances, the capacity of the construction industry in Palestine is quite developed. In view of the number of civil construction/building works being done in Jericho and the surrounding areas, construction materials would be able to be procured properly and the capacity of local sub-contractors would be sufficient for this project.

4-6-7-2 Points concerning the Construction Work

Selection of locations for the site offices and warehouses for construction materials will be decided after discussions with the Jericho JC and before construction work commences. Some parts of the existing landfill site can be utilized for the above-mentioned facilities during construction for the expansion of the Jericho Landfill site. Local sub-contractors are capable of undertaking basic architectural works and the quality of materials and finishes of the work need to be supervised. General conditions and safety control for construction work are shown as follows;

(1) General Information

a. To respect and take into consideration the fact during the project execution that Fridays are public holidays. A number of holidays will be taken after Ramadan in accordance with the Muslim calendar. The national holidays are also to be respected and their dates are to be verified.

b. Basically, construction materials will be transported by vehicles in Palestine. There being no railway in Palestine.

c. The total annual rainfall amount is very small, and has ranged on average from 50mm to 400mm in recent years. The climate in the municipality is divided into two seasons; the rainy season, which is from October to March, and the dry season, which is from April to September. In the rainy season, it usually rains from evening to morning or from afternoon to evening. In the dry season there is virtually no rain fall. Normally it is expected that there will be no disturbances caused by rain fall at the construction work sites throughout the year. In implementing the construction, a decrease of efficiency in the work program may occur on days when precipitation is more than 10mm/day and this will only occur predominantly in the rainy season

d. It is assumed that approval of an EIA will be necessary for building the landfill site in Jericho during this Project.. The EQA which is responsible for authorization of approvals on environmental issues will decide whether an EIA or IEE is necessary for this project based on its screening actions. Therefore, the MoLG needs to apply for approval of the necessary procedures as the project implementation body. For constructing the landfill site, transfer

station and MRF, an environmental management plan and a solid waste management plan are necessary. Restoration of the construction site and material storage space, dust, noise and how to treat leachate water are needed to be taken into account in compliance with relevant environmental laws in Palestine. The application for Approval of Environmental Impact Assessment (EIA) for implementing this project had already been submitted to EQA by PWA. It will need to be approved by EQA with some comments by August. The Project including the construction of the WWTP is designated as a 'category B' project by JICA, which requires the application of adequate environmental and social considerations. An Environmental Management plan and a Solid Waste Management plan will be prepared and implemented during the construction phase. Especially, during the construction stage environmental protection measures will be planned and instituted including mitigation of dust and noise pollution; turbid water treatment and solid waste disposal according to the relevant environmental laws applicable in Palestine.

e. Recent price escalation rates in the Palestine market also needs to be considered. It was Determined as being [Five (5) percent in 2011, and Six (6) percent in 2010 in the Gaza area (The World Fact Book, CIA)]

(2) Safety management information

Local safety information applicable to the Jericho Municipality and the surrounding areas will be collected from the JICA Palestine Office and Embassy of Japan in Tel Aviv, and suitable safety measures in the construction stage will be instituted as follows;

a. Generally, updated advice for safety and necessary precautions that need to be adhered to shall be obtained from local counterpart authorities.
b. Contact will be made with other donors who work closely with the Jericho Municipality and the surrounding areas. Safety information shall be shared amongst each other.
c. In general, the areas inside the Jericho Municipality and its surrounding areas are considered relatively safe, and there is no danger in working during the daytime. However, extra attention would be needed for worker safety with regard to accommodation facilities. Therefore, sufficiently guarded hotels or apartments will need to be considered for accommodation, and detached houses will not be recommended.
d. All construction vehicles shall have stickers that identify this project as being supported by Japan.
e. The Government of Israel and a part of the Palestine Authority are in a state of tension currently. As an expected contingency in case of such disputes, suitable evacuation routes and availability of satellite phones should be considered during the construction phase. The Basic Operating Guideline (BOG) for construction workers should be amended and publicized to take into

account any unexpected contingencies.

(3) Others

a. Procurement of cement

Cement for concrete mixing is readily distributed and easily purchased in the local market. The quality of the cement shall be confirmed as regards its resistance to saline concentrations, which may affect the long-term durability of the concrete.

b. Procurement of Re-bars

There is a manufacturer of reinforce bars in the Jericho Municipality. It is therefore easy to source re-bars in this area.

c. Procurement of form works.

This is also widely distributed and easily purchased in the local market in Palestine.

d. Procurement of aggregate and sand

Aggregate is made by crushing stones collected from the surrounding mountains in Palestine, and sand is collected from deserts which is an abundant resource. Proper particle size of the aggregate shall be confirmed in accordance with the stated specifications.

e. Transportation cost

The Palestine Authority shall be required to agree to accept in-land transportation costs in Palestine as shown in Table 4.12.

f. Fluctuations of exchange rate of the New Israel shekel (NIS)

The New Israel Shekel fluctuates at around 21 Japanese Yen per NIS on average as of the beginning of 2011. It has been stable recently. However, attention should be paid to trends in the exchange rate in future.

4-6-8 Initial Operation Instructions and Operation Plans

(1) Adjustment and Commissioning Plan

Since all equipment will be totally fabricated, there will be no adjustment and commissioning work for procured equipment. Some parts for heavy machinery may be taken out for transportation but it is considered that reinstallation for these parts will be part of delivery. The schedule for reinstallation and adjustment for machinery is not included in this plan.

(2) Initial Operation Instruction Plan

Most of procured equipment is normally used and is generally that which the Palestinian side is accustomed to. Therefore, relatively few instructions and due considerations for maintenance will be needed, but this is also a part of delivery. Therefore, special instruction for initial operations and maintenance are not necessary in this project.

(3) Operation Plan

For improving solid waste management on this project, the improved efficiency of solid waste collection and implementing an effective operation with the procured equipment will be a necessary outcome for this project. This type of technical assistance is done by the Technical Transfer Program.

(4) Inspection Plan

Inspection and submission of the equipment are planned as follows in this project.

1) Inspection by the supplier

a) Factory inspection

Quality, condition and performance of the assembled machinery in the factory are to be inspected in the factory. Especially, confirming the lifting capability of a container unit by each compactor is needed to be inspected. A total inspection will have to be done except for spare parts for each piece of machinery. For spare parts inspection, random inspection for each spare part will be done based on the manufacture's quality assurance system.

b) Inspection before shipment

Items and quantities of the equipment are confirmed before packing for shipment.

c) Verification before loading

The supplier will prepare verifications before loading which will be checked by the Consultant, and the supplier will attest the verification.

2) Inspection by the Consultant

a) Factory inspection

The Consult will re-check the result of the factory inspection. Especially, random inspection for the compactors at the assembly factory will be done, and the consultant will verify the result of inspections from the factory. At the same time, the Consultant will confirm the documents submitted by the supplier during the Tender/ after making the contract.

b) Inspection before shipment

A third party inspection will be employed by the Consultant to conduct verifications before landing. The inspection will include features such as quantities and packing condition of procured equipment and the party will verify that the cargo is on-board as mentioned on the contract.

c) Acceptance inspection for delivering on-site

The Consultant will confirm that the contracted items are delivered after the equipment arrives on site. The Consultant also will check for damages and if he finds any whether the

accident occurred during transportation, and instructs the supplier to repair the equipment for free. The Consultant will confirm that the supplier completed the required work including instructions on how to operate and maintain the procured equipment.

(5) Instructions for regular maintenance on the equipment

Vehicle maintenance in Japan is regulated by inspection and maintenance manuals governed by the Ministry of Land, Infrastructure, Transport and Tourism in Japan. The inspection and maintenance items apply for certain specific periods e.g. every one month, three months or every year as indicated in the guidelines. The procured machinery working for solid waste management, is part of the public service, thus specific inspection and maintenance plans are needed to be referred to in the manual on this project. However, the operating conditions are different for each vehicle, therefore it is ideal for inspection and maintenance of the machinery to be conducted based on mileage, and not based on how long the vehicle has been used for. The contents and frequency of necessity regular check-up is shown in **Table4.11**.

Table 4.11 Sample Maintenance Schedule for Vehicles

No.	Item	Millage	Contents
1	Minor maintenance	Every 3,000km	To maintain power lines, hydraulic systems, electric components and underbody. Precautions that need to be taken are important maintenance works.
2	Average maintenance	Every 12,000km	Abrasions, deformation, cracks and damage vary by each working situation. Thus, average maintenance is to be conducted every 12,000 km on Engine, power transmission devices and underbody and hydraulics that may need to be adjusted or exchanged. These maintenance activities need to be conducted in a workshop. Hydraulic systems and plate painting also need to be conducted.
3	Major maintenance	Every 36,000km	The contents of maintenance are the same as for average maintenance. Brake systems, clutch systems and underbody (especially springs) are focused on during this maintenance.

Inspections of the construction machinery are needed to be conducted not only on a daily basis but also periodically at certain operation times. Inspection and maintenance of machinery need to follow procedures outlined in maintenance manuals. The contents of inspection and maintenance for construction machinery are shown in **Table 4.12**.

Table 4.12 Sample Maintenance Schedule for Construction Machinery

No.	Item	Contents of inspection and maintenance
1	Daily maintenance	Operator checks, cleans and puts fuel and coolant after finishing daily operations.
2	Weekly maintenance (Every 50 hours)	Operator checks parts which he can't inspect during daily checkups, including oil and elements.
3	Monthly maintenance (Every 250 hours)	Operator exchanges consumables and checks the parts which he can't inspect during weekly checkups.

The practical serviceable years for machinery vary on usage conditions and how much they are utilized on site. However, provisions for a renewal plan for solid waste management equipment need to be considered on average every 10 years with due thought being given to the renewal of vehicles and construction machinery.

(6) Instruction for spare parts preparation

Necessary periodic spare parts for one year after the delivery are to be procured in this project. Spare parts for the second year after delivery will be needed to be procured by the Palestinian side on their own. Items of spare parts that are needed require a plan based on operational conditions and utilization conditions of the machinery. Therefore, a budget, which is approximately 2.5percent of the total machinery cost, is needed on average to secure required spare parts every year.

4-6-9 Implementation Schedule

After obtaining signed Exchange Notes by both the Governments, the Consultant will conduct a detailed design. (1) Tender/procurement contacts and (2) procurement will then be conducted.

(1) Tender documents/Making the Contract

The Consultant prepares tender documents, announces the tender, accepts the letter of interest from the bidders, explains the tender and distributes the tender documents on behalf of the Client. A certain period after preparing the tender, offered prices and relevant drawings will be submitted to the Consultant. The Consultant evaluates the result immediately and assists in making a contract between the Client and the successful Supplier.

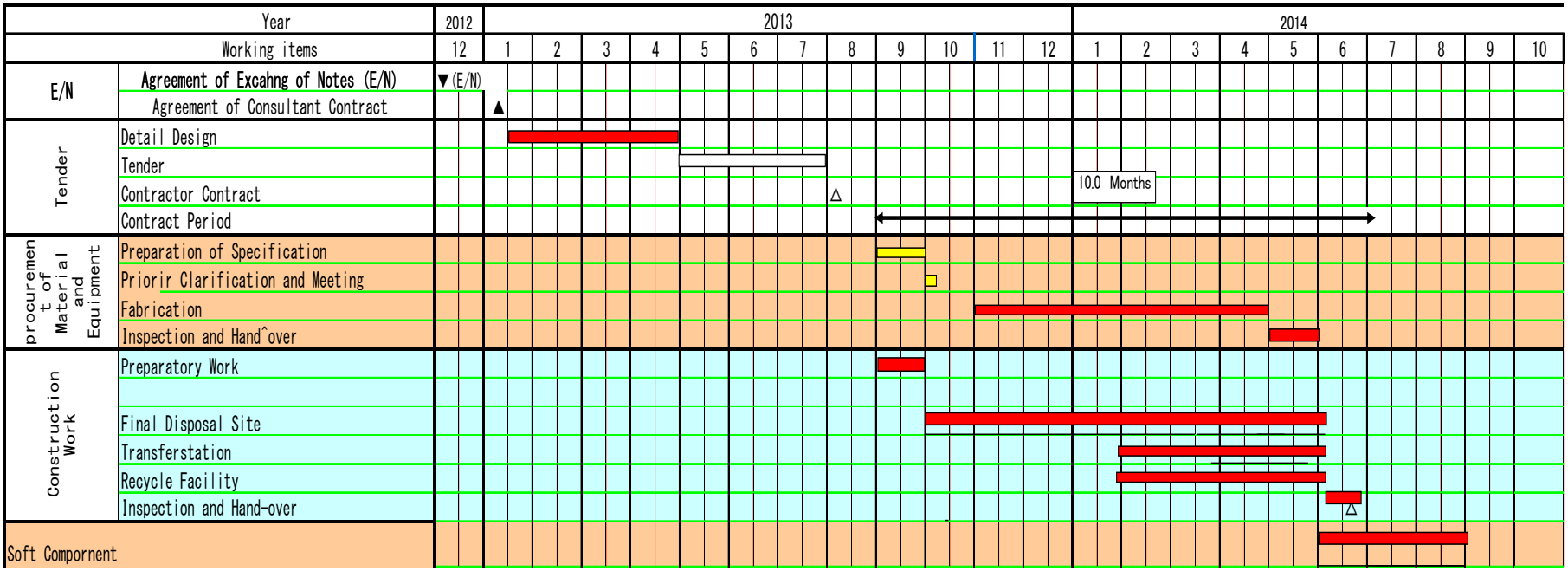
Tendering is held between the relevant parties and the lowest bidder is the successful bidder and makes a contract with the Client if the submitted documents are approved after evaluation. Three months is needed from distributing the document to making a contract between the Client and the successful Supplier.

(2) Procurement and Construction

After making the contract, the supplier starts procuring equipment with JICA's verification. The Supplier prepares the ordering specifications three (3) months later after making the contract.

Relevant machinery in this project will be assembled in six (6) months. Product inspection, transportation, installation, acceptance inspection and handout will done in one month.

Construction work will start after making of the contract. The transfer station, MRF and landfill site will be implemented after the building of access roads and leveling of the site. The construction period would be 10 months. **Figure 4.8** shows the project implementation schedule.



実施設計

Figure 4.8 Procurement and Construction Implementation Schedule

4-6-10 Soft Components

(1) Background

The result of the site survey showed that there is a difference in the solid waste management capacity of the JCs in the West Bank. For this reason, it will be necessary to supply the equipment and facilities to the JCs having the appropriate level of management capacity and are able to implement the technical assistance through the soft component regarding capacity building that each JC requires. This will be done, in order to improve the solid waste management capacity through sufficient operation and maintenance of the supplied equipment.

(2) Objective

The objective is to improve the solid waste management capacity of each of the JCs, living environment and human health in the region by the soft component implementation with equipment and facility supply.

(3) Soft Component Activity (Input Plan)

Japanese specialists with the counterpart will implement the activities below.

Specialist for Solid Waste Management and Recycling Planning [three (3) months]

The most sophisticated three (3) JCs; Jenin, Hebron and Jericho, the MoLG and the private recycling company, will share the information regarding recycling material distribution and study the recycling strategy. Below are plans to be implemented for the Jericho JC.

- Establishment of "The separation rule at the Solid Waste Discharge" in the collection service area
- Implementation of separate collection
- Establishment of the implementation plan for MRF and building of the operation organization.
- Separation work at MRF
- Monitoring and evaluation（confirmation of the achievement）

Specialist for Collection and Transportation [three (3) months]

Specialist plans will be made for separate collection and transportation for the Jericho JC and collection and transportation for the Tulkarem JC and Salfit JC.

Specialist for Awareness and Education [two (2) months]

The specialist will implement awareness and education for the residents in the Jericho JC governorate, through brochure making and conduct of training programs.

(4) Implementation Schedule of the Soft Component

The implementation schedule of the soft component activities are as shown in **Figure 4.9**.

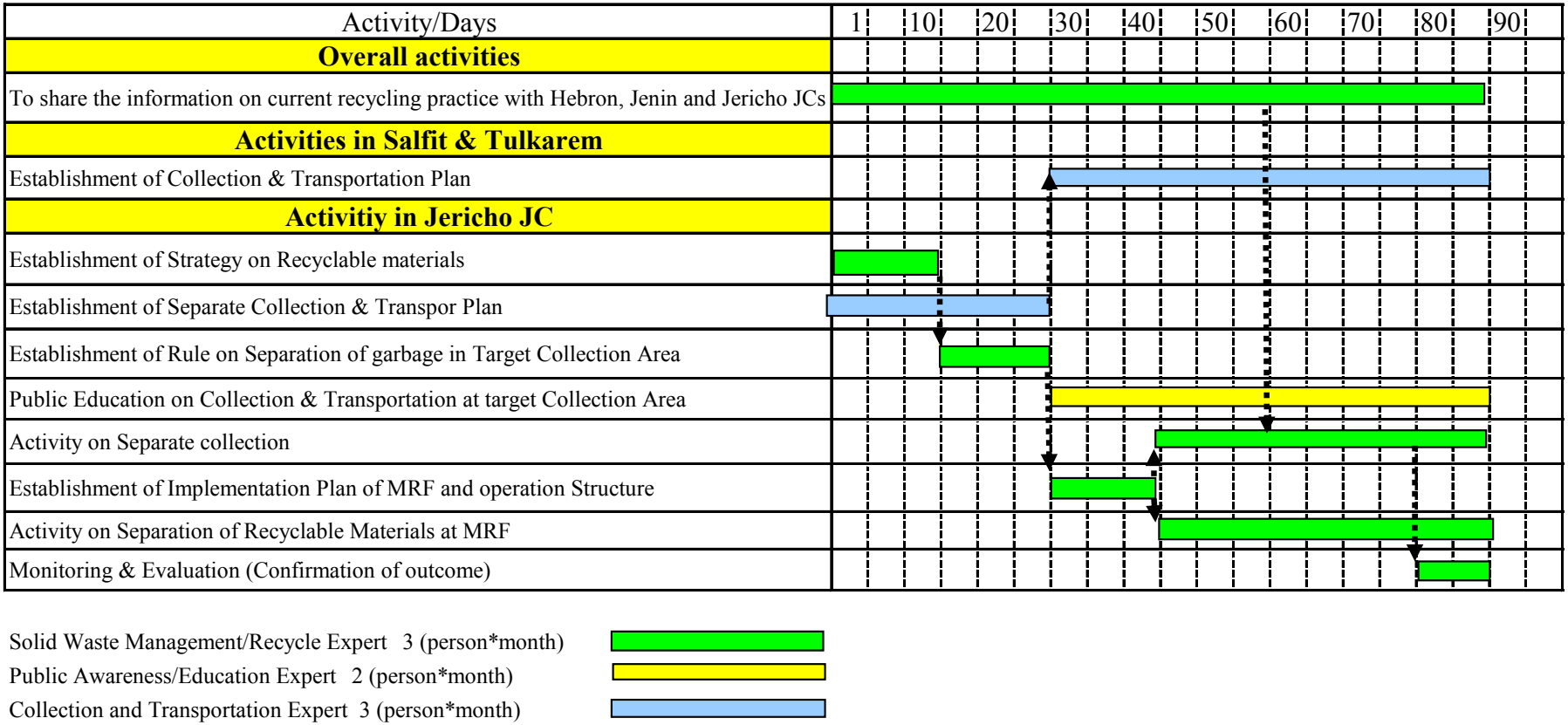


Figure4.9 Works and Implementation Schedule

(5) Deliverables from the Soft Component

- Soft Component Completion Report
- Document for Collection and Transportation Planning (Tulkarem JC and Salfit JC)
- Document for Separate Collection and Transportation Planning (Jericho JC)
- Table of the Collection and Recycling Result based on the planning (Collection: Tulkarem and Salfit JCs, Recycling: Jericho JC)
- Brochure and teaching material to be used for awareness and environmental education regarding the separate collection rule. (Jericho JC)

4-6-11 Operation and Maintenance Plan of the Project

(1) General Policy

The users of the equipment and facilities provided by the project are the JCs. The operation and maintenance costs are to be borne by the JCs.

(2) Operation and Maintenance Organization

Operation and Maintenance in each JC will be implemented by the organization shown in **ANNEX 7**. The Number of Operators will be increased in order to operate additional equipment supplied by the project but the organization will not be changed. The sanitary landfill expanded in Jericho will be operated by the current operators because the existing landfill will be closed, therefore the number of operators is not needed to increase. Five (5) JCs which are targeted by this project, are evaluated highly on their ability in the areas of technical, financial and organization, also having capacity to have suitable availability to operate and maintain the equipment supplied and the facilities built by the project.

The operation and maintenance costs for the equipment and facilities under this project which is shown in **3-5-2** can be covered by the increase of revenue because of increases of collectable solid waste amounts by the JCs.

(3) Outline of Work by the Counterpart

The scope of Palestine in this project is described in "**3-2-4-3 Scope of Work**". The following are the concrete contents. The proposed scope is as follows:

a) Land Acquisition： 1.7 hectare (For Landfill Expansion)

As the proposed land is private owned by the Arab Society, land purchase is not needed but a land lease fee, and compensation fee for lending agricultural land and a transplanting fee for

existing plants shall need to be accepted and paid.

b) Power cable installation：Approx. 300m

c) Water supply pipe installation：Approx. 300m

d) Bank commissions

The whole cost of the above works is estimated to be [redacted] (refer to **4-7-1 Estimated Cost of the Project**)

4-7 Estimating the Project Cost

4-7-1 Estimated Cost of the Project

The total project cost is estimated at [redacted]yen, the cost breakdowns between Japan and Palestine based on the scope of work as mentioned above was estimated as shown below.

However the amount does not mean that it is the maximum amount granted in the Exchange of Notes.

(1) Expenses borne by Japan

Estimated expenses to be borne by Japan are shown as follows.

Table 4.13 Project Costs on the Japanese Side

Total Amount [redacted] Japanese Yen

Expense Item		Estimated Cost (Million Japanese yen)	
Facility	Sanitary Landfill Expansion	[redacted]	[redacted]
	Waste Transfer Station, MRF	[redacted]	
Equipment Supply			[redacted]
Detail Design, Supervision			[redacted]
Total			[redacted]

(2) Expenses borne by Palestine

Estimated expenses to be borne by Palestine were estimated as shown in **Table 4.14**.

Table 4.14 Project Costs on the Palestinian Side

Total Amount [redacted] NIS ([redacted] Japanese yen)

Item	Breakdown	Amount in NIS (Thousand)	Amount in Japanese Yen (Million)
Sanitary Landfill/Waste Transfer Station	Leasing Fee* (Area 1.7ha), Compensation for Farmers	[redacted]	[redacted]
	Electricity Preparation Work	[redacted]	[redacted]
	Water and Electricity Preparation Work	[redacted]	[redacted]
Bank Commission		[redacted]	[redacted]
Total		[redacted]	[redacted]

(3) Estimation Conditions

a) Time of Estimation: in June, 2012

b) Foreign Currency Exchange Rate: USD 1 = JPY[redacted]

EUR 1 = JPY[redacted]

NIS 1 = JPY[redacted]

c) Work Schedule: Detail Design and Construction periods are followed in **4-6-9 Implementation Schedule**.

d) Others: Estimated based on the system of grant aid project by Japanese government

4-7-2 Operation and Maintenance Costs

Operation and maintenance costs will increase when supplied equipment starts operating in each of the JCs. Increased operation and maintenance costs of collection and transportation equipment are shown in **Table 4.15**. As shown in the table, the increased amounts for each JCs are 20.5 million yen in Jenin, 38.6 million yen in Hebron, 4.8million yen in Jericho, 46.7 million yen in Salfit and 16.9 million yen in Tulkarem. Estimated cost breakdowns are shown for each JCs in **Table 4.16.1 – 4.16.5**.

Table 4.15 Estimated Operation and Maintenance Costs for Supplied Equipment (Collection and Transportation Vehicles)

Item JC	Jenin	Hebron	Jericho	Salfit	Tulkarem
A. Operation Cost					
(1) Fuel Cost	374	725	31	666	436
(2) Personnel Cost for Operation	343	612	147	661	171
B. Repair and Maintenance Cost	65	150	15	155	60
C.: Depreciation Cost	144	333	34	319	132
Total	926	1,820	227	1,801	799

Unit :1,000 NIS

Table 4.16.1 Breakdown of Estimated Costs for Operation and Maintenance (Collection and Transportation Vehicles) (1/5)

Jenin JC								
A. Operation Cost								
（1） Fuel Cost		Quantity	Fuel Consumption per Month (Lit.)	Fuel Price per Litter (NIS/Lit)	Monthly Amount (NIS)	Annual Amount (US$)	Annual Amount (Yen)	Annual Amount (NIS)
	Compactor 5 m³	2	410	4.8	3,936	12,614	1,001,318	47,232
	Compactor 8 m³	1	650	4.8	3,120	9,999	793,728	37,440
	Dump Truck for Waste 15m3	1	460	4.8	2,208	7,076	561,715	26,496
	Hook Lift 32 m3 wuth Trailer	1	4,560	4.8	21,888	70,148	5,568,307	262,656
	Subtotal					99,837	7,925,068	373,824
（2） Personnel Cost for Operation		Staff	Quantity	Monthly Salary （NIS)				
	Compactor 5 m³	Driver	2		2040	13,076	1,037,952	48,960
		Helper	4		2040	26,151	2,075,904	97,920
	Compactor 8 m³	Driver	1		2040	6,538	518,976	24,480
		Helper	2		2040	13,076	1,037,952	48,960
	Dump Truck for Waste 15m3	Driver	1		2040	6,538	518,976	24,480
		Helper	2		2040	13,076	1,037,952	48,960
	Hook Lift 32 m3 wuth Trailer	Driver	1		2,040	6,538	518,976	24,480
		Helper	1		2,040	6,538	518,976	24,480
	Subtotal					91,531	7,265,664	342,720
B. Repair and Maintenance Cost		Quantity	Basic Price	Annual Repair and Maintenance Cost per Vehicle				
			（Basic Price x 45%／Life :15years）					
	Compactor 5 m³	2	80,173	2,405		4,810	381,818	18,010
	Compactor 8 m³	1	90,077	2,702		2,702	214,485	10,117
	Dump Truck for Waste 15m3	1	82,401	2,472		2,472	196,227	9,256
	Hook Lift 32 m3 wuth Trailer	1	244,975	7,349		7,349	583,364	27,517
	Subtotal					17,333	1,375,894	64,900
C.: Depreciation Cost		Quantity	Basic Price	Annual Depreciation Cost per Vehicle				
			（Basic Cost / Life:15 years)					
	Compactor 5 m³	2	80,173	5,345		10,690	848,572	40,027
	Compactor 8 m³	1	90,077	6,005		6,005	476,677	22,485
	Dumpt Truck for Waste 15m3	1	82,401	5,493		5,493	436,034	20,568
	Hook Lift 32 m3 wuth Trailer	1	244,975	16,332		16,332	1,296,434	61,153
	Subtotal					38,520	3,057,717	144,233
Total (Annual Operation and Maintenance Cost)Jenin JC						247,221	19,624,343	925,677

Table 4.16.2 Breakdown of Estimated Costs for Operation and Maintenance (Collection and Transportation Vehicles) (2/5)

Hebron JC								
A. Operation Cost								
（1） Fuel Cost		Quantity	Fuel Consumption per Month (Lit.)	Fuel Price per Litter (NIS/Lit)	Monthly Amount （NIS)	Annual Amount (US$)	Annual Amount (Yen)	Annual Amount (NIS)
	Compactor 5 m³	1	410	4.8	1,968	6,307	500,659	23,616
	Compactor 8 m³	1	650	4.8	3,120	9,999	793,728	37,440
	Compactor 12 m³	2	980	4.8	9,408	30,151	2,393,395	112,896
	Compactor 19 m³	3	1,550	4.8	22,320	71,532	5,678,208	267,840
	Grapple Crane 19m3	1	350	4.8	1,680	5,384	427,392	20,160
	Hook Lift 32 m3 wuth Trailer	1	4,560	4.8	21,888	70,148	5,568,307	262,656
	Subtotal					193,521	15,361,689	724,608
（2） Personnel Cost for Operation		Staff	Quantity		Monthly Salary （NIS)			
	Compactor 5 m³	Driver	1		2040	6,538	518,976	24,480
		Helper	2		2040	13,076	1,037,952	48,960
	Compactor 8 m³	Driver	1		2040	6,538	518,976	24,480
		Helper	2		2040	13,076	1,037,952	48,960
	Compactor 12 m³	Driver	2		2040	13,076	1,037,952	48,960
		Helper	4		2040	26,151	2,075,904	97,920
	Compactor 19 m³	Driver	3		2040	19,614	1,556,928	73,440
		Helper	6		2040	39,227	3,113,856	146,880
	Grapple Crane 19m3	Driver	1		2040	6,538	518,976	24,480
		Helper	1		2040	6,538	518,976	24,480
	Hook Lift 32 m3 wuth Trailer	Driver	1		2040	6,538	518,976	24,480
		Helper	1		2040	6,538	518,976	24,480
	Subtotal					163,448	12,974,400	612,000
B. Repair and Maintenance Cost		Quantity	Basic Price	Annual Repair and Maintenance Cost per Vehicle				
			（Basic Price x 45%／Life :15years）					
	Compactor 5 m³	1	80,173	2,405		2,405	190,909	9,005
	Compactor 8 m³	1	90,077	2,702		2,702	214,485	10,117
	Compactor 12 m³	2	103,753	3,113		6,226	494,220	23,312
	Compactor 19 m³	3	155,631	4,669		14,007	1,111,876	52,447
	Grapple Crane 19m3	1	244,975	7,349		7,349	583,364	27,517
	Hook Lift 32 m3 wuth Trailer	1	244,975	7,349		7,349	583,364	27,517
	Subtotal					40,038	3,178,216	149,915
C.: Depreciation Cost		Quantity	Basic Price	Annual Depreciation Cost per Vehicle				
			（Basic Cost / Life:15 years)					
	Compactor 5 m³	1	80,173	5,345		5,345	424,286	20,013
	Compactor 8 m³	1	90,077	6,005		6,005	476,677	22,485
	Compactor 12 m³	2	103,753	6,917		13,834	1,098,143	51,799
	Compactor 19 m³	3	155,631	10,375		31,125	2,470,703	116,543
	Grapple Crane 19m3	1	244,975	16,332		16,332	1,296,434	61,153
	Hook Lift 32 m3 wuth Trailer	1	244,975	16,332		16,332	1,296,434	61,153
	小計					88,973	7,062,677	333,146
Total (Annual Operation and Maintenance Cost) : Hebron JC						485,980	38,576,982	1,819,669

Table 4.16.3 Breakdown of Estimated Costs for Operation and Maintenance (Collection and Transportation Vehicles) (3/5)

Jericho JC								
A. Operation Cost								
（1） Fuel Cost		Quantity	Fuel Consumption per Month (Lit.)	Fuel Price per Litter (NIS/Lit)	Monthly Amount (NIS)	Annual Amount (US$)	Annual Amount (Yen)	Annual Amount (NIS)
	Compactor 5 m³	1	410	4.8	1,968	6,307	500,659	23,616
	Dump Truck 2 ton	1	130	4.8	624	2,000	158,746	7,488
	Subtotal					8,307	659,405	31,104
（2） Personnel Cost for Operation		Staff	Quantity	Monthly Salary （NIS)				
	Compactor 5 m³	Driver	1		2040	6,538	518,976	24,480
		Helper	2		2040	13,076	1,037,952	48,960
	Dump Truck 2 ton	Driver	1		2040	6,538	518,976	24,480
		Helper	2		2040	13,076	1,037,952	48,960
	Subtotal					39,228	3,113,856	146,880
B. Repair and Maintenance Cost		Quantity	Basic Price	Annual Repair and Maintenance Cost per Vehicle				
			（Basic Price x 45%／Life :15years）					
	Compactor 5 m³	1	80,173	2,405		2,405	190,909	9,005
	Dump Truck 2 ton	1	56,566	1,697		1,697	134,708	6,354
	Subtotal					4,102	325,617	15,359
C.: Depreciation Cost		Quantity	Basic Price	Annual Depreciation Cost per Vehicle				
			（Basic Cost / Life:15 years)					
	Compactor 5 m³	1	80,173	5,345		5,345	424,286	20,013
	Dump Truck 2 ton	1	56,566	3,771		3,771	299,342	14,120
	Subtotal					9,116	723,628	34,133
Total (Annual Operation and Maintenance Cost) : Jericho JC						60,753	4,822,506	227,476

Table 4.16.4 Breakdown of Estimated Costs for Operation and Maintenance (Collection and Transportation Vehicles) (4/5)

Salfit JC								
A. Operation Cost								
（1） Fuel Cost		Quantity	Fuel Consumption per Month (Lit.)	Fuel Price per Litter (NIS/Lit)	Monthly Amount (NIS)	Annual Amount (US$)	Annual Amount (Yen)	Annual Amount (NIS)
	Compactor 5 m³	2	410	4.8	3,936	12,614	1,001,318	47,232
	Compactor 12 m³	4	980	4.8	18,816	60,302	4,786,790	225,792
	Dump Truck for Waste 15m3	1	460	4.8	2,208	7,076	561,715	26,496
	Grapple Crane 19m3	1	350	4.8	1,680	5,384	427,392	20,160
	Hook Lift 10 m³	1	1,460	4.8	7,008	22,460	1,782,835	84,096
	Hook Lift 32 m3 wuth Trailer	1	4,560	4.8	21,888	70,148	5,568,307	262,656
	Subtotal					177,984	14,128,357	666,432
（2） Personnel Cost for Operation		Staff	Quantity		Monthly Salary （NIS)			
	Compactor 5 m³	Driver	2		2040	13,076	1,037,952	48,960
		Helper	4		2040	26,151	2,075,904	97,920
	Compactor 12 m³	Driver	4		2040	26,151	2,075,904	97,920
		Helper	8		2040	52,303	4,151,808	195,840
	Dump Truck for Waste 15m3	Driver	1		2040	6,538	518,976	24,480
		Helper	2		2040	13,076	1,037,952	48,960
	Grapple Crane 19m3	Driver	1		2040	6,538	518,976	24,480
		Helper	1		2040	6,538	518,976	24,480
	Hook Lift 10 m³	Driver	1		2040	6,538	518,976	24,480
		Helper	1		2040	6,538	518,976	24,480
	Hook Lift 32 m3 wuth Trailer	Driver	1		2040	6,538	518,976	24,480
		Helper	1		2040	6,538	518,976	24,480
	Subtotal					176,523	14,012,352	660,960
B. Repair and Maintenance Cost		Quantity	Basic Price	Annual Repair and Maintenance Cost per Vehicle				
			（Basic Price x 45%／Life :15years）					
	Compactor 5 m³	2	80,173	2,405		4,810	381,818	18,010
	Compactor 12 m³	4	103,753	3,113		12,452	988,440	46,625
	Dump Truck for Waste 15m3	1	82,401	5,493		5,493	436,034	20,568
	Grapple Crane 19m3	1	244,975	7,349		7,349	583,364	27,517
	Hook Lift 10 m³	1	129,168	3,875		3,875	307,598	14,509
	Hook Lift 32 m3 wuth Trailer	1	244,975	7,349		7,349	583,364	27,517
	Subtotal					41,328	3,280,617	154,746
C.: Depreciation Cost		Quantity	Basic Price	Annual Depreciation Cost per Vehicle				
			（Basic Cost / Life:15 years）					
	Compactor 5 m³	2	80,173	5,345		10,690	848,572	40,027
	Compactor 12 m³	4	103,753	6,917		27,668	2,196,286	103,598
	Dump Truck for Waste 15m3	1	82,401	5,493		5,493	436,034	20,568
	Grapple Crane 19m3	1	244,975	16,332		16,332	1,296,434	61,153
	Hook Lift 10 m³	1	129,168	8,611		8,611	683,541	32,243
	Hook Lift 32 m3 wuth Trailer	1	244,975	16,332		16,332	1,296,434	61,153
	Subtotal					85,126	6,757,301	318,742
Total (Annual Operation and Maintenance Cost) : Salfit JC						480,961	38,178,627	1,800,880

Table 4.16.5 Breakdown of Estimated Costs for Operation and Maintenance (Collection and Transportation Vehicles) (5/5)

Tulkarem JC								
A. Operation Cost								
（1） Fuel Cost		Quantity	Fuel Consumption per Month (Lit.)	Fuel Price per Litter (NIS/Lit)	Monthly Amount (NIS)	Annual Amount (US$)	Annual Amount (Yen)	Annual Amount (NIS)
	Compactor 19 m³	1	1,550	4.8	7,440	23,844	1,892,736	89,280
	Hook Lift 10 m³	1	1,460	4.8	7,008	22,460	1,782,835	84,096
	Hook Lift 32 m3 with Trailer	1	4,560	4.8	21,888	70,148	5,568,307	262,656
	Subtotal					116,452	9,243,878	436,032
（2） Personnel Cost for Operation		Staff	Quantity	Monthly Salary （NIS)				
	Compactor 19 m³	Driver	1		2040	6,538	518,976	24,480
		Helper	2		2040	13,076	1,037,952	48,960
	Hook Lift 10 m³	Driver	1		2040	6,538	518,976	24,480
		Helper	1		2040	6,538	518,976	24,480
	Hook Lift 32 m3 with Trailer	Driver	1		2040	6,538	518,976	24,480
		Helper	1		2040	6,538	518,976	24,480
	Subtotal					45,766	3,632,832	171,360
B. Repair and Maintenance Cost		Quantity	Basic Price	Annual Repair and Maintenance Cost per Vehicle				
			（Basic Price x 45%／Life :15years）					
	Compactor 19 m³	1	155,631	4,669		4,669	370,625	17,482
	Hook Lift 10 m³	1	129,168	3,875		3,875	307,598	14,509
	Hook Lift 32 m3 with Trailer	1	244,975	7,349		7,349	583,364	27,517
	Subtotal					15,893	1,261,586	59,508
C.: Depreciation Cost		Quantity	Basic Price	Annual Depreciation Cost per Vehicle				
			（Basic Cost / Life:15 years)					
	Compactor 19 m³	1	155,631	10,375		10,375	823,568	38,848
	Hook Lift 10 m³	1	129,168	8,611		8,611	683,541	32,243
	Hook Lift 32 m3 with Trailer	1	244,975	16,332		16,332	1,296,434	61,153
	Subtotal					35,318	2,803,543	132,244
Total (Annual Operation and Maintenance Cost) : Tulkarem JC						213,429	16,941,839	799,144

Chapter 5 Project Evaluation

5-1 Preconditions of the Project

5-1-1 Project Purpose

The grant aid project will assist solid waste management for the prioritized JCs which provide the SWM services for the municipalities in the West Bank. The assistance will contribute towards advancing the capacities of the JCs to improve the sanitary conditions and health of the residents.

1) Project Purpose

Effective activities of the JCs for SWM will be possible in the West Bank with the assistance of the Project.

2) Expected Outputs

- to improve Solid Waste Management capacity
- to strengthen collection and transportation capacity
- to promote the closing of random dumpsites
- to improve the recycle ratio

3) Project Inputs

Facility: final disposal site, transfer station (Jericho JC)

Vehicles, equipment and heavy machines: containers, compactor trucks, hook lift cranes, transportation trucks, dump trucks etc. (for Jericho, Jenin, Hebron, Salfit and Tulkarem JCs)

4) Project sites,

Jericho, Jenin, Hebron, Salfit and Tulkarem JCs in Palestine's West Bank

5-1-2 Project Design Matrix

Verification Indicators have categorically made clear the effectiveness of the project. The projected JCs shall record baseline data of SWM. **Table 5.1** shows a simplified project design matrix.

Table 5.1 Simple Project Design Matrix

Project purpose	Objectively Verifiable Indicators	Means of verification
Effective activities of JCs for SWM can be possible in the West Bank by the assistance of the Project.	・Increase of waste collection amounts . record ing of (expansion of collection areas, increasing the collection serviced population. ・Improvement of the collection coverage ratio.	・Operating records of collection vehicles. ・Waste amount records at transfer station.
	・Increase of waste amounts being land filled in the sanitary landfill site, and closing of random dump sites	・Waste amounts recorded at sanitary landfill site. ・Number of total random dumpsites which are closed.
	・3R activities will be promoted, the activities will be conducted to reduce waste amounts reaching the landfill.	・Recycle waste amounts recorded
	・Strengthening of SWM capacity of the JCs	・Relevant financial records

5-1-3 Preconditions of the Project

Equipment and facilities will be provided by the project and shall be operated and well maintained to achieve the project targets. It is important that capacity development of the JCs be also carried out. The Jericho, Hebron and Jenin JCs have enough knowledge and skills for SWM, therefore these JC's activities are expected to produce suitable results. The JCs are required to promote 3 R activities in the near future. The Soft component of the 3R activity will assist in the capacity development of the JCs. Salfit and Tulkarem will in addition be provided soft components for the formulation of the collection/transfer plans and implementation of organization. The JCs shall be prepared to take Japanese experts in and nominate counterparts for implementation of the soft components.

The preconditions for project implementation are as follows.

1) Tax Exemption

The Palestine self-government area is situated in Israel and taxes such as import duties etc. are handled by the Israeli agency(s) concerned. There may be some possibilities of unexpected changes in their policies concerning the matters under consideration. Therefore the Palestinian side implementing agency shall collect all the latest necessary information and handle the procedures for tax exemption to avoid any problems in the course of any tax clearance processes.

2) Obtaining Environmental Permission of the Palestine Environmental Impact Assessment System

With regard to the final disposal facilities, waste transfer station and material recovery facilities in Jericho shall take the appropriate procedures for obtaining the necessary permissions for EIA and other necessary construction permits from the central government and the relevant local governments. Jericho JC shall responsibility the activities above mentioned.

3) Securing the site for Storage of the Procured Equipment and Spare Parts

Each JC shall identify sufficient secured areas for parking the procured waste collection vehicles and heavy machines and for the storage of spare parts as well.

5-2 Prerequisite Conditions and Undertakings on the Palestinian Side for Implementation of the Project

The following indicates the prerequisites and undertakings of the Palestinian Side for implementation of the project.

5-2-1 Prerequisites

1) Obtaining the Environmental Permission of the Palestine Environmental Impact Assessment System

With regard to the final disposal facilities, waste transfer station and material recovery facilities in Jericho shall take the appropriate procedures for obtaining the necessary permissions for EIA and other necessary construction permissions from the central government and the local government. Jericho JC shall responsibility the activities above mentioned.

2) Securing the site for Storage of the Procured Equipment and Spare Parts

Each JC shall identify sufficient secured areas for parking the procured waste collection vehicles and heavy machines and for the storage of spare parts as well.

5-2-2 Undertakings Required on the Palestinian Side

1) Identifying and Securing Staff for Operation and Maintenance

Regarding new equipment to be procured under the Project such as the waste collection and transport vehicles, heavy machines, final disposal facilities and material recovery facilities (MRF), the adequate number of staff including truck drivers, waste collection workers, as well as operation and maintenance staff of the facilities shall be employed to make effective use of the equipment, vehicles and the facilities.

2) Securing a Budget for Operation and Maintenance

It is necessary to ensure the appropriation of an additional increase for the budget for operation and maintenance of the new vehicles, heavy machines and the solid waste management facilities. In each JC, superannuated/old vehicles, equipment and machines are being used requiring frequent repairs. For collection vehicles, it will be economical to replace the vehicles after approximately 10 years when taking into account their repair costs and it is necessary to prepare a long-term budget taking into account the periodical replacement of these vehicles. Furthermore, it is desirable to carry out periodical inspections such as after every 6 month period as preventive measures against breakdowns. Expenditure of all the JCs will be increased for operation and maintenance costs for the new equipment, all the JCs shall need to make an effort to collect proper waste charges from residents in the collection areas. The amount of the increase is shown in **Table 5.1**.

3) Linkage with Other Donors

Currently, an assistance project for solid waste management is being implemented by the

EU for provision of equipment, machinery and the technical cooperation. In addition, World Bank is assisting in Hebron, the construction of a large scale regional landfill. GIZ and KfW are assisting the construction of the regional landfill in Ramallah. The basic outline for a national strategy on solid waste management will be established with the construction works of the regional landfill. Meanwhile, in Bethlehem, technical assistance has been carried out with Italian Cooperation. The Jenin, Hebron and Jericho JCs, which are considered advanced JCs with respect to solid waste management, are planned for implementation through soft components which will examine the direction and coordination of recycling activities. It will be necessary to link up with similar activities of other donors during the implementing this Project.

5-3 Important Assumptions

Important assumptions of the project are the 3 (three) following items in order to achieve the project purpose.

1) Securing the Staff for Operation and Maintenance

The adequate number of staff/workers for operation and maintenance of the facilities shall be employed to allow effective use of the equipment, vehicles and the facilities.

2) Securing the Budget for Operations and Maintenance

It is necessary to ensure appropriate functioning that an additional budget for operation and maintenance of the new vehicles, heavy machines and the solid waste management facilities be secured.

3) Unseasonable weather effects and disputes have not been addressed as yet

It is difficult to manage a SWM facility under unseasonable weather conditions and when disputes arise.

5-4 Project Evaluation

5-4-1 Validity

The project is in perfect harmony with the needs and the development policy of the PNA. Also, the project to be carried out with assistance from the Japanese Government has been evaluated as having high priority, because the Jericho JC needs to receive the business waste from the agriculture industry base.

A major component of the project is the “provision of collection/transportation equipment” for more than half a million beneficiaries (residents). This component will definitely improve the sanitary conditions of residents and will be operated through their own skills and financial capability.

5-4-2 Effectiveness

(1) Quantitative effectiveness

1) Improvement of collection capacity

The collection capacity by the project is shown in **Table 5.2**. The capacity was calculated based on an 8 hour working period. The Hebron and Jenin JCs need overtime to collect all the solid waste generated in their service areas. The Jenin JC is required to come up with some way to prolong the life of their existing collection vehicles.

Table 5.2 Improvement of Collection Capacity through the Project

Indices	Collection Capacity （8hr working period）	
	Present Capacity (AD 2011)	Future Capacity after Project Implementation (AD 2017)
Hebron JC: Collection capacity (t/day)	46	308
Jenin JC: Collection capacity (t/day)	204.7	148
Jericho JC: Collection capacity (t/day	45	59
Salfit JC: Collection capacity (t/day)	53.5	62
Tulkarem JC: Collection capacity (t/day)	30.1	133
Recycled amount in Jericho JC (Plastic: kg/day）	0	800
Recycled amount in Jericho JC （Metal: kg/day）	0	200

Note) Jenin has many old collection vehicles which will reach the life-span at the target year, therefore Jenin shall replace new collection vehicles and/or maintain old vehicles well to keep required collection capacity.

2) Reduction of Existing Dump sites

Existing open dumping sites will be closed by the improvement of transportation capacity.

Table 5.3 Number of Open Dump Sites

JC	Number of existing open dump sites (AD 2011)	Number of future open dump sites (AD 2017)
Hebron JC	17	0
Jenin JC	1	0
Jericho JC	1	0
Salfit JC	10	0
Tulkarem JC	0	0
Total	29	0

(2) Qualitative Effectiveness

The Project will effect the introduction of a sustainable and sanitary SWM system in the Jericho and Jordan River Rift Valley (JJRRV)" and carry out popularization of the project's SWM system as a model for adoption in other areas of the PNA. The project is thus expected to improve both the public sanitary conditions and health conditions of the residents.

5-5 Conclusion

The project is expected to improve public sanitary conditions and health conditions of the Jenin, Hebron, Jericho, Salfit and Tulkarem for more over than a half million beneficiaries. The project has established validity and effectiveness as mentioned above. The soft components will promote and multiply the effectiveness of the project.

ANNEX

ANNEX 1

Minutes of Meeting dated on 22nd November, 2012

別添-2

MINUTES OF MEETING
BETWEEN
JAPANESE PREPARATORY SURVEY TEAM
AND
THE MINISTRY OF LOCAL GOVERNMENT
ON
THE PROJECT FOR THE IMPROVEMENT OF EQUIPMENT FOR SOLID WASTE MANAGEMENT IN THE WEST BANK

In response to the request from the Palestinian Authority (hereinafter referred to as "PA"), the Government of Japan decided to conduct the Preparatory Survey of the Project for Improvement of Solid Waste Management in the West Bank (hereinafter referred to as "the Project") and entrusted the study to the Japan International Cooperation Agency (hereinafter referred to as "JICA").

JICA sent the Preparatory Survey (Basic Design) Team (hereinafter referred to as "the Team") to the West Bank, which is headed by Dr. Mitsuo Yoshida, Senior Advisor, JICA, and is scheduled to stay in the country from 20th November 2011 to 17th December 2011.

The Team held discussions with the officials concerned of the Palestinian side and conducted field surveys in the study area.

In the course of discussions and field surveys, both parties have confirmed the outline and schedule of the survey, Japan's Grand Aid Scheme, necessary actions to be taken by the Palestinian side and so forth which are described in the attachment of this minutes of meeting.

Ramallah, 22nd, November 2011

Dr. Mitsuo Yoshida
Senior Advisor
Japan International Cooperation Agency

Mr. Mazen Ghuneim
Deputy Minister
Ministry of Local Government

ATTACHMENT

1. Objective of the Project

The objective of the Project is to enhance the capacity of Joint Councils (JCs) for municipal waste management in the West Bank by installing vehicles and equipment for waste collection and transportation and constructing transfer stations. The Project does not conflict with the regulation of the Palestinian Authority and the Palestinian National Strategy for Solid Waste Management.

2. Project Site

The target area of the Project will be selected through the survey in close consultation between the Team and the Palestinian side based on following prioritization. The Team proposed prioritization of Joint Councils.

Group 1: Jericho

Group 2: Jenin, Hebron

Group 3: Ramallah & Al-Bireh, Nablus, Tubas

Group 4: Jerusalem, Bethlehem, Salfeet, Qalquilya, Tulkarm

Palestinian side commented that Salfeet and Tulkarem should be moved into Group 3 and Ramallah & Al-Bireh into Group 4 in accordance with their capacity. Both sides agreed that the capacity of JCs will be assessed through the survey and this grouping is revised based on the survey result.

3. Responsible and Implementing Agencies

(1) The responsible agency is the Ministry of Local Government (MOLG).
(2) The implementing agencies of the Project are JCs of selected area.

Organization charts are attached as Annex-1

4. Items Requested by PA

Following the discussion between the both sides, the items described in the Annex-2 were finally requested by PA. The both sides confirmed that the appropriateness of the final components of the Project would be decided by the Japanese side.

5. Japan's Grant Aid Scheme

(1) The Palestinian side understood the Japan's Program Grant Aid Scheme explained by the Team, as described in Annex-3.

(2) The Palestinian side will take necessary measures, as described in Annex-4 for smooth implementation of the Project, as the condition of the Japan's Grant Aid to be implemented.

(3) JICA will report to the Palestinian side if there are any other specific undertakings based on the result of this Survey.

6. Schedule of the Survey

(1) The consultant members of the Team will continue further surveys in West Bank until December 17th, 2011. Then, the Team will report the result of this survey to the Government of Japan and JICA. The Japanese side will decide rough outline of the Project.

(3) The Team will carry out further survey in January, 2012.

(2) The Team will prepare a draft Basic Design Report and dispatch a mission in order to explain its contents to MOLG around April, 2012.

(3) In case the contents of the report are accepted in principle by Palestinian side, the Team will complete the final report and send it to Palestinian side around May 2012.

(4) The Team explained that the implementation of the Basic Design Survey does not ensure the actualization of the Project itself.

7. Other Relevant Issues

(1) Inception Report

The contents of Inception Report, which the Team explained to the Palestinian side, was understood and accepted in principle by the Palestinian side.

(2) Arrangements for the Study

As a response to the request by the Team, the Palestinian side agreed necessary number of counterpart personnel for the survey and provide all the data and information relevant to the Project for the smooth implementation of the survey. The Palestinian side also agreed to provide an appropriate office space.

(3) Responsibility of each Agency Concerned the Project

MOLG shall facilitate the implementation of the Project in such areas as exemption from taxes and so on. JCs in the West Bank shall take responsibility of operation and maintenance of equipment and materials which will be procured in the Project.

(4) Budgetary Allocation for the Project by the Palestinian side

The concrete amount of budget to be borne by Palestinian side for the Project including operation and maintenance cost shall be assessed through the survey and analysis by Japanese side. The Palestinian side accepted and gave assurance that appropriate budgetary allocation would be put in place for the Project.

(5) Environmental and Social Considerations

The survey will follow both Palestinian laws/regulations and JICA's Environmental and Social Guidelines as of April 2011. Palestinian side agreed to go through the procedures for environmental impact assessment with regard to the Project implementation when necessary.

(6) Other Undertakings of the Palestinian side

Although general undertakings of the both sides are shown in Annex-4, the Team emphasized

the responsibilities of the Palestinian side to execute following matters and the Palestinian side agreed to it.

1) Tax Payment

The Team explained that Value Added Tax, customs duties and any other taxes and fiscal levy charges in the West Bank arisen from the Project activities should be exempted. The Palestinian side understood that and would take necessary measures for tax exemption, if any.

2) Necessary measures for Operation and Maintenance of facilities and equipment

The Palestinian side would take any necessary measures and allocate the necessary budget, if any, to operate and maintain the facilities and equipment which would be provided by the Project.

(7) Avoidance of duplication with other projects

The both side agreed that any of the component of equipment and materials would not be overlapped with any other project supported by other donor agencies, NGOs, and Palestinian official organization(s).

(8) Safety and Security

The Palestinian side agreed to take measures to secure the safety of the members of the Team.

(9) Careful Handling of the Study Reports

The Team explained that certain information in both the draft and the final reports of the Study should be dealt with confidentially until the tender is closed when the Project proceeds to actual implementation stage, since disclosure of the information would affect fairness of tender procedure. The Palestinian side understood the sensitivity in dealing with the Study reports and agreed on careful handling of the reports for achieving fair tendering.

Annex-1	Japan's Grant Aid
Annex-2	Major Undertakings to be taken by Each Government
Annex-3	General Flow of Japan's Grant Aid

Annex-1 Japan's Grant Aid

The Government of Japan (hereinafter referred to as "the GOJ") is implementing the organizational reforms to improve the quality of ODA operations, and as a part of this realignment, a new JICA law was entered into effect on October 1, 2008. Based on this law and the decision of the GOJ, JICA has become the executing agency of the Grant Aid for General Projects, for Fisheries and for Cultural Cooperation, etc.

The Grant Aid is non-reimbursable fund provided to a recipient country to procure the facilities, equipment and 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. The Grant Aid is not supplied through the donation of materials as such.

1. Grant Aid Procedures

The Japanese Grant Aid is supplied through following procedures :

・Preparatory Survey
- The Survey conducted by JICA

・Appraisal &Approval
-Appraisal by the GOJ and JICA, and Approval by the Japanese Cabinet

・Authority for Determining Implementation
-The Notes exchanged between the GOJ and a recipient country

・Grant Agreement (hereinafter referred to as "the G/A")
-Agreement concluded between JICA and a recipient country

・Implementation
-Implementation of the Project on the basis of the G/A

2. Preparatory Survey

(1) Contents of the Survey

The aim of the preparatory Survey is to provide a basic document necessary for the appraisal of 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 country necessary for the implementation of the Project.
- Evaluation of the appropriateness of the Project to be implemented under the Grant Aid Scheme 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 a basic design of the Project.
- Estimation of costs of the Project.

The contents of the original request by the recipient country are not necessarily approved in

their initial form as the contents of the Grant Aid project. The Basic Design of the Project is confirmed based on the guidelines of the Japan's Grant Aid scheme.

JICA requests the Government of the recipient country to take whatever 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 organization of the recipient country which actually implements the Project. Therefore, the implementation of the Project is confirmed by all relevant organizations of the recipient country based on the Minutes of Discussions.

(2) Selection of Consultants

For smooth implementation of the Survey, JICA employs (a) registered 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 appropriateness of the Project.

3. Japan's Grant Aid Scheme

(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 country to make a pledge for assistance, which is followed by the conclusion of the G/A between JICA and the Government of the recipient country to define the necessary articles to implement the Project, such as payment conditions, responsibilities of the Government of the recipient country, and procurement conditions.

(2) 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 country to continue to work on the Project's implementation after the E/N and G/A.

(3) Eligible source country

Under the Japanese Grant Aid, in principle, Japanese products and services including transport or those of the recipient country are to be purchased. When JICA and the Government of the recipient country or its designated authority deem it necessary, the Grant Aid may be used for the purchase of the products or services of a third country. However, the prime contractors, namely, constructing and procurement firms, and the prime consulting firm are limited to "Japanese nationals".

(4) Necessity of "Verification"

The Government of the recipient country or its designated authority will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be verified by JICA. This "Verification" is deemed necessary to fulfill accountability to Japanese taxpayers.

(5) Major undertakings to be taken by the Government of the Recipient Country

In the implementation of the Grant Aid Project, the recipient country is required to undertake such necessary measures as Annex-5.

(6) "Proper Use"

The Government of the recipient country is required to maintain and use properly and effectively the facilities constructed and the equipment purchased under the Grant Aid, to assign staff necessary for this operation and maintenance and to bear all the expenses other than those covered by the Grant Aid.

(7) "Export and Re-export"

The products purchased under the Grant Aid should not be exported or re-exported from the recipient country.

(8) Banking Arrangements (B/A)

a) The Government of the recipient country or its designated authority should open an account under the name of the Government of the recipient country in a bank in Japan (hereinafter referred to as "the Bank"). JICA will execute the Grant Aid by making payments in Japanese yen to cover the obligations incurred by the Government of the recipient country or its designated authority under the Verified Contracts.

b) The payments will be made when payment requests are presented by the Bank to JICA under an Authorization to Pay (A/P) issued by the Government of the recipient country or its designated authority.

(9) Authorization to Pay (A/P)

The Government of the recipient country should bear an advising commission of an Authorization to Pay and payment commissions paid to the Bank.

(10) Environmental and Social Considerations

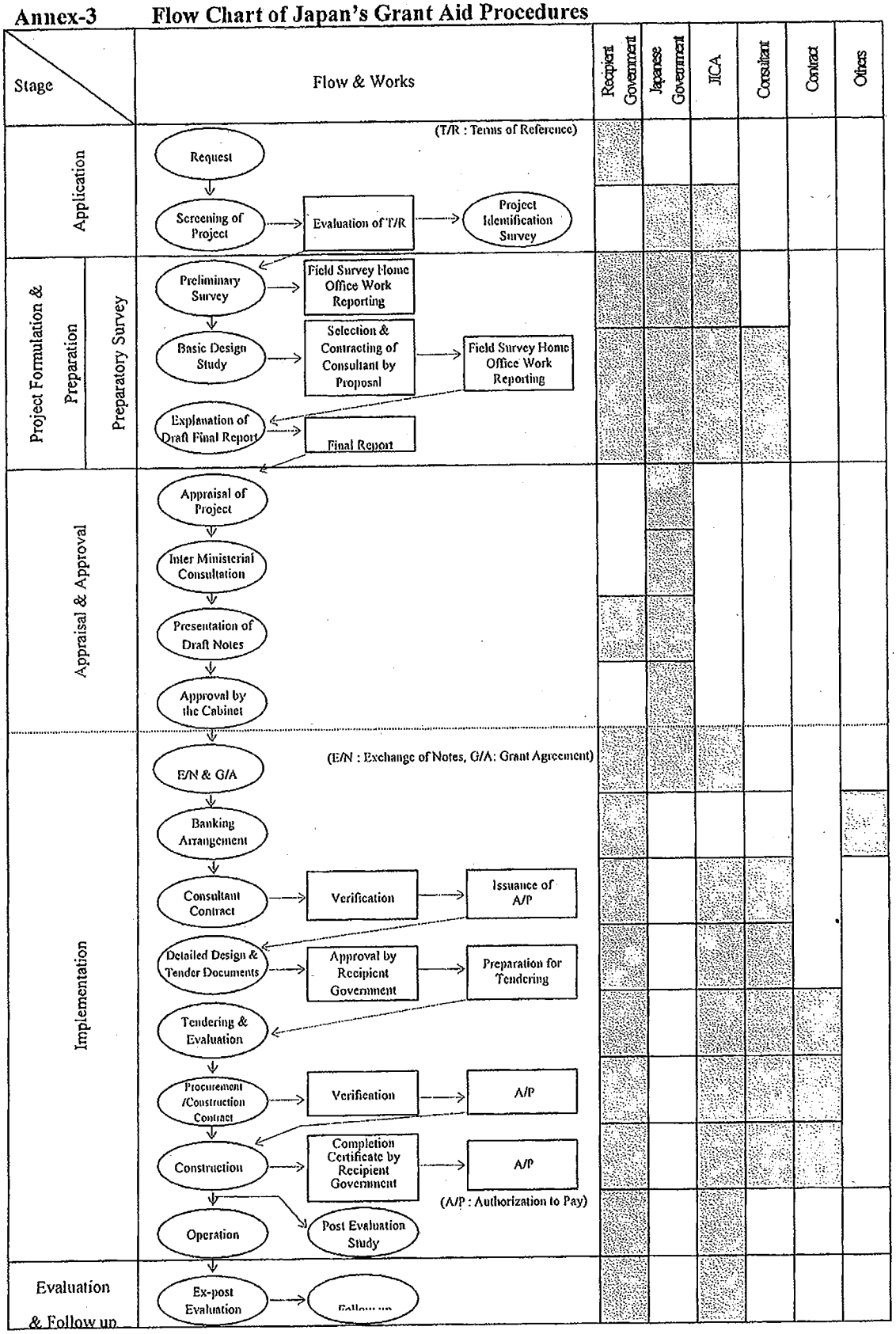
A recipient country must carefully consider social and environmental impacts by the Project and must comply with the environmental regulations of the recipient country and JICA's Environmental and Social Guidelines as of April 2011.

Annex-2 Major Undertakings to be taken by Each Government

No.	Items	To be covered by Grant Aid	To be covered by Recipient Side
1	Transfer Station		
1.1	to secure [a lot]/[lots] of land necessary for the implementation of the Project and to clear the [site]/[sites];		●
1.2	To construct the following facilities		
	1) The building	●	
	2) The gates and fences in and around the site	●	
	3) The parking lot	●	
	4) The road within the site	●	
	5) The road outside the site under the area of Palestinian control		●
	6) Utilities (electricity, water, gas, telephone, etc.)		●
1.3	Equipments(Compaction Unit)	●	
2	Equipment and Materials for Collection and Transport of Solid Waste	●	
2.1	Container, Compactor Truck, Grapple Crane, Tranfer Vehicle, Backhoe Loader, Wheel Loader, Dump Tru	●	
3	To ensure prompt unloading and customs clearance of the products at ports of disembarkation in the recipient country and to assist internal transportation of the products		
	1) Marine (Air) transportation of the Products from Japan to the recipient country	●	
	2) Tax exemption and custom clearance of the Products at the port of disembarkation		●
	3) Internal transportation from the port of disembarkation to the project site	(●)	(●)
4	To ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the purchase of the products and the services be exempted		●
5	To accord Japanese nationals 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 recipient country and stay therein for the performance of their work		●
6	To ensure that the Facilities and the products be maintained and used properly and effectively for the implementation of the Project		●
7	To bear all the expenses, other than those covered by the Grant, necessary for the implementation of the Project		●
8	To bear the following commissions paid to the Japanese bank for banking services based upon the B/A		
	1) Advising commission of A/P		●
	2) Payment commission		●
9	To give due environmental and social consideration in the implementation of the Project.		●

(B/A : Banking Arrangement, A/P : Authorization to pay)

Annex-3 Flow Chart of Japan's Grant Aid Procedures



ANNEX 2

Minutes of Meeting dated on 12th July, 2012

MINUTES OF MEETING
BETWEEN
JAPANESE PREPARATORY SURVEY TEAM
AND
THE MINISTRY OF LOCAL GOVERNMENT
ON

THE PROJECT FOR THE IMPROVEMENT OF SOLID WASTE MANAGEMENT IN THE WEST BANK

The Japan International Cooperation Agency (hereinafter referred to as “JICA”) has carried out the preparatory survey on the Project for Improvement of Solid Waste Management in the West Bank (hereinafter referred to as “the Project”) since November 2011. Through discussion with the Palestinian side, field survey and technical evaluation, JICA has prepared the draft Preparatory Survey Report (hereinafter referred to as “the Draft Report”).

In order to explain and consult with the Ministry of Local Government (hereinafter referred to as "MOLG") and relevant Joint Councils on the components of the Draft Report, JICA has sent the Draft Report Explanation Team (hereinafter referred to as “the Team”) headed by Dr. Mitsuo Yoshida to Palestine from 7th to 12th July, 2012.

As a result of discussions, both sides confirmed the main items described in the Attachment.

Ramallah, 12th July, 2012

Dr. Mitsuo Yoshida	Mr. Mazen Ghuneim
Senior Advisor	Vice Minister
Japan International Cooperation Agency	Ministry of Local Government

Attachment

1. Components of the Draft Report

The Team explained an outline of the result of the preparatory survey to the Palestinian side. The Palestinian side agreed and accepted in principle, the contents of the Draft Report explained by the Team. Both sides confirmed the contents of the Project as shown in the Outline of the Preparatory Survey (ANNEX-1).

2. Japan's Grant Aid Scheme

The Palestinian side understood the Japan's Grant Aid Scheme and the necessary measures to be taken by the Palestinian side as explained by the Team as per the Minutes of Meetings signed by both sides on 22th November, 2011.

3. Schedule of the Survey and Project Approval

3-1. Schedule of the Survey

JICA will complete the final report of the preparatory survey and send it to MOLG by the end of October, 2012.

3-2. Project Approval

The Project should be approved by the cabinet meeting of Japanese Government. Upon the approval of the cabinet, Exchange of Notes (E/N) will be agreed and concluded between the Palestinian Authority and the Government of Japan. Grant Agreement (G/A) will be agreed and signed between the Palestinian Authority and JICA, afterward.

4. Other relevant issues

4-1. Project Cost Estimation

The Team explained that the cost estimation of the Project as described in ANNEX-2. Both sides agreed that the Project Cost Estimation should never be duplicated or released to any outside parties and should be kept CONFIDENTIAL before signing of all the Contract(s) for the Project. Both sides also understood that the Project Cost Estimation is not final and is subject to change.

4-2. Funding by the Palestinian side

The Team explained the necessary budget have to be allocated by the Palestinian side for the implementation of the Project. The amount of the budget will be 118 thousand NIS per year. Breakdown of the budget is shown in ANNEX-2. The Team also explained the necessity of budget allocation for operation and maintenance of equipment which will be provided through the Project. The Palestinian side agreed the necessary budget allocation.

4-3. Land Acquisition for the expansion of the Jericho landfill

Jericho and Jordan River Rift Valley Joint Service, Planning and Development Council (hereinafter referred to as "Jericho JC") explained that a lease contract of a land for the expansion of the Jericho landfill was agreed and concluded. At the same time, Jericho JC provided English copy of the lease contract. The Team visited the project site and checked the current situation of the land.

4-4. Plans for operation and maintenance of equipment

The Team reiterated the importance of plans for operation and maintenance of equipment provided through the Project by each JC, namely, Jenin, Hebron, Jericho, Salfit and Tulkarem. The Palestinian side understood its necessity and promised to make those plans through the Project.

4-5. Jericho MRF (Material Recovery Facilities)

The Team explained that the Recycling yard and housing structure will be constructed in Jericho through the Project. Jericho JC explained that the JC will carry out source separation and recycling activities through and after the Project in collaboration with private sector.

4-6. Soft component of the Project

The Team explained the contents of the soft component of the Project, which include technical guidance, technology transfer program, training and consultation, to the Palestinian side, which were requested by Palestinian side through the preparatory survey. The Palestinian side agreed the contents of the soft component and assignment of necessary counterparts and allocation of the office for the experts who will be dispatched through the Project for implementing the soft component assistance.

4-7. Environmental and Social Considerations

The Team explained that necessary environmental approval from relevant authority for the expansion of the Jericho landfill and other activities. The Palestinian side explained in consultation with the Ministry of Environment Affairs that necessary approval will be secured within two weeks to one month after the submission of IEE/EIA by Jericho JC.

4-8. Environmental and Social Considerations

4-8-1. Environmental Checklist

The environmental and social considerations including major impacts and mitigation measures for the Project are summarized in the Environmental Checklist attached as ANNEX-3.

4-8-2. Monitoring for Environmental and Social Considerations

Monitoring for Environmental and Social considerations of the Project implementation will be conducted by the Palestinian side in accordance with the Monitoring Plan for the Project described in the Preparatory Survey Report. The frequency and timing of the monitoring is specified in the Monitoring Form attached as ANNEX-4. The results of monitoring will be provided by the Palestinian side to JICA by filling in the Monitoring Form as part of progress reports of the Project. After the completion of the Project, the monitoring will be continued by Palestinian side under the relevant regulation in Palestine.

4-8-3. Disclosure of Monitoring Result

The Palestinian side agreed that JICA may disclose the monitoring results conducted by the Palestinian side as shown in the Monitoring Form. JICA explained that disclosure of further information upon third parties request is subject to approval of the Palestinian side.

ANNEX-1: The Outline of the Preparatory Survey
ANNEX-2: Project Cost Estimation
ANNEX-3: Environmental Checklist
ANNEX-4: Monitoring Form

THE PREPARATORY SURVEY (BASIC DESIGN)

ON

THE PROJECT FOR

THE IMPROVEMENT OF SOLID WASTE

MANAGEMENT IN THE WEST BANK, PALESTINE

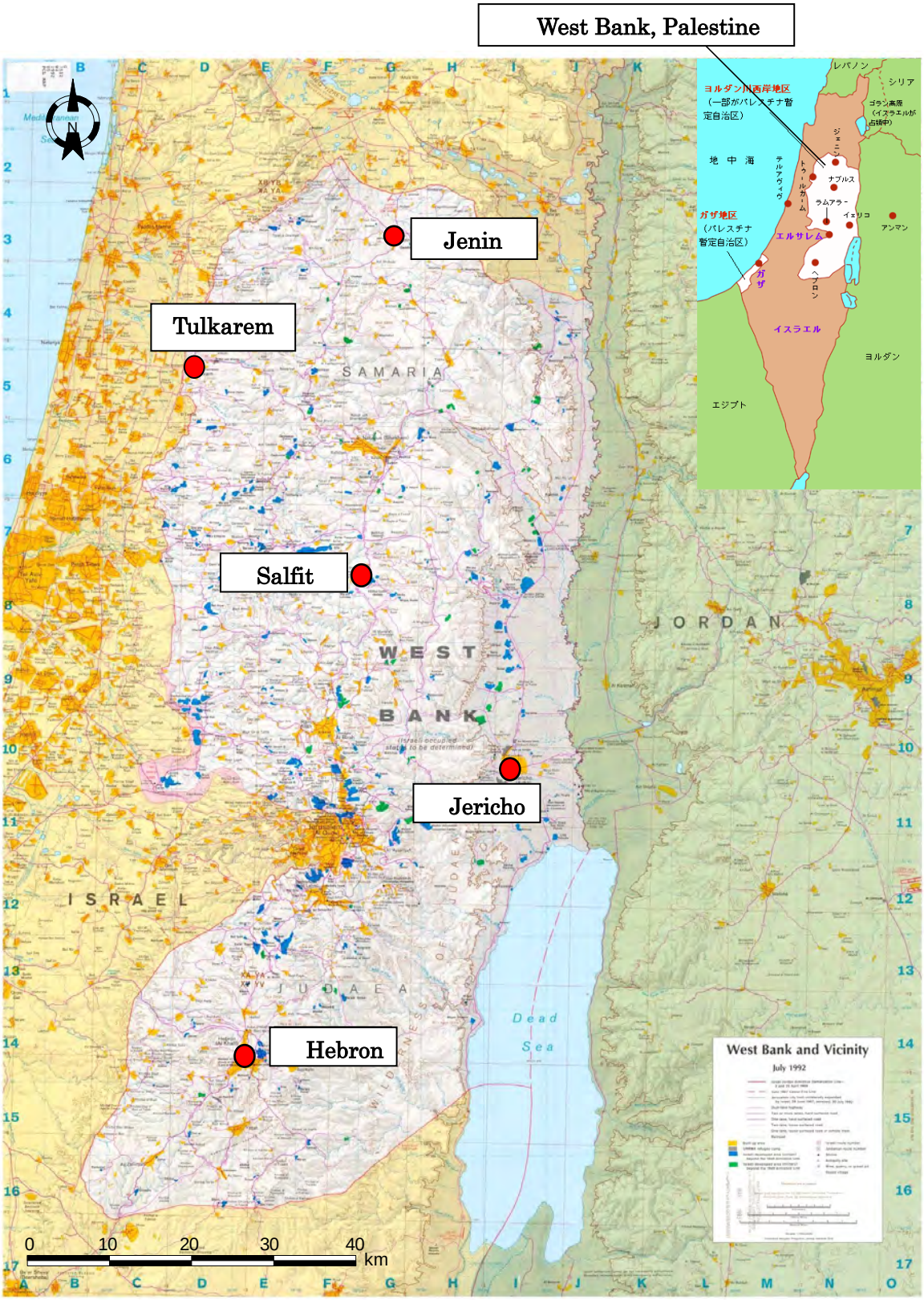
The Outline of

the Preparatory Survey

July, 2012

JAPAN INTERNATIONAL COOPERATION AGENCY

NJS CONSULTANTS CO., LTD.



Location Map

INTRODUCTION

This report is the outline of the preparatory survey on the project for the improvement of solid waste management in the West Bank, Palestine (herein after referred to as the Project), which has been carried out by Japan International Cooperation Agency (herein after referred as JICA) since November 2011. The purpose of the Project is to promote improvement of waste collection, transportation, waste reduction activities and operating sanitary final disposal in the service area of five JCs in the West Bank through provision of solid waste management equipment, vehicles and machinery in addition to the expansion of final disposal facilities and development of material recovery facilities (MRF) in Jericho JC.

1. Requested Equipment

The list of equipment shown in Table 1.1 was officially submitted in the second filed survey period in January 2012 after several discussions among the parties of each JC, MOLG and the JICA Preparatory Survey Team.

Table 1.1 Requested Equipment List (January 2012)

JCs	Jenin	Hebron	Jericho	Salfit	Tubas	Tulkarem	Qalkilya	Nablus	Bethlehem	Ramallah & Al-Bireh
Component	Q'ty	Q'ty	Q'ty	Q'ty	Q'ty	Q'ty	Q'ty	Q'ty	Q'ty	Q'ty
Compactor : 5 m³	2	1	2	2	*	*	2	1	1	*
Compactor : 8 m³	1	1	*	*	*	*	2	1	2	8
Compactor : 2 m³	*	2	*	2	1	*	2	6	4	5
Compactor : 19 m³	*	3	*	*	*	1	*	*	2	2
Container : 1.1 m³	600	1,000	150	500	100	500	300	500	500	1,500
Container : 4 m³	30	*	10	2	*	20	20	*	*	*
Container : 8 m³	*	*	2	5	*	5	*	*	*	*
Container : 10 m³	*	*	5	20	*	*	*	12	*	*
Container : 40 m³	3	5	*	1	4	6	6	2	*	*
Dump Truck : 15m^3 for Waste	1	*	*	1	*	*	*	*	*	1
Dump Truck : 2 ton	*	*	1	*	*	*	*	*	*	*
Backhoe Loader : 1m^3	*	1	*	*	1	*	1	1	1	2
Grapple Crane : 19m^3	*	1	*	1	*	*	1	*	*	1
Hook Lift : 10 m³	*	*	*	1	*	1	*	2	*	*
Hook Lift with Trailer 32 m³	*	1	*	1	1	1	1	1	*	*
Skid Steer Loader : 60HP	1	1	1	1	1	1	1	*	*	*

Track Excavator with Hydro-hammer : 240HP	1	*	*	*	*	*	*	*	*	*
Track Loader : 180HP	1	*	*	*	*	*	*	*	*	*
Wheel Loader : 185HP	1	*	*	*	*	*	*	*	*	*
Compaction unit : 100m^3/hr	*	*	1	1	*	*	*	*	*	*
Truck Scale : 60 ton	*	*	*	1	1	*	1	*	*	*
Trailer for Hook Lift : 32m^3	*	*	*	*	*	*	*	1	*	*

Source: JICA Preparatory Survey Team

Solid Waste Management Facilities

- Expansion of final disposal facilities for Jericho JC
- Material recovery facilities with a function of waste transfer station in future for Jericho JC
- Waste transfer station for Salfit, Qalkilya and Tubas JCs

2. Evaluation of Solid Waste Management Capacity of Each JC

The preparatory survey has been carried out with the planning policy to cooperate with the JCs having capacity of some level in consideration of the validity for sustainability of the Project. The target JCs are selected by the evaluations as follows;

Evaluation Criteria

Twelve indicators in four categories were determined for evaluation of the activity of each JC as shown in the Table 2.1. The evaluation criteria shown in the table is set to determine the grade of each indicator. With regard to the weight for evaluating the indicators, the indicators under the evaluation category-1 and category-3 comprised of four evaluation indicators were determined to have the weight by one except for the Evaluation Indicator 3-1 “Balance of payment”. There might be a discussion point for how to evaluate the financial situation properly. However, the weight of evaluation for the financial situation was determined with double score considering its importance and even the minus score was introduced for the financial deficit. Then, the indicators under the evaluation category-2 and category-4 were decided to have the weight by two. Scoring according to the grade for the indicators with weight described above is summarized as follows:

- Weight-1 Group Indicators : Grade 1=1, Grade 2=2, Grade 3=3
- Weight-2 Group Indicators : Grade 1=2, Grade 2=4, Grade 3=6
- Indicator 3-1 ”Balance of payment” : Grade 1= -2, Grade 2=2, Grade 3=6
  (See right three columns of Table 2.1)

The evaluation criteria for twelve indicators is basically determined through quantitative analysis as a basic rule and summarized as shown in the table. However, the two indicators for the Evaluation Indicator 2-1 "Technical capacity of managerial level staff" and Evaluation Indicator 4-1 "Organizational strength" are evaluated by qualitative means. These two indicators were evaluated through questionnaires, interviews and field surveys.

Table 2.1 Evaluation Criteria for the Activities of JCs

Evaluation Indicators	Weight	Evaluation Criteria		
Evaluation Category-1: Target Beneficiaries		Grade 1	Grade 2	Grade 3
Evaluation Indicator 1-1: Covering ratio to the governorate population (present) (%)	1	< 50	50	80
Evaluation Indicator 1-2: Covering ratio to the governorate population (future) (%)	1	< 50	50	80
Evaluation Indicator 1-3: Waste collection amount (present) (t/day)	1	< 50	50	100
Evaluation Indicator 1-4: Waste collection amount (future) (t/day)	1	< 50	50	100
Evaluation Category-2: Technical Capacity				
Evaluation Indicator 2-1: Technical capacity of managerial level staff	2	Low	Middle	High
Evaluation Indicator 2-2: Waste collection ratio in service area (present) (%)	2	< 50	50	80
Evaluation Category-3: Financial Viability				
Evaluation Indicator 3-1: Balance of payment	2	Deficit	Profit	High Profit
Evaluation Indicator 3-2: Cost benefit (B/C)	1	< 0.5	0.5	1
Evaluation Indicator 3-3: Expenditure per ton-waste (NIS/t)	1	100	50	< 50
Evaluation Indicator 3-4: Revenue per service population (NIS/t)	1	< 20	20	40
Evaluation Category -4 :Organizational Capacity				
Evaluation Indicator 4-1: Organizational strength	2	Low	Middle	High
Evaluation Indicator 4-2: Waste collection amount per capita-staff member (t/c/day)	2	< 1	1	2

Source: JICA Preparatory Survey Team

Evaluation Results

The result of evaluation is tabulated as shown in Table 2.2 and the summary in Table 2.3. As shown in the tables, Jenin and Hebron JCs were evaluated as Group A, where new equipment and/or facility can be operated/maintained without any difficulties. Jericho, Salfit and Tulkarem JCs were evaluated as Group B, where new equipment and/or facility can be operated/maintained if minimum support of soft components are provided. The other JCs were evaluated as Group C, where new equipment and/or facility cannot be operated/maintained under current capacities. Among the JCs in Group C, Bethlehem, Ramallah & Al-bireh and Qakiliya have a financial deficit in management. Bethlehem and Ramallah & Al-Bireh JCs evaluated as Group C are now supported by other donors.

Table 2.2 Scoring for Evaluation of the Activities of Each JCs

Result of Evaluation	Weight	Jenin	Hebron	Jericho	Salfit	Bethlehem	Ramallah & Al-Bireh	Tubas	Tulkarem	Qalkilya	Nablus	Jerusalem
Evaluation Category-1: Target Beneficiaries												
Indicator 1-1: Covering ratio to the governorate population (present) (%)	1	3	1	3	3	2	2	2	1	3	1	
Indicator 1-2: Covering ratio to the governorate population (future) (%)	1	3	3	3	3	3	3	3	3	3	3	
Indicator 1-3: Waste collection amount (present) (t/day)	1	3	2	2	2	3	3	2	2	2	2	
Indicator 1-4: Waste collection amount (future) (t/day)	1	3	3	1	2	3	3	1	3	3	3	
Evaluation Category-2: Technical Capacity												
Indicator 2-1: Technical capacity of managerial level staff	2	6	6	6	4	4	4	4	4	4	4	
Indicator 2-2: Waste collection ratio in service area (present) (%)	2	6	6	6	6	6	6	6	6	6	6	
Evaluation Category-3: Financial Viability												
Indicator 3-1: Balance of payment	2	6	6	2	2	-2	-2	2	6	-2	2	
Indicator 3-2: Cost benefit (B/C)	1	1	3	1	1	1	1	1	2	1	1	
Indicator 3-3: Expenditure per ton-waste (NIS/t)	1	1	3	2	2	1	3	3	3	3	2	
Indicator 3-4: Revenue per service population (NIS/t)	1	3	1	2	2	2	1	1	2	1	2	
Evaluation Category -4 :Organizational Capacity												
Indicator 4-1: Organizational strength	2	6	6	6	6	6	4	4	4	4	4	
Indicator 4-2: Waste collection amount per capita-staff member (t/c/day)	2	4	6	4	4	4	4	4	4	4	4	
Total Point	-	45	46	38	37	33	32	33	40	32	34	-
Evaluation	-	A	A	B	B	C	C	C	B	C	C	-

Note: Currently, Jerusalem JC is not organized as a joint council.

Source: JICA Preparatory Survey Team

Table 2.3 Summary of Evaluation of SWM Activities of JCs

Evaluation	Group A	Group B	Group C
Name of JC	・Jenin (45) ・Hebron (46)	・Jericho (38) ・Tulkarem (40) ・Salfit (37)	・Bethlehem (33) ・Nablus (34) ・Tubas (33) ・Ramallah (32) ・Qalkilya (32)
Remarks	Bethlehem, Ramallah and Qalkilya JCs are suffering deficit. The deficit amount of Qalkilya JC is very few. The donor activities are in progress in Bethlehem and Ramallah JCs and it is expectable that the activities including the financial situation of these JCs will improve.		

Source: JICA Preparatory Survey Team

3. Target JCs to be supported by the Project

Through the survey, the target JCs to be supported by the Project are selected using the criteria explained in the previous section.

However, even if these equipment are procured, the capacity of JCs for the sustainable utilization of the equipment are important matters. Especially, securing more than a certain level

of organizational, financial and continuous annual budget allocation for the running cost will be prerequisite. This means that the target JCs for the Project must have the certain organizational and financial capacities.

Through these evaluation, the JCs in Group A and Group B specified in Table 2.3, Jenin, Hebron, Jericho, Salfit and Tulkarem JCs, are selected as the target JCs to be supported by the Project.

4. Waste Collection and Transport Capacity in the Target Year (2015)

4.1 Waste Collection and Transport Capacity

The capacity of the existing vehicles for the waste collection and transfer/transport capacity of each target JC is computed as of 2015. The computation was carried out based on the following assumptions.

- The compactor trucks makes two trips per day and the loading ratio including the operation ratio is assumed at 80% to the rated loading capacity
- The Hook lift vehicle for waste collection makes 6-8 trips per day depending on the distance between the collection area and the disposal site. The loading ratio including the operation ratio is assumed at 80% to the waste container volume.
- The waste transfer/transport vehicle makes 2-3 trips per day depending on the distance between the transfer station and the waste disposal site. The loading ratio including the operation ratio is assumed at 80% to the container volume.
- The existing vehicles more than 10 years as of 2015 since the purchase are assumed as abolished vehicles and excluded from the carrying capacity computation.

Applying the same assumption in the precedent subsection for estimation of the existing vehicles, the capacity of the vehicles supplied by EU in 2012 were also estimated. It is assumed that all the vehicles supplied by EU will be operational in 2015. In addition, the waste collection and transport capacity of the vehicles to be supplied by the Project is added to examine if the total waste collection and transport capacity meet with the planned waste collection and transport capacity in 2015. The result of calculation is as shown in Table 4.1.

The result of survey is summarized in the followings.

- In each JC, the total waste collection and transfer/transport capacity of the existing and EU vehicles only is not sufficient for the planned waste collection amount in 2015.

- Almost all the JCs can meet with the planned waste collection amount in 2015 by adding the capacity of the vehicles to be supplied by the Project.
- However, the covering ratio of waste collection capacity to the planned waste collection amount in Jenin and Hebron JCs is estimated at 56% and 78% respectively, which do not cover 100 % of waste amount in the waste collection area. These two JCs must take measures to prolong the life of the existing vehicles.
- The waste transfer/transport capacity is "zero" at Jericho JC but waste transfer/transport operation will not be required for the time being if expansion of the final disposal site is implemented.
- In Jenin and Salfit JCs, the waste transfer/transport capacity of each JC will become 56% and 85% respectively and the capacities are not sufficient to the planned waste transfer/transport waste amount. In Jenin JC, the counter measures must be taken to have the direct hauling by the large waste collection vehicles. In Salfit JC, direct hauling by the large waste collection vehicles or utilization of the waste transfer/transport facilities of the private sector constructed at Beita in Nabulus Governorate will be the responding measures to solve the insufficient waste transfer/transport capacity.

The requested equipment and facilities for waste transfer station for Salfit JC were deleted since Salfit JC could not obtain the permission for construction of the transfer station from the Israel side by the time limit. Instead, the Salfit JC made a plan, for the provisional measures, to load waste by the existing backhoe and haul to the disposal site in Jenin by the waste transfer/transport vehicles and direct hauling by large waste collection vehicles. Accordingly, two units of $12m^3$ compactors, one unit of hook lift $32m^3$ with trailer and one unit of $40m^3$ waste containers were added to the request equipment to cope with the shortage of waste transfer/transport capacity.

In conclusion, almost all the target JCs will be able to meet with the planned waste collection, transfer/transport amount with the equipment to be supplied by the Project. And, the JCs running short of the capacity will be able to meet with the required capacity through provisional extension for the life of the existing vehicles, use of large waste collection vehicles for direct hauling, and use of private waste transfer/transport facilities.

Table 4.1 Evaluation of Waste Collection and Transfer/Transport Capacity in 2015 (t/day)

Item	Jenin	Hebron	Jericho	Salfit	Tulkarem
Collection Capacity of Existing Vehicles	86	100	51	32	115
Transfer Capacity of Existing Vehicles	29	67	0	0	61
Collection Capacity of EU Supply Vehicles	48	133	0	0	0
Transfer Capacity of EU Supply Vehicles	0	202	0	0	0
Total Collection Capacity	134	233	51	32	115
Total Transfer Capacity	29	269	0	0	61
Required Waste Collection Amount	262	395	58	68	141
Required Waste Transfer & Transport Amount	51	302	44	68	83
Balance (Shortage or Excess of Waste Collection Capacity)	-128	-161	-7	-36	-26
Balance (Shortage or Excess of Waste Transfer & Transport Capacity)	-23	-33	-44	-68	-22
Collection Capacity Computed by the Request Vehicles	14	75	8	30	18
Transport Capacity Computed by the Request Vehicles	0	67	0	58*[1]	45
Collection Capacity after Supply of the Request Vehicles	148	308	59	62	133
Transport Capacity after Supply of the Request Vehicles	29	336	0	58*[1]	106
Shortage/Excess of Waste Collection Amount after Procurement	-114	-86	1	-5	-7
Shortage/Excess of Waste Transport Amount after Procurement	-23	34	-44	-11	23
Waste Collection Coverage Ratio (%)	56%	78%	101%	92%	95%
Waste Transport Coverage Ratio (%)	56%	111%	0%	85%	128%

Note: *[1]:Jenin JC transfer/transport a part of waste of Salfit JC by the hook lift 32m^3 with trailer to be supplied to Jenin JC.
Source: JICA Preparatory Survey Team

4.2 Study for the Validity of Requested Quantity of Waste Containers

The requested waste containers include two types, i. e., waste containers placed in the collection area to receive discharged waste and the large waste containers for waste transfer/transport purpose. The survey is carried out to check whether the waste storage capacity of the requested waste containers are reasonable to the planned waste amount in 2015 in consideration of the remaining waste storage capacity of the existing containers and the containers supplied by EU. The following assumptions are made for the calculation.

1. Bulk density of waste stored in the waste container is determined at 0.15 t/m^3
2. Waste stored in the waste containers are determined at 80% to the storage capacity
3. The life of waste container is determined for five years and 20% of the waste containers are abolished every year.

The result of calculation based on above assumption is summarized as shown in Table 4.2.

Table 4.2 Study of Storage Capacity of Existing, EU supply and Requested Containers in 2015

JC	Existing Containers				EU Supply Containers			Existing +EU Storage Cap. (ton) (2015)	Requested Containers			Total Storage Cap. In 2015 (ton)	Waste Discharge Amounmt 2015 (t/d)	Balance Storage Cap. 2015 (t/d)	Ratio to the Waste Discharge Amount (%)
	Volume (m3)	Quantity	Storage Cap. (ton)	Quantity	Volume (m3)	Quantity	Storage Cap. In 2015 (ton)		Volume (m3)	Quantity	Storage Cap. In 2015 (ton)				
Jenin	1.1&4	540	85	34	1.1 & 4	721	147	181	1.1&4	630	94	275	262	13	5%
Hebron	180L&1.1	360	32	13	1.1 & 4	1,470	236	249	1.1	1,000	132	381	395	-14	-4%
Jericho	1.1,4 & 8	414	78	31		0	0	31	1.1,4,8&10	167	28	59	58	1	2%
Salfit	1.1	474	63	25		0	0	25	1.1,4,8&10	527	96	121	68	53	78%
Tulkalem	1.1	1,642	217	87	1.1	598	79	166	1.1,4& 8	525	80	246	141	105	74%

Source: JICA Preparatory Survey Team

Output of the calculation is summarized as follows.

- In Salfit and Tulkarem JCs, the storage capacity after including the requested containers have excess amount by 78% and 74% to the waste discharge amount in 2015. The requested quantity of these two JCs are too much.
- In other JCs, the requested quantity of the containers almost meet with the planned waste discharge amount in 2015.

The numbers of 1.1m^3 waste containers requested from Salfit and Tulkarem JCs, 500 units each, were reduced to 250 units each since the waste storage capacity after procurement exceed largely the required storage capacity in 2015.

5. Summary of Quantity of Equipment Procurement

After adjustment through the survey of validation of the requested quantity, the equipment list to be procured by the Project is shown in Table 5.1.

Table 5.1 Summary of Equipment Procurement Quantity

Item	Total	Jenin	Hebron	Jericho	Salfit	Tulkarem
1． Waste Container						
Container ：1.1m³	2,250	600	1,000	150	250	250
Container ：4m³	62	30	0	10	2	20
Container ：8m³	12	0	0	2	5	5
Container ：10m³	25	0	0	5	20	0
Container ：40m³	16	4	5	0	1	6
2． Waste Collection Vehicle						
Compactor ：5 m³	7	2	1	2	2	0
Compactor ：8 m³	2	1	1	0	0	0
Compactor ：12 m³	6	0	2	0	4	0
Compactor ：19 m³	4	0	3	0	0	1
3． Other Vehicles						
Dump Truck for Waste：15 m³	2	1	0	0	1	0
Dump Truck ：2 ton	1	0	0	1	0	0
Backhoe Loader ：1 m³	1	0	1	0	0	0
Grapple Crane ：19 m³	2	0	1	0	1	0
Hook Lift Truck ：10 m³	2	0	0	0	1	1
Hook Lift with Trailer ：32 m³	4	1	1	0	1	1
4． Heavy Machine						
Skid Steer Loader ：60HP	5	1	1	1	1	1
Track Excavator with hydraulic hammer	1	1	0	0	0	0
Track Loader ：180HP	1	1	0	0	0	0
Wheel Loader：185HP	1	1	0	0	0	0

6. Civil and Building Works

The final disposal facility, transfer station and MRF (Material Recovery Facilities) in Jericho JC are summarized as below.

Table 6.1 Summary of Civil and Building Facilities

Item	Specifications
1. Extension of Final Landfill (Jericho JC)	
1.1 Type of Landfill	Semi-aerobic Landfill Capacity : Approx. 50,000 m^3
1.2 Hauling road	Width : 5 m Asphalt pavement
1.3 Fence	Net fencing Height :1.8 m
1.4 Drainage system	U-shaped gutter : 30 cm
1.5 Liner sheet	HDPE 1.5 mm
1.6 Leachate collection line	Main : 400 mm (porous pipe), PVC Branch : 200 mm (porous pipe), PVC
1.7 Gas collection system	Drum, covered with gravel, PVC Dia. 200mm
1.8 Leachate Pond	Capacity : Approx. 1,400 m^3 Sealing structure : HDPE 2mm
2. Material Recovery Facility	
2.1 Structure	Steel beam structure
2.2 Architectural area	Approx. 250 m^2
2.3 Recovery method	Collecting By hand
3. Transfer station	
3.1 Structure	RC structure(height : 4 m, width : 18 m
3.2 Input stage	RC structure : height 4 m, width 18 m
3.3 Working area	Asphalt pavement : Approx. 700 m^2

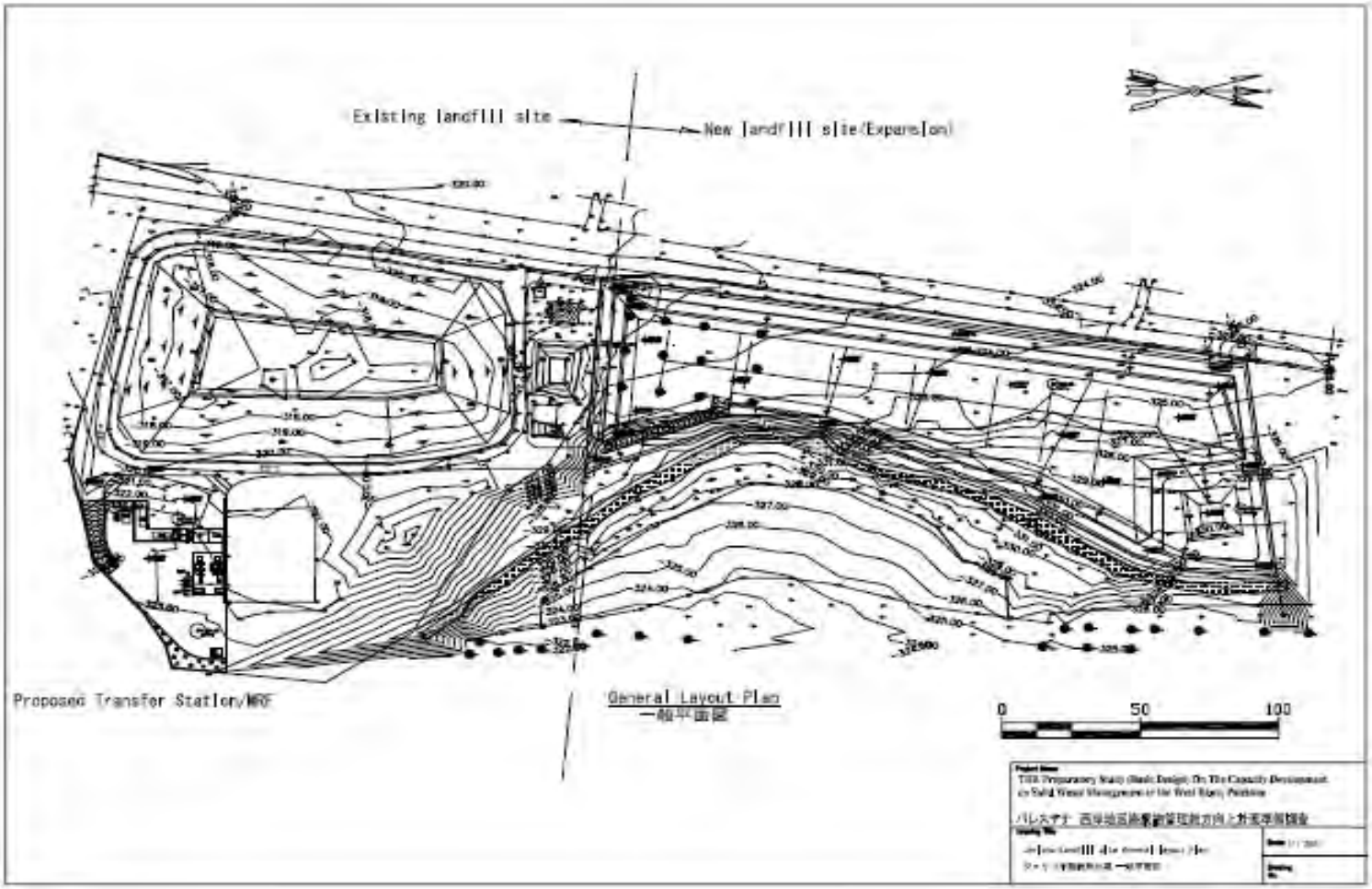


Figure 6.1 Plan of Extension of Final Landfill (Jericho JC)

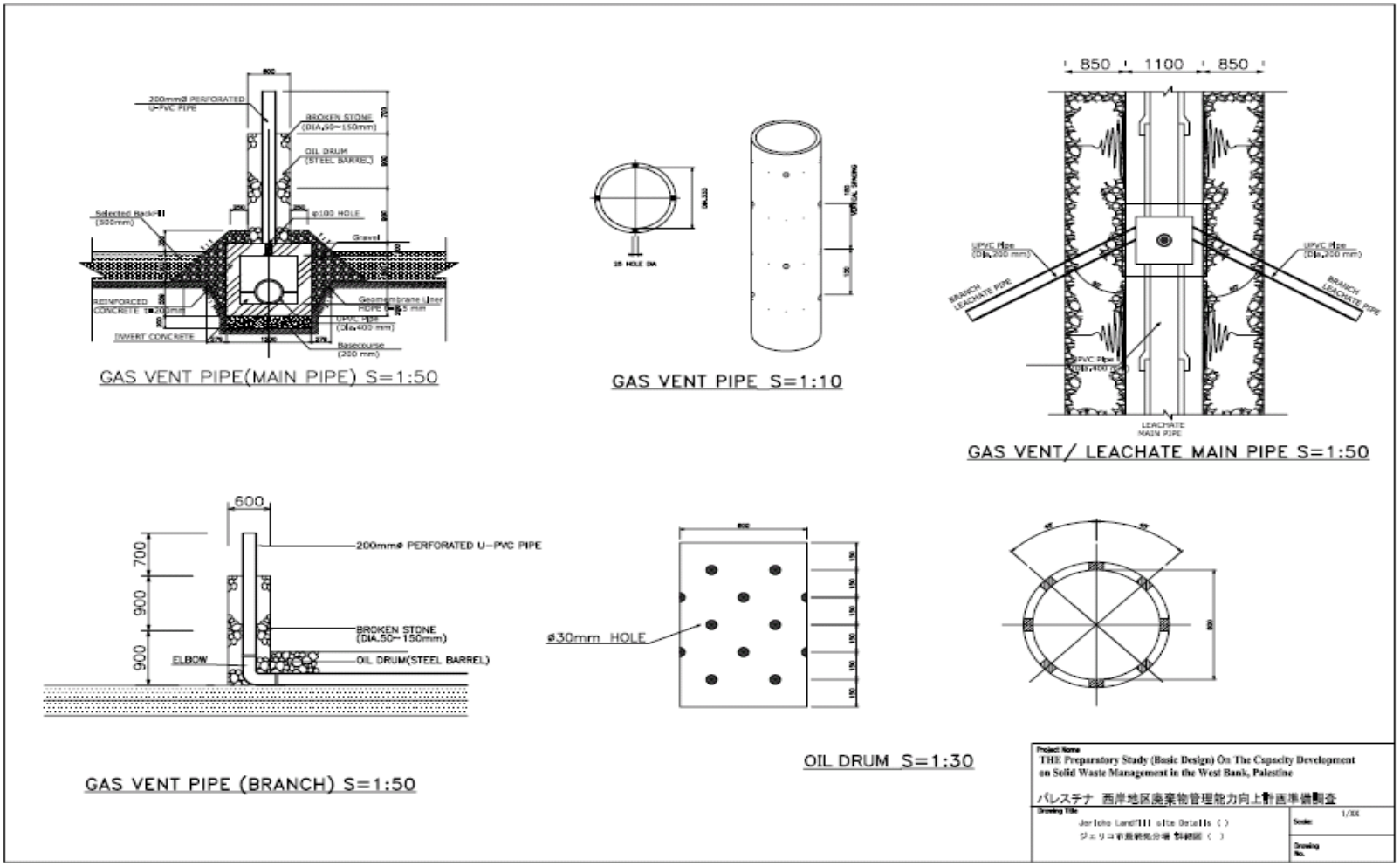


Figure 6.2 Details of Final Landfill Facilities (1/2) (Jericho JC)

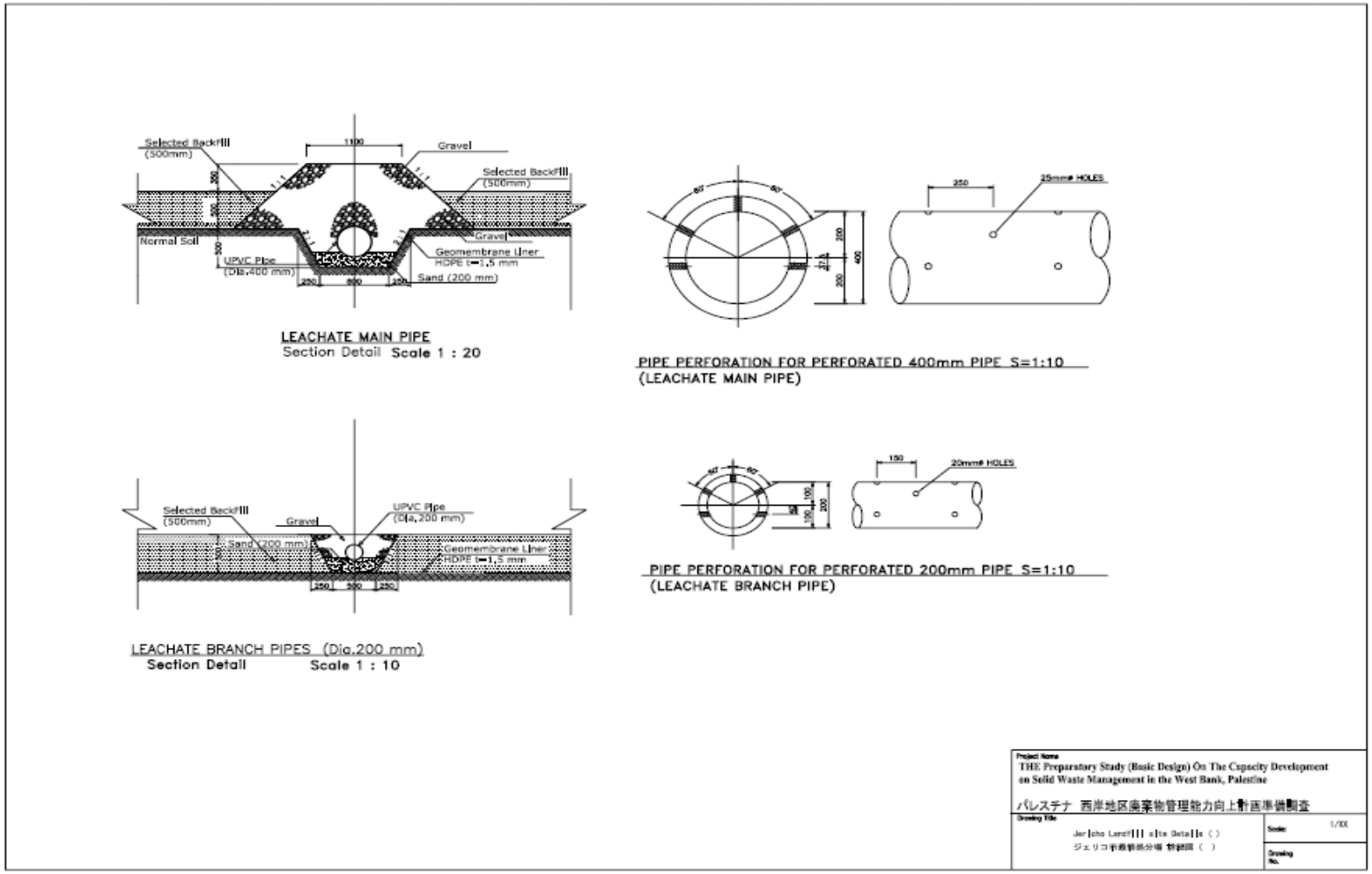


Figure 6.3 Details of Final Landfill Facilities (2/2) (Jericho JC)

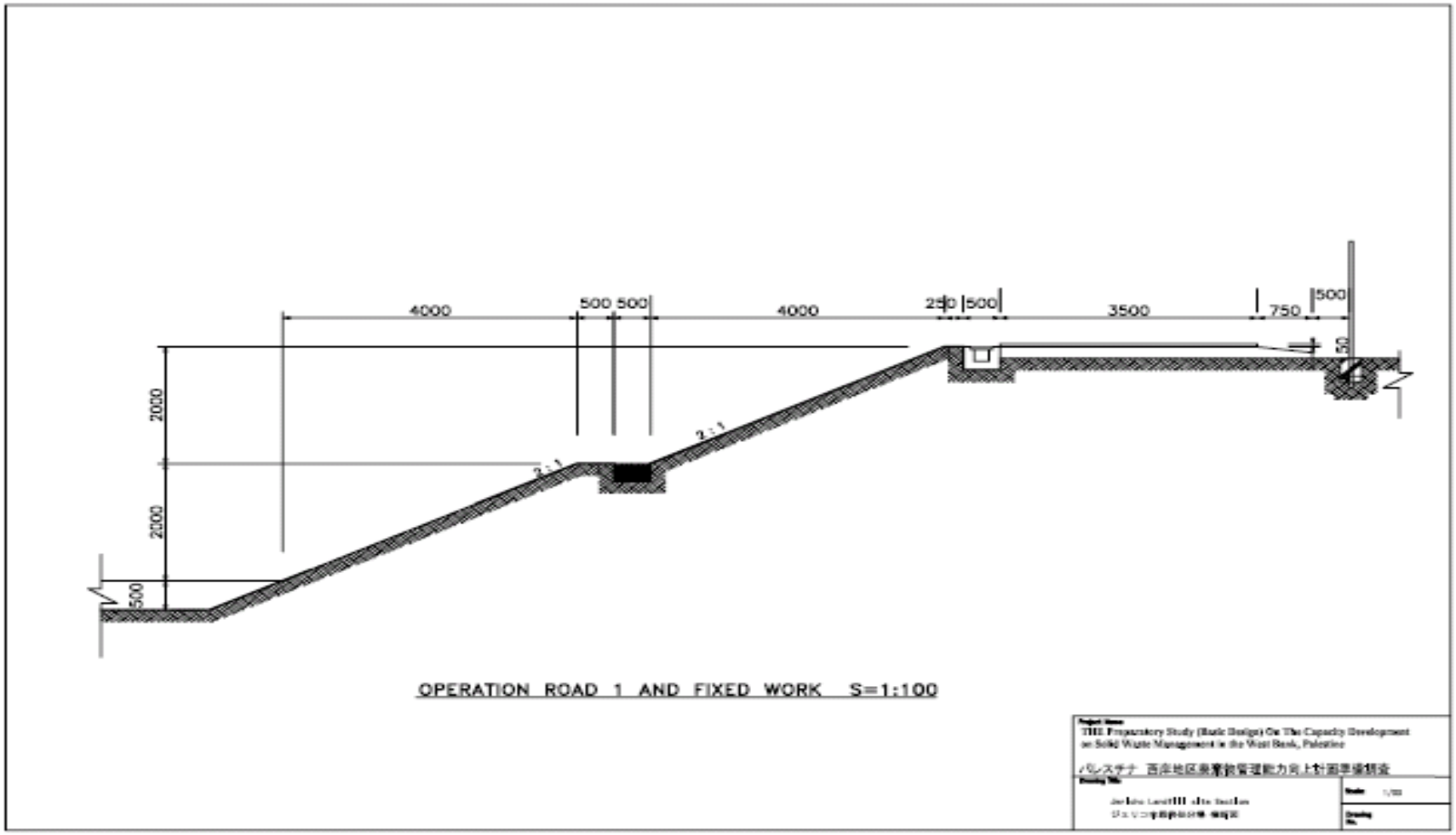


Figure 6.4 Cross Section of Final Landfill Facilities (Jericho JC)

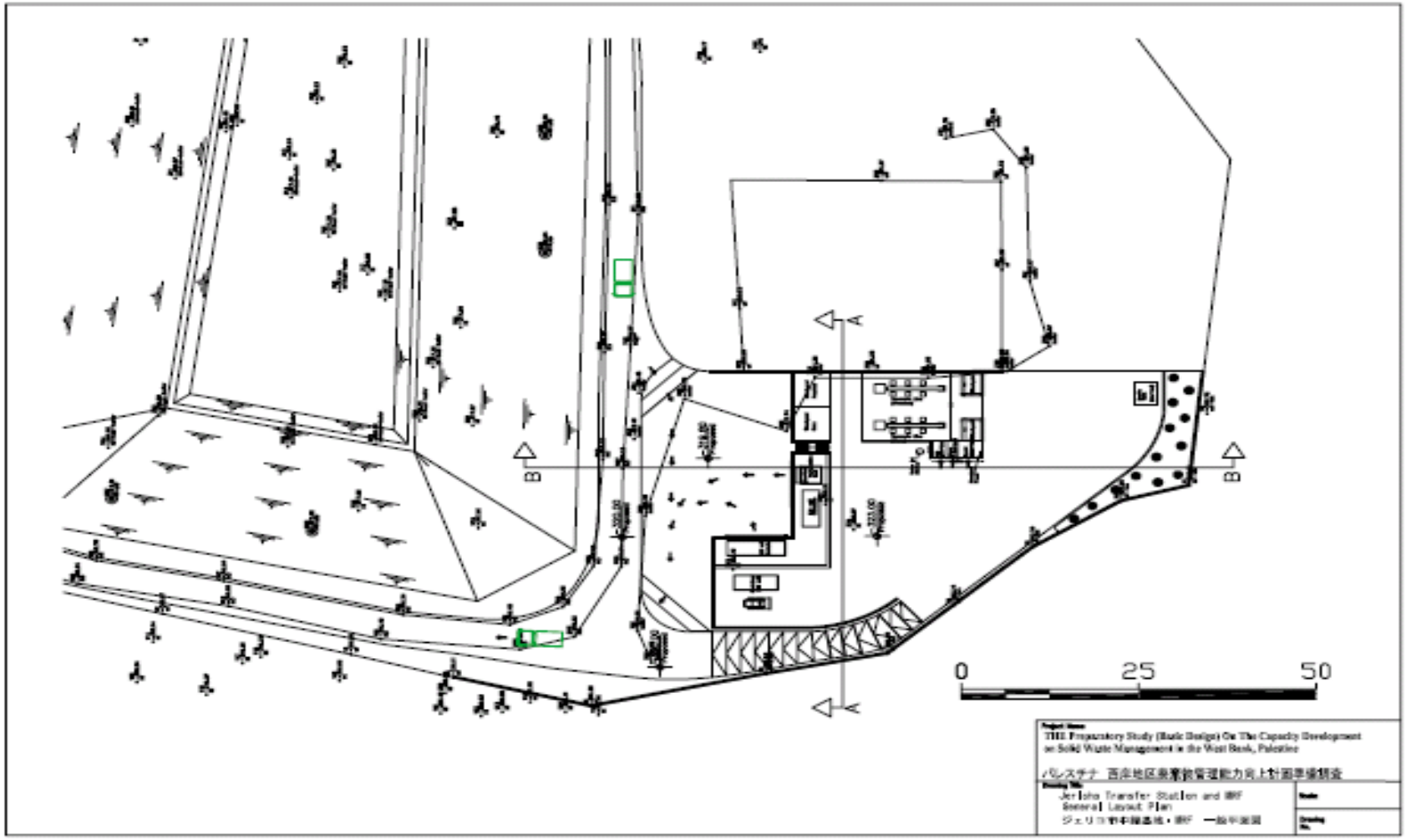


Figure 6.5 Transfer Station and Material Recovery Facilities (MRF) (Jericho JC) - Plan

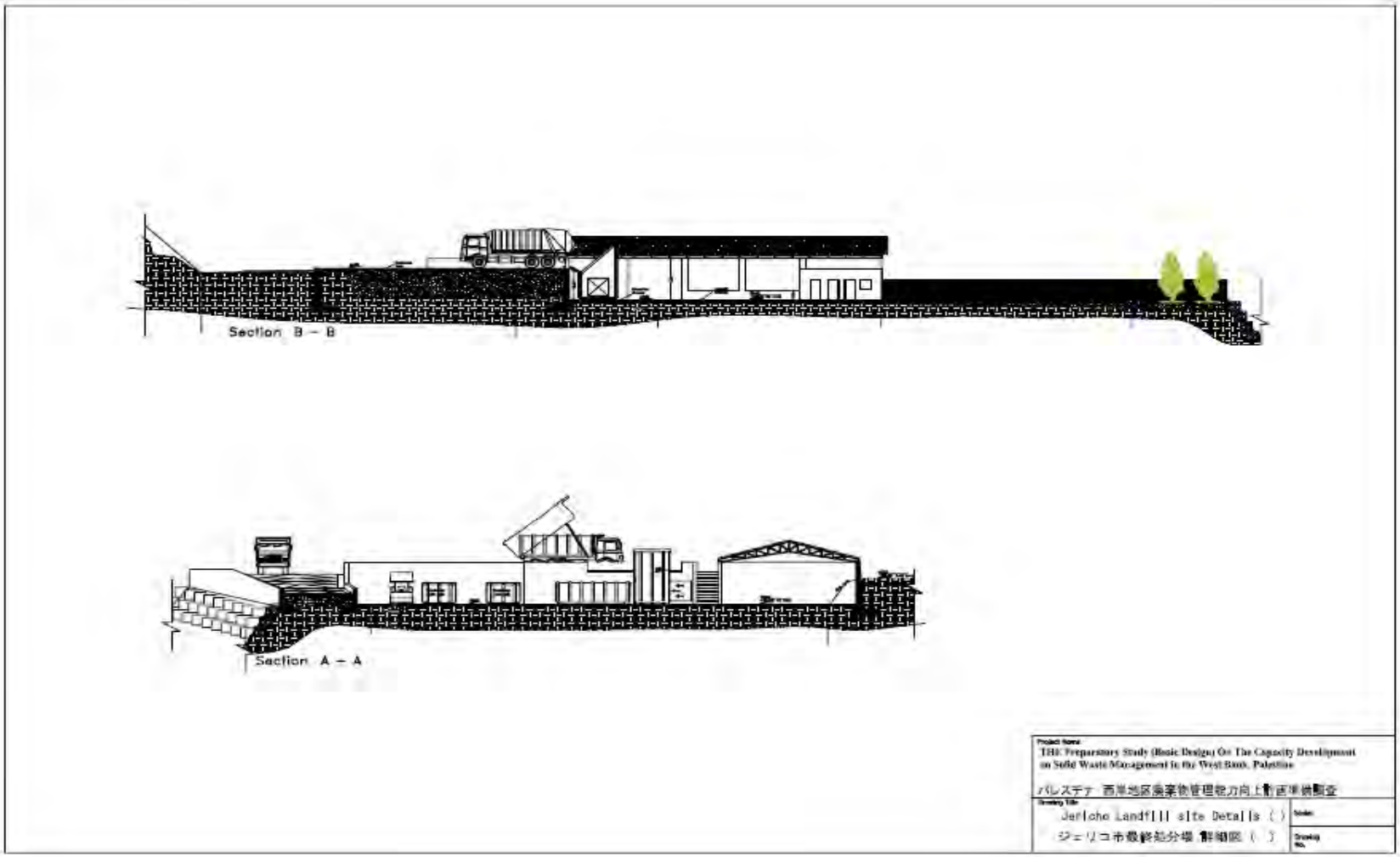


Figure 6.6 Transfer Station and Material Recovery Facilities (MRF) (Jericho JC) – Cross Sections

7. Implementation Schedule

The expected implementation schedule of the Project is shown as below.

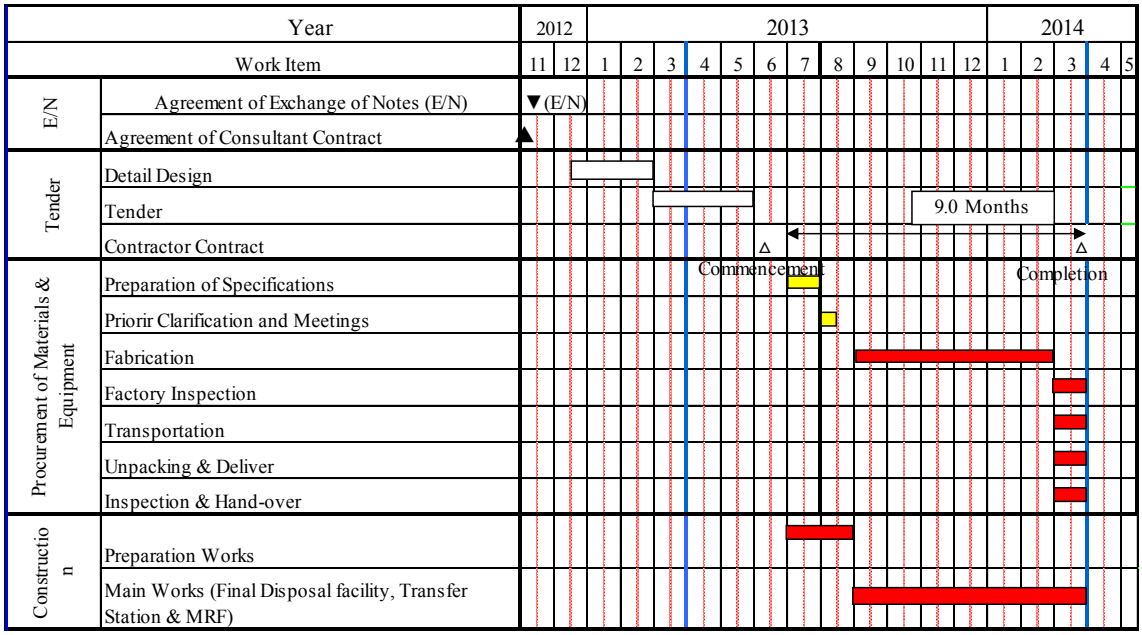


Figure 7.1 Implementation Schedule

8. Soft Component Plan

The soft component on collection, transport and recycling will be implemented by the Project immediately after the procurement of equipment. The soft component plan is shown as below.

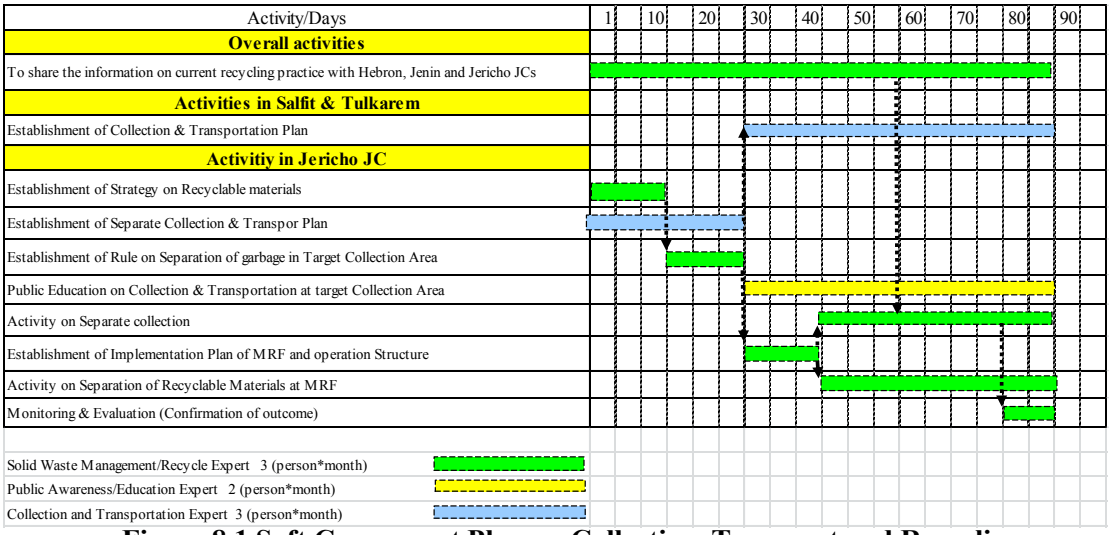


Figure 8.1 Soft Component Plan on Collection, Transport and Recycling

9. Prerequisite Condition and Undertakings of Palestine Side for Implementation of the Project

The following shows the prerequisite and undertaking of Palestinian Side for implementation of the project.

(1) Prerequisite

1) Tax Exemption

The taxes such as import duty is handled by the Israel agency(s) concerned. There might have some possibilities of unexpected changes of the policies on the matter concerned. Therefore, the Palestinian side shall collect all the necessary latest information and grasp the procedures for tax exemption to avoid the problems in the course of tax clearance processes.

2) Obtaining the Environmental Permission of Palestine Environmental Impact Assessment System

With regard to the final disposal facilities, waste transfer station and material recovery facilities in Jericho shall take the appropriate procedures for obtaining the necessary permissions from the Ministry of Environmental Affairs and other necessary construction permissions from the relevant authorities.

3) Securing the Place and Storage for the Procured Equipment and Spare Parts

Each JC shall secure sufficient secured area for parking the procured waste collection vehicles and heavy machines and the storage of spare parts as well.

(2) Undertakings of Palestinian Side

1) Securing the Staff for Operation and Maintenance

Regarding new equipment to be procured under the Project such as the waste collection and transport vehicles, heavy machines, final disposal facilities and material recovery facilities (MRF), the adequate number of staff including truck drivers, waste collection workers, operation and maintenance staff of the facilities shall be employed to make effective use of the equipment, vehicles and the facilities.

2) Securing the Budget for Operation and Maintenance

It is necessary to secure the additional budget for operation and maintenance of the new vehicles, heavy machines and the solid waste management facilities. In each JC, superannuated vehicles, equipment and machines are used with frequent repair. As for collection vehicles, it is economical to replace the vehicles around 10 years when taking into account the repair cost and it is necessary to prepare the long-term budget planning for the periodical replacement of the vehicles. Furthermore, it is desirable to carry out periodical inspection such as 6 month intervals for the preventive measures of breakdown. Expenditure of all JCs will be increased for operation and maintenance cost for new equipment, all JCs shall make effort to collect proper waste charge from residents of collection area. The amount of increase of O & M Cost is shown in Table 9.1.

Table 7.1 Increase of O & M Cost per year after the completion of the Project

(Unit : 1,000NIS)

Item JCs	Jenin	Hebron	Jericho	Salfit	Tulkarem
A. Operation Cost					
（1）Fuel Cost	374	725	31	666	436
（2）Personnel Cost for Operation	343	612	147	661	171
B. Repair and Maintenance Cost	65	150	15	155	60
C. Depreciation Cost	144	333	34	319	132
Total	926	1,820	227	1,801	799

Source: JICA Preparatory Survey Team

3) Linkage with Other Donors Activities

Currently, the assistance project for solid waste management has been implemented by EU for provision of equipment, machinery and the technical cooperation. In addition, in Hebron, the construction of large scale regional landfill has been implemented through cooperation of the World Bank. GIZ and KfW are assisting the construction of the regional landfill in Ramallah. The basic system of the national strategies on solid waste management will be established with those construction works of the regional landfill. Meanwhile, in Bethlehem JC, the technical assistance has been carried out by the Italian Corporation. Jenin, Hebron and Jericho JCs, advanced JCs in solid waste management, are planned to implement the soft component to examine the direction and coordination for recycling activities. It is necessary to link with the activities of other donors for the implementation of the Project.

10. Major Undertakings

The major undertaking for the implementation of the Project is shown as below.

Table 10.1 Major Undertakings to be taken by Each Government

No.	Items	To be covered by Grant Aid	To be covered by Recipient Side
1	to secure [a lot] /[lots] of land necessary for the implementation of the Project and to clear the [site]/[sites], ground leveling and embankment of the land;		●
2	Construction of facilities (Final disposal facility, transfer station & MRF)		
	1) The structure and building	●	
	2) The gates and fences in and around the site	●	
	3) The parking lot	●	
	4) The road within the site	●	
	5) The road outside the site	●	
3	Equipment and Materials for Collection and Transport of Solid Waste		
	Container, Compactor Truck, Grapple Crane, Transfer Vehicle, Backhoe Loader, Wheel Loader, Dump Truck, etc.	●	
4	Electricity, water and others which are necessary for implementation of the project outside the site.		
	1) Electricity		
	Transmission line connected to the site		●
	Wiring inside the site	●	
	Breaker & transformer	●	
	2) Water		
	Connection pipe to the site from main distribution pipe		●
	Piping inside the site (Water receiving tank, elevated reservoir)	●	
	3) Drainage		
	Connection pipe to the site from main drainage pipe (stormwater pipe)		●
	Piping inside the site (Toilet, human sewage, stormwater, others)	●	
	4) Utility Gas		
	Connection pipe to the site		●
	5) Telephone		
	Connection line to the distribution panel from the site office		●
	Connection of lines inside the site office	●	
	6) Furniture & fixtures		
	General furniture		●
	Office equipment	●	
5	To ensure prompt unloading and customs clearance of the products at ports of disembarkation in the recipient country and to assist internal transportation of the products		
	1) Marine (Air) transport of the Products from Japan or Third Country to the recipient country	●	
	2) Tax exemption and custom clearance of the Products at the port of disembarkation		●
	3) Internal transport from the port of disembarkation to the project site		●
6	Tax		
	To ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the purchase of the products and the services be exempted		●
7	Others		
7.1	To accord Japanese nationals 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 recipient country and stay therein for the performance of their work		●
7.2	Appropriate and effective maintenance of the facility to be required for the project		●
7.3	To bear all the expenses, other than those covered by the Grant, necessary for the implementation of the Project		●

8	To bear the following commissions paid to the Japanese bank for banking services based upon the B/A		●
	1) Advising commission of A/P		●
	2) Payment commission		●
9	To give due environmental and social consideration in the implementation of the Project.		●
9.1	To hold stakeholder meetings		●
9.2	To execute Environmental Impact Assessment and obtain Permission of EIA related Approval		●
9.3	To prepare Resettlement Action Plan (RAP) if necessary and their monitoring		●

(B/A : Banking Arrangement, A/P : Authorization to pay)

11. Environmental and Social Consideration

The application for environmental approval was submitted by Jericho JC to the Ministry of Environmental Affairs for expansion of the landfill facilities and material recovery facilities. The type of EIA (EIA or IEE) will be decided based on the TOR which will be specified by the Ministry of Environmental Affairs. Jericho JC will prepare the relevant documents in accordance with the type of EIA.

12. Project Evaluation

12.1 Validity

The Project is perfectly harmonized with the needs and development policies of PNA. Also, the Project is evaluated with high priority because Jericho JC receive business waste from the Agro-industry Park, which is now in construction under the assistance of the Japanese Government.

Major component of the Project is “Provision of collection/transportation equipment” for over an half million beneficiaries(residents) and operation of the supplied equipment/vehicles/facilities will contribute for improvement of public sanitation and the supplied equipment/vehicles will be operated by their own skill and financial capacity.

12.2 Effectiveness

(1) Quantitative effectiveness

1) Improvement of collection capacity

Collection capacity by the Project is shown in Table 12.1. The capacity is calculated based on 8 hours working time. Hebron and Jenin JC need over time to collect all solid waste in the services area. Jenin JC is required to take some measures to prolong the life of the existing collection vehicle or procure new equipment.

Table 12.1 Improvement of Collection Capacity by the Project

Indexes	Collection Capacity （8hr working time）	
	Present Capacity (2011)	Future Capacity by Project Implementation (2017)
Hebron JC: Collection capacity (t/day)	46	308
Jenin JC: Collection capacity (t/day)	204.7	148
Jericho JC: Collection capacity (t/day	45	59
Salfit JC: Collection capacity (t/day)	53.5	62
Tulkarem JC: Collection capacity (t/day)	30.1	133
Recycle amount in Jericho JC (Plastic: kg/day）	0	800
Recycle amount in Jericho JC （Metal: kg/day）	0	200

2) Reduction of Dumping sites

Scattered open dumping sites will be closed by improvement of the waste collection, transfer, and transport capacities as shown in Table 12.2.

Table 12.2 Number of Open Dump Sites

JC	Number of existing open dump sites (2011)	Number of future open dump sites (2017)
Jenin JC	1	0
Hebron JC	17	0
Jericho JC	1	0
Salfit JC	10	0
Tulkarem JC	0	0
Total	29	0

Note: The figures in the table denote the number of open dump site locate within the present waste collection service area of JCs

3) Qualitative Effectiveness

Input of waste collection and transfer/transport equipment will increase physically the waste collection amount and hauling waste from the place to live to the remote landfill site for contribution to the improvement of the surrounding environmental and public sanitation. In addition, expansion of sanitary landfill and construction of material recovery facilities with the function for waste transfer station in Jericho JC will be able to reduce the cost burden for financial improvement. The good practices or advanced technology in 3R in Jenin, Hebron and Jericho JCs will discriminate to the other JCs and municipalities in the West Bank.

4) Conclusion

As described in the previous sections, the Project is expected to bring about significant effects for improvement of public sanitation, quality of life and the environment in the service area of Jenin,

Hebron, Jericho, Salfit and Tulkarem JCs for more than half million beneficiaries. Therefore, the validity and effectiveness of the Project to implement under the Project is confirmed. In addition, implementation of the soft component programs will promote the synergistic effects to the Project.

(**Reference: Environmental Checklist and environmental monitoring sheet)**

The following mitigation measures should be taken at the project stage of construction and operation based on the scoping results.

During Construction

- Mitigation measures toward noise, vibration and traffic
- Mitigation measures toward dust to be generated by the construction works

At Operation

- Noise and vibration due to heavy equipment and traffic disturbance due to the collection vehicles
- Odor and leachate water to be generated by piled waste

Environmental Checklist and environmental monitoring sheet are shown as follows.

Environmental Checklist

Category	Environmental Item	Main Check Items	Confirmation of Environmental Considerations
1 Permits and Explanation	(1) EIA and Environmental Permits	① Have EIA reports been officially completed? ② Have EIA reports been approved by authorities of the host country's government? ③ Have EIA reports been unconditionally approved? If conditions are imposed on the approval of EIA reports, are the conditions satisfied? ④ In addition to the above approvals, have other required environmental permits been obtained from the appropriate regulatory authorities of the host country's government?	① The environmental application was submitted to THE MINISTRY OF ENVIRONMENTAL AFFAIRS for the proposed project and is currently under process. The type of EIA (EIA or IEE) will be decided based on the TOR which will be specified by THE MINISTRY OF ENVIRONMENTAL AFFAIRS. Jericho JC will prepare the relevant documents in accordance with the type of EIA. ② The environmental application is under process for future approval of THE MINISTRY OF ENVIRONMENTAL AFFAIRS. ③ The conditions for approval of the EIA will be confirmed in the future process. ④ Not necessary.
	(2) Explanation to the Public	① Are contents of the project and the potential impacts adequately explained to the public based on appropriate procedures, including information disclosure? Is understanding obtained from the public? ② Are proper responses made to comments from the public and regulatory authorities?	① The project site has no dwelling houses nearby. In addition, the proposed project has been widely known to the public because of its high public benefit and its project purpose of improvement of urban sanitary condition. The holding of stakeholder meetings will be discussed in THE MINISTRY OF ENVIRONMENTAL AFFAIRS in the process of EIA. ② Yes, they will be made.
2 Mitigation Measures	(1) Air Quality	① Do air pollutants, such as sulfur oxides (SOx), nitrogen oxides (NOx), and soot and dust, and dioxins emitted from various sources, such as incinerators, and vehicles used for waste collection and transportation comply with the country's emission standards and ambient air quality standards?	① EURO V will be applied to the emission control as the specification of proposed collection / transfer vehicles. Incinerator is not covered in the components of the Project.
	(2) Water Quality	① Do effluents from various facilities comply with the country's effluent standards and ambient water quality standards? ② Does the water quality of leachates from the waste disposal sites comply with the country's effluent standards and ambient water quality standards? ③ Are adequate measures taken to prevent contamination of surface water and groundwater by these effluents and leachates?	① The leachate water from the proposed sanitary landfill will be dried up at the collection pond by utilizing local dry metrological condition in order to avoid its discharge to external water body. ② The leachate water from the proposed sanitary landfill will be dried up at the collection pond by utilizing local dry metrological condition in order to avoid its discharge to external water body. ③ Water quality monitoring will be made at the surrounding wells.
	(3) Wastes	① Are wastes, such as treatment residues, cinder, and fly ash generated from crushing and segregation processes, and diverted wastes from composting process properly treated and disposed of in accordance with the country's standards? ② Are hazardous and dangerous wastes properly segregated from other wastes,	① MRF (Material Recovery Facility) will be constructed by the Project toward reduction of the incoming waste amount at the final disposal facility. The final disposal facility will be designed as a sanitary landfill type which complies with international guidelines or standards for appropriate disposal. ② The proposed project is planned only

		stabilized, treated, and disposed of in accordance with the country's standards?	for general municipal waste.
	(4) Soil Contamination	① Are adequate measures taken to prevent contamination of soil and groundwater by leachates from the waste disposal sites?	① A seepage impermeable liner at the bottom of the proposed final disposal facility will collect the leachate water and convey it through laid perforated pipes to a collection pond also covered with impermeable sheet and dry it up. Therefore, the proposed final disposal facility will not pollute soil and groundwater.
	(5) Noise and Vibration	① Do noise and vibrations generated by the facility operations (especially incinerators, waste segregation and crushing facilities), and vehicle traffic for waste collection and transportation comply with the country's standards?	① No dwelling houses which should be protected from noise impact are identified in and around the project sites. Only few number of vehicles per day runs around the project site and this will not cause adverse impact of noise.
	(6) Odor	① Are there any odor sources? Are adequate odor control measures taken?	① No dwelling houses which should be protected from odor impact are identified in and around the project sites. The proposed facility will carry out soil covering at the landfill area to keep sanitary condition.
3 Natural Environment	(1) Protected Areas	① Is the project site located in protected areas designated by the country's laws or international treaties and conventions? Is there a possibility that the project will affect the protected areas?	① No protected area nor nature reserve has been identified at the project site.
	(2) Ecosystem and biota	① Does the project site encompass primeval forests, tropical rain forests, ecologically valuable habitats (e.g., coral reefs, mangroves, or tidal flats)? ② Does the project site encompass the protected habitats of endangered species designated by the country's laws or international treaties and conventions? ③ If significant ecological impacts are anticipated, are adequate protection measures taken to reduce the impacts on the ecosystem? ④ Is there a possibility that the project will adversely affect aquatic organisms? If impacts are anticipated, are adequate measures taken to reduce the impacts on aquatic organisms? ⑤ Is there a possibility that the project will adversely affect vegetation and wildlife? If impacts are anticipated, are adequate measures taken to reduce the impacts on vegetation and wildlife?	① No important ecosystem has been identified at the project site. ② There is no habitat of important species of flora and fauna because the surrounding area of the project site is adjacent to existing final landfill. ③ The adverse impact on ecosystem will be minimum because the surrounding area of the project site is adjacent to existing final landfill. ④ The surrounding area is an arid land and no aquatic organism has been identified. ⑤ No important ecosystem has been identified.

	(3) Management of Abandoned Sites	① Are environmental protection and restoration plans (such as landfill gas and leachate collection and treatment systems, prevention of illegal dumping, and reforestation) after facility closure considered? ② Is a sustainable management framework for the abandoned sites established? ③ Are adequate financial provisions secured to manage the abandoned sites?	① Mitigation measures of gas vent pipes and impermeable seepage control liner is planned for the proposed final disposal facility. ② The management structure of the decommissioning of the abandoned sites will be discussed with PNA (Palestinian National Authority) toward its realization. ③ The management structure of the decommissioning of the abandoned sites will be discussed with PNA (Palestinian National Authority) in order to secure appropriate amount of budget for its management.
4 Social Environment	(1) Resettlement	① Is involuntary resettlement caused by project implementation? If involuntary resettlement is caused, are efforts made to minimize the impacts caused by the resettlement? ② Is adequate explanation on relocation and compensation given to affected persons prior to resettlement?③ Is the resettlement plan, including proper compensation, restoration of livelihoods and living standards developed based on socioeconomic studies on resettlement? ④ Does the resettlement plan pay particular attention to vulnerable groups or persons, including women, children, the elderly, people below the poverty line, ethnic minorities, and indigenous peoples? ⑤ Are agreements with the affected persons obtained prior to resettlement? ⑥ Is the organizational framework established to properly implement resettlement? Are the capacity and budget secured to implement the plan?⑦ Is a plan developed to monitor the impacts of resettlement?	No resettlement will occur because no dwelling houses nor offices have been identified at the project sites.
4 Social Environment	(2) Living and Livelihood	① Is there a possibility that the project will adversely affect the living conditions of inhabitants? Are adequate measures considered to reduce the impacts, if necessary? ② Are considerations given to the existing recovery systems, including waste pickers? ③ Is there a possibility that waste transportation will adversely affect the regional traffic? ④ Is there a possibility that effluents from the project and leachates form the waste disposal sites will adversely affect fisheries and other water uses by local inhabitants (especially drinking water)? ⑤ Is there a possibility that pathologic insects or other disease vectors will breed as a result of the project?	① The adverse impact on local residents will be minimum since there is no residential houses in the neighboring area at least within 500m radius from the site. ② There is a policy to permit the activities of waste pickers at the the proposed MRF (Material Recovery Facility). ③ The traffic amount near the project site is very few and the planned number of procured vehicles is also few numbers and it will not cause significant impact on local traffic. ④ The leachate water from the proposed final disposal facility will not be discharged to surrounding water area. However, water quality monitoring is planned at the surrounding wells not to cause adverse impact on water use of surrounding farmers. ⑤ Soil covering will be implemented to prevent the generation of hygiene

			pests.
	(3) Heritage	① Is there a possibility that the project will damage the local archeological, historical, cultural, and religious heritage sites? Are adequate measures considered to protect these sites in accordance with the country's laws?	① No important heritage or historical sites have been identified at the surrounding area of the project site.
	(4) Landscape	① Is there a possibility that the project will adversely affect the local landscape? Are necessary measures taken?	① There is no important landscape near the project site.
	(5) Ethnic Minorities and Indigenous Peoples	① Does the project comply with the country's laws for rights of ethnic minorities and indigenous peoples? ② Are considerations given to reduce the impacts on culture and lifestyle of ethnic minorities and indigenous peoples?	① No ethnic minorities nor indigenous peoples to be affected by the project have been identified.
5 Others	(1) Impacts during Construction	① Are adequate measures considered to reduce impacts during construction (e.g., noise, vibrations, turbid water, dust, exhaust gases, and wastes)? ② If construction activities adversely affect the natural environment (ecosystem), are adequate measures considered to reduce impacts? ③ If construction activities adversely affect the social environment, are adequate measures considered to reduce impacts? ④ Are intangible measures being planned and implemented for individuals involved in the project, such as safety training (including traffic safety and public sanitation) for workers etc.?	① Measures of pollution control for air, noise and traffic will be taken at construction stage. ② No important ecosystem has been identified at the surrounding area of the project site. ③ No adverse impact on social environment is estimated by the construction work of the proposed project. ④ The selected contractor will carry out safety training (including traffic safety and public sanitation) for workers during construction stage.
	(2) Monitoring	① Does the proponent develop and implement monitoring program for the environmental items that are considered to have potential impacts? ② Are the items, methods and frequencies included in the monitoring program judged to be appropriate? ③ Does the proponent establish an adequate monitoring framework (organization, personnel, equipment, and adequate budget to sustain the monitoring framework)?	① Environmental monitoring of air (dust), noise, water quality and traffic will be implemented before, during and after construction. ② The monitoring items, method and frequency will be decided by referring international standards and other projects. ③ The monitoring framework of the project proponent will be discussed with PNA to build its framework. ④ The reporting method and its frequency will be discussed with THE MINISTRY OF

		④ Are any regulatory requirements pertaining to the monitoring report system identified, such as the format and frequency of reports from the proponent to the regulatory authorities?	ENVIRONMENTAL AFFAIRS.
6 Note	Reference to Checklist of Other Sectors	① Where necessary, pertinent items described in the Forestry Projects checklist should also be checked (e.g., projects including large areas of deforestation).	① Not applicable.
	Note on Using Environmental Checklist	① If necessary, the impacts to transboundary or global issues should be confirmed (e.g., the project includes factors that may cause problems, such as transboundary waste treatment, acid rain, destruction of the ozone layer, or global warming).	① The proposed project will not cause transboundary or global issues.

1) Regarding the term "Country's Standards" mentioned in the above table, in the event that environmental standards in the country where the project is located diverge significantly from the World Bank Safeguard Policy as a general rule, or the International Finance Corporation Performance Standards for private sector limited or non-recourse project finance cases, or other standards established by other international financial institutions, or other internationally recognized standards or good practices established by developed countries such as Japan regarding environmental and social considerations, the background and rationale for this deviation, and the measures to rectify it if necessary, are to be confirmed. In cases where local environmental regulations are yet to be established in some areas, considerations should be based on comparisons with international standards such as the World Bank Safeguard Policy, and appropriate standards of other countries(including Japan).
2) Environmental checklist provides general environmental items to be checked. It may be necessary to add or delete an item taking into account the characteristics of the project and the particular circumstances of the country and locality in which it is located.

MONITORING FORM

1. Responses/Actions to Comments and Guidance from Government Authorities and the Public

	Monitoring item	Monitoring Results during Report Period
1	EIA and Environmental Permits	Project proponent (MOLG and Jericho JC) has already made an application for environmental permits to The Ministry of Environmental Affairs in May, 2012 and is currently waiting for their reply in relation to the process on EIA.
2	Preparation of EIA Reports	Project proponent will prepare EIA Reports, upon necessity, to be required for the proposed project in accordance with the TOR prepared by The Ministry of Environmental Affairs after their screening in the process.
3	Approval of EIA Reports	The approval of EIA Reports will be obtained after The Ministry of Environmental Affairs's examination of the reports which the project proponent will prepare.

2. Mitigation Measures

Environmental monitoring will be conducted for the items of air (dust), water quality, noise and vibration to monitor mitigation measures. The detail of the monitoring is shown as below.

(1) Air Quality (Dust)

Project Phase: Before Construction, During and After Construction

The monitoring of dust (SPM) will be carried out to examine the impacts on air quality to be potentially caused by the project (by the running of construction vehicles or collection vehicles) before construction (baseline), during construction and after construction (operation).

Air Quality（Ambient Air Quality - SPM: Boundary of project site）

Item (Unit)	Measured Value （Mean）	Measured Value （Max.）	Country's Standards	Standards specified for the Project	Referred International Standards	Referred International Standards
SPM (μg/m^3)	Monitoring will be carried out by the implementation of the project.	Monitoring will be carried out by the implementation of the project.	N/A	N/A	Japan 1hour mean value: 100μg/m^3 Value for 1 hour: 100μg/m^3 EU Total number of days with its concentration exceeding	Monitoring point (Recommended): Boundary of the facility Frequency: Before construction: Once (Continuous measurement for 7 days) During construction: - Ditto -

					50μg/m^3 <= 35 days per year Or Annual mean value of concentration <= 40μg/m^3	After construction:

(2) Water Quality（Wastewater/Ambient Water Quality）

Water quality monitoring will be carried out to examine the adverse impacts on the water use in the surrounding water body (wells for irrigation) for the following three (3) monitoring points;

- Collection pond (inside the final disposal facility) at operation stage
- Surrounding water body: 2 wells for irrigation as baseline and during construction

Time for Monitoring

- Before construction (Baseline): Once
- During construction: Once
- Operation: Once per year up to the year when the measured concentration of each parameter is stabilized

Item (Unit)	Measured Value（Mean）	Measured Value（Max.）	Country's Standards	Standards specified for the Project	Referred International Standards	Referred International Standards
pH	Monitoring will be carried out at each project phase.	Monitoring will be carried out at each project phase.	N/A	N/A	FAO or Japan (Standards for irrigation water use, 1970, the Ministry of Agriculture, Forestry and Fisheries)	• Collection pond (inside the final disposal facility) at operation stage • Surrounding water body: 2 wells for irrigation as baseline and during construction • Before construction (Baseline): Once • During construction: Once • Operation: Once per year
Temperature（℃）	Ditto	Ditto	Ditto	Ditto	—	Ditto
Electric conductivity（mS）	Ditto	Ditto	Ditto	Ditto	FAO or Japan (Standards for irrigation water use, 1970, the Ministry of Agriculture,	Ditto

					Forestry and Fisheries)	
Dissolved Oxygen (mg/l)	Ditto	Ditto	Ditto	Ditto	Japan (Standards for irrigation water use, 1970, the Ministry of Agriculture, Forestry and Fisheries)	Ditto
BOD (mg/l)	Ditto	Ditto	Ditto	Ditto	Ditto	Ditto
COD (mg/l)	Ditto	Ditto	Ditto	Ditto	Ditto	Ditto
SS (mg/l)	Ditto	Ditto	Ditto	Ditto	Ditto	Ditto
Arsenic（mg/l）	Ditto	Ditto	Ditto	Ditto	Ditto	Ditto
Copper（mg/l）	Ditto	Ditto	Ditto	Ditto	Ditto	Ditto
Total Nitrogen（mg/l）	Ditto	Ditto	Ditto	Ditto	Ditto	Ditto
Ammonium Nitrogen（mg/l）	Ditto	Ditto	Ditto	Ditto	FAO	Ditto
Zinc（mg/l）	Ditto	Ditto	Ditto	Ditto	FAO	Ditto
Boron（mg/l）	Ditto	Ditto	Ditto	Ditto	FAO	Ditto
Chloride（mg/l）	Ditto	Ditto	Ditto	Ditto	FAO or Japan (Standards for irrigation water use, 1970, the Ministry of Agriculture, Forestry and Fisheries)	Ditto

(3) Noise & Vibration

Monitoring of noise will be carried out to examine the impacts of the noise potentially to be caused by the construction vehicles or equipment during construction, collection / transfer vehicles and heavy equipment at the final disposal facility at operation stage.

Time for Monitoring:

- Before construction (Baseline): Once
- During construction: Once
- Operation: Once

Monitoring Point: At site boundary of final disposal facility)

Item (Unit)	Measured Value（Mean）	Measured Value（Max.）	Country's Standards	Standards specified for the Project	Referred International Standards	Referred International Standards
Noise Level（dB）	Monitoring will be carried out at each project phase.	Monitoring will be carried out at each project phase.	N/A	N/A	World bank, EU, etc.	At site boundary • Before construction (Baseline): Once • During construction: Once • At Operation: Once

(4) Traffic

Monitoring of traffic volume will be carried out to examine the impacts of the traffic potentially to be caused by the construction vehicles during construction and collection / transfer vehicles at operation stage.

Time for Monitoring:

- Before construction (Baseline): Once
- During construction: Once
- Operation: Once

Monitoring Point: Surrounding road of final disposal facility)

Item(Unit)	Measured Value （Mean）	Measured Value （Max.）	Country's Standards	Standards specified for the Project	Referred International Standards	Referred International Standards
Traffic volume(number/day)	Monitoring will be carried out at each project phase.	Monitoring will be carried out at each project phase.	N/A	N/A	—	Time or frequency • Before construction (Baseline): Once • During construction: Once • At Operation: Once

3. Natural Environment

No protected area, nature reserve nor important ecosystem exists in and around the project site.

4. Social Environment

(1) Project Site

The ownership of the project site is Arab Society and currently rented by a farmer. Jericho JC has already made a lease agreement with Arab Society for the use of the final disposal facility. An alternative farm land was provided for the farmer by Jericho municipality.

(2) Resettlement

There is no dwelling house in and around the project site. Therefore, no resettlement will be caused by the project.

(3) Living and Livelihood

The following monitoring will be carried out to examine the project proponent's measures on

employment of waste pickers.

Monitoring Item	Monitoring Results during Report Period
Waste Picker Survey • Number • Age distribution • Family structure • Income • Type of recycling materials and their amount	Baseline survey will be carried out before construction.
Mitigation measures on employment • Number of employees at MRF • Waste pickers' awareness • Livelihood	Monitoring will be carried out at the operation of MRF.

ANNEX 3

Current Random Dumping Sites in West bank
(As of August, 2012)

Random Dumpsites in West Bank (August, 2012: MoLG)

No.	Name of Dumpsite	Number of Dumpsite	Governorate	Status
1	Deir Abu Mashal	1	Ramallah & Al Berih	Current
2	Ein Yabroud	1	Ramallah & Al Berih	Current
3	Aboud	1	Ramallah & Al Berih	Current
4	Qarawet Bani Zeid	1	Ramallah & Al Berih	Current
5	Rantis	1	Ramallah & Al Berih	Current
6	Shibten	1	Ramallah & Al Berih	Current
7	Jammala	1	Ramallah & Al Berih	Current
8	Umm Safa	1	Ramallah & Al Berih	Current
9	Deir Qaddis	1	Ramallah & Al Berih	Current
10	Burqa	1	Ramallah & Al Berih	Current
11	Almedya	1	Ramallah & Al Berih	Current
12	Shoqba	5	Ramallah & Al Berih	Current
13	al maghayyir	1	Ramallah & Al Berih	Current
14	Nilin	1	Ramallah & Al Berih	Current
15	surda	1	Ramallah & Al Berih	Current
16	Deir Assudan	1	Ramallah & Al Berih	Current
17	Budrus	1	Ramallah & Al Berih	Current
18	Deir Ammar	1	Ramallah & Al Berih	Current
19	Beit Liqya	1	Ramallah & Al Berih	Current
20	alluban Algharby	1	Ramallah & Al Berih	Current
21	Deir jreer	1	Ramallah & Al Berih	Current
22	Atara	1	Ramallah & Al Berih	Current
23	bilin	1	Ramallah & Al Berih	Current
24	Turmos Ay'a	1	Ramallah & Al Berih	Current
25	Alzaytona	1	Ramallah & Al Berih	Current
26	Kufr Nima	1	Ramallah & Al Berih	Current
27	Abween	1	Ramallah & Al Berih	Current
28	Kufr Ein	1	Ramallah & Al Berih	Current
29	Bittine	1	Ramallah & Al Berih	Current
30	Rammun	1	Ramallah & Al Berih	Current
31	At Tira	1	Ramallah & Al Berih	Current
32	Almazra'a Algharbia	1	Ramallah & Al Berih	Current
33	Kufr Malik	1	Ramallah & Al Berih	Current
34	Aljanya	1	Ramallah & Al Berih	Current
35	Beit Ur Atahta	1	Ramallah & Al Berih	Current
36	Silwad	1	Ramallah & Al Berih	Current
37	Yabroud	1	Ramallah & Al Berih	Current
38	Jifna	1	Ramallah & Al Berih	Current
39	Kharbatha Bani Harith	1	Ramallah & Al Berih	Current
40	Saffa and Beit Ur Al Fauqa	1	Ramallah & Al Berih	Current

Random Dumpsites in West Bank (August, 2012: MoLG)

No.	Name of Dumpsite	Number of Dumpsite	Governorate	Status
41	Ras Karkar	1	Ramallah & Al Berih	Current
42	Attayba	1	Ramallah & Al Berih	Current
43	Betillu	1	Ramallah & Al Berih	Current
44	Kober	1	Ramallah & Al Berih	Current
45	Sinjil	1	Ramallah & Al Berih	Current
46	Bani Zeid & Deir Ghasanneh	1	Ramallah & Al Berih	Current
47	Arura	1	Ramallah & Al Berih	Current
48	Deir Dibwan	1	Ramallah & Al Berih	Current
49	Deir Ibzi	1	Ramallah & Al Berih	Current
50	Qabia	1	Ramallah & Al Berih	Current
51	Al Fondok	1	Qalqilia	Close has not been rehabilitated
52	Kufr Thlith	1	Qalqilia	Close has not been rehabilitated
53	Jayyous	1	Qalqilia	Close has not been rehabilitated
54	Fara'tah	1	Qalqilia	Current
55	Bieta	1	Nablus	Current
56	Aqrabah	1	Nablus	Close has not been rehabilitated
57	Jammai'n	1	Nablus	Close has not been rehabilitated
58	Beit Furik	1	Nablus	Current
59	Beit Dajan	1	Nablus	Current
60	Qabalan	1	Nablus	Close has not been rehabilitated
61	Duma	1	Nablus	Close has not been rehabilitated
62	Al Luban Ash Sharqiya	1	Nablus	Close has not been rehabilitated
63	Assawiya	1	Nablus	Current
64	Qusra	1	Nablus	Close has not been rehabilitated
65	Qaryut	1	Nablus	Close has not been rehabilitated
66	nablus	1	Nablus	Close has not been rehabilitated
67	Tell	1	Nablus	Close has not been rehabilitated
68	Qusin	1	Nablus	Close has not been rehabilitated

Random Dumpsites in West Bank (August, 2012: MoLG)

No.	Name of Dumpsite	Number of Dumpsite	Governorate	Status
69	Deir Sharaf	1	Nablus	Close has not been rehabilitated
70	Iraq Burin	1	Nablus	Close has not been rehabilitated
71	Salim	1	Nablus	Close has not been rehabilitated
72	Deir Al Hatab	1	Nablus	Close has not been rehabilitated
73	Azmut	1	Nablus	Close has not been rehabilitated
74	Beit Iba	1	Nablus	Close has not been rehabilitated
75	Asira Al Shamaliya	1	Nablus	Close has not been rehabilitated
76	Sabastia	1	Nablus	Close has not been rehabilitated
77	Beit Imrin	1	Nablus	Close has not been rehabilitated
78	Yasid	1	Nablus	Close has not been rehabilitated
79	Al Bathan	1	Nablus	Close has not been rehabilitated
80	An Nasarriya	1	Nablus	Close has not been rehabilitated
81	Al Aqrabaniya	1	Nablus	Close has not been rehabilitated
82	Attil	1	Tulkarm	Close has not been rehabilitated
83	Illar	1	Tulkarm	Close has not been rehabilitated
84	Deir Ghsun	1	Tulkarm	Close has not been rehabilitated
85	Zeita & Baqa As Sharqitya	1	Tulkarm	Current
86	An Nazla Al Sharqiya	1	Tulkarm	Close has not been rehabilitated
87	An Nazla Al Gharbiya	1	Tulkarm	Close has not been rehabilitated
88	An Nazla Al Wusta	1	Tulkarm	Close has not been rehabilitated
89	Nazlat Isa	1	Tulkarm	Close has not been rehabilitated
90	Qaffin	1	Tulkarm	Close has not been rehabilitated

Random Dumpsites in West Bank (August, 2012: MoLG)

No.	Name of Dumpsite	Number of Dumpsite	Governorate	Status
91	Seida	1	Tulkarm	Current
92	Al Auja	1	Jericho	Current
93	Jericho	1	Jericho	Close has not been rehabilitated
94	Bardalah	1	Jericho	Close has not been rehabilitated
95	Ein Al Bidah	1	Jericho	Close has not been rehabilitated
96	Wadi Al Malaki (An Nasariya)	1	Jericho	Close has not been rehabilitated
97	Al Jiftlik	1	Jericho	Close has not been rehabilitated
98	Marj Na'ji	1	Jericho	Close has not been rehabilitated
99	Ad Dahiriya	1	Hebron	Current
100	Beit Amar & Surif	1	Hebron	Close has not been rehabilitated
101	Beit Ula	1	Hebron	Close has not been rehabilitated
102	Bani Na'am	1	Hebron	Close has not been rehabilitated
103	Dura	1	Hebron	Close has not been rehabilitated
104	Ash shuyukh	1	Hebron	Close has not been rehabilitated
105	Sa'ir	1	Hebron	Close has not been rehabilitated
106	Nuba	1	Hebron	Close has not been rehabilitated
107	Taffuh	1	Hebron	Current
108	Al Ubeidiya	1	Bethlehem	Current
109	Za'atara	1	Bethlehem	Current
110	Tuqu'	2	Bethlehem	Current
111	Dar Salah	1	Bethlehem	Current
112	Husan	1	Bethlehem	Close has not been rehabilitated
113	Battir & Al Walaja	1	Bethlehem	Close has not been rehabilitated
114	Nahalin	1	Bethlehem	Close has not been rehabilitated

Random Dumpsites in West Bank (August, 2012: MoLG)

No.	Name of Dumpsite	Number of Dumpsite	Governorate	Status
115	Slfit	1	Salfit	Current
116	Deir Ballut	1	Salfit	Current
117	Rafat	1	Salfit	Current
118	Zawiya	1	Salfit	Current
119	Sarta	1	Salfit	Current
120	Biddya	1	Salfit	Current
121	Qarawet Bani Hassan	1	Salfit	Current
122	Bruqin	1	Salfit	Current
123	Kufr Ad Dik	1	Salfit	Current
124	Kifl Haris	1	Salfit	Current
125	Marda	1	Salfit	Current
126	Al Eizariya	1	Jerusalem	Current
127	Biddo	1	Jerusalem	Current
128	Beit Sorik	1	Jerusalem	Current
129	Beit Iksa	1	Jerusalem	Current
130	Beit Duqqu	1	Jerusalem	Current
131	Qatanna	1	Jerusalem	Current
132	Beir Nabala	1	Jerusalem	Current
133	Al Tib	1	Jerusalem	Current
134	Rafat	1	Jerusalem	Current
135	Kalandia	1	Jerusalem	Current

* Note: All random dumpsites in Jenin and Tubas Governorate were closed and rehabilitated

ANNEX 4

Lease Agreement regarding New Landfill Site in Jericho

Arab Development Society

جمعية المشروع الانشائي العربي
العربية للتنمية الزراعية المجتمعي

اتفاقية إيجاره

انه في اليوم الموافق ٢٠١٢/٠١/٠١ تم توقيع هذا العقد بين كل من :

فريق أول: (مؤجر) جمعية المشروع الإنشائي ممثلة برئيس مجلس الإدارة د.محمد القطب ، العنوان / أريحا ، شارع عمان

فريق ثاني (مستأجر): بلدية أريحا ممثله برئيسها المحامي حسن صالح

العنوان: أريحا، الساحة العامة ص.ب ١٥ / أريحا

مقدمـــة

حيث أن الفريق الأول لـه حريـة التصرف والمنفعـة في قطعـة الأرض رقم (٥) من الحوض رقم ٣٣٠٣٨ من أراضي أريحا ، وحيث أن الفريق الثاني يرغب في استئجار جزء من هذه القطعة لاستخدامها كمكب للنفايات وبمساحة (٢٩) دونم من الموقع الذي يتصرف فيه الفريق الأول تصرف المالك ، فقد اتفق الفريقان على ما يلي :

١) تعتبر مقدمة العقد ومخطط الموقع المرفق جزء لا يتجزأ منه وتقرأ معه .

٢) مكان وموقع المأجور : اتفق الفريقان على أن يكون مكان المأجور في قطعة الأرض رقم (٥) من الحوض رقم ٣٣٠٣٨ كما هو مبين في المخطط المرفق وبمساحة (٢٩) دونم .

٣) بدل الإيجار: اتفق الفريقان على أن تستغل الأرض من قبل الفريق الثاني باجرة سنوية ٣٥ دينار/ الدونم ، بما مجموعه (١٠١٥) دينار أردني سنويا ، تدفع على

رقمتين ، الدفعة الأولى تستحق بتاريخ ٢٠١٢/٠٤/٠١ والدفعة الثانية بتاريخ ٢٠١٢/١٠/٠١ ، وتتكرر مواعيد الدفعات بنفس الأيام والأشهر للدفعات القادمة .

٤) التزامات الفريق الثاني / المستأجر:

أ- يلتزم الفريق الثاني المستأجر على مراعاة الصحة العامة وعلى أن يستخدم الأرض دون أن يكون هناك تأثير على موجودات المشروع الإنشائي سواء بشرية أو حيوانية أو نباتية .

ب- يلتزم الفريق الثاني المستأجر بعدم استغلال أية مساحة أخرى ملاصقة لقطعة الأرض المتفق عليها دون الرجوع للفريق الأول .

ج- يلتزم الفريق الثاني بوضع علامات تبين حدود القطعة المتفق عليها لاستعمالها من قبل الجهات القائمة على العمل

٥) التزامات الفريق الأول (المؤجر) :

أ- يقر الفريق الأول بانه قد وافق على إيجار القطعة واستغلالها من قبل الفريق الثاني كمكتب للنفايات باجره سنوية حسب ما ورد بالبند الثالث

ب- يلتزم الفريق الأول بالحدود المبينة في مخطط المساحة والموقع المتفق عليه كما هو مبين في مخطط المساحة المرفق

ج- يقر الفريق الأول بانه قام بتأجير قطعة الأرض للفريق الثاني من منطلق التعاون والمحافظة على البيئة والمجتمع والصحة العامة .

د- يقر الفريق الأول بانه قد قام بمعاينة الأرض وبرفقة الفريق الثاني وذلك من اجل ضمها لمكب النفايات القديم من اجل استغلالها كمساحة إضافية لمكب النفايات

ه- عدم معارضة الفريق الأول للأعمال التي سوف يقوم بها الفريق الثاني من حفريات وطم واستخدام الآليات بأنواعها وذلك من اجل سير العمل

٦) من المفهوم والمتفق عليه بين الفريقين ما يلي

أ- يحق للفريق الثاني المباشرة باستغلال الأرض وذلك بعد التوقيع على عقد الإيجار

ب- في حال رغبة الفريق الأول إجراء أي ترتيبات تتعلق بالمأجور الذي يوجد في حدود الأرض المتفق عليها كزراعة أشجار أو زيارات تثقيفية للطالب فعليه إشعار الفريق الثاني بذلك .

ج- يتعهد الفريق الأول بعدم معارضة أو إعاقة احد من استعمال واستغلال الأرض وفي حال اعتراضه على أي عمل مراجعة الفريق الثاني ومن يمثله .

٧) تخضع أحكام هذا العقد للقوانين السارية المفعول والمعمول بها في مناطق السلطة الوطنية الفلسطينية وتكون المحاكم في مدينة أريحا هي المختصة بالنظر في أي نزاع يتعلق بتنفيذ أو تفسير العقد.

٨) يسري هذا العقد اعتبارا من تاريخ ٢٠١٢/٠١/٠١

حرر هذا العقد من مقدمة وثمانية بنود على نسختين أصليتين بيد كل فريق نسخة للعمل بموجبها وعليه تم التوقيع.

فريق أول (مؤجر)
جمعية المشروع الإنشائي
ممثلة بالدكتور محمد ...

فريق ثاني (مستأجر)
بلدية أريحا ممثله
... حسن صالح

JERICHO MUNICIPALITY

JERUSALEM : Tel: (02) 6282880 Fax: (02) 6284290 P.O.Box 25320
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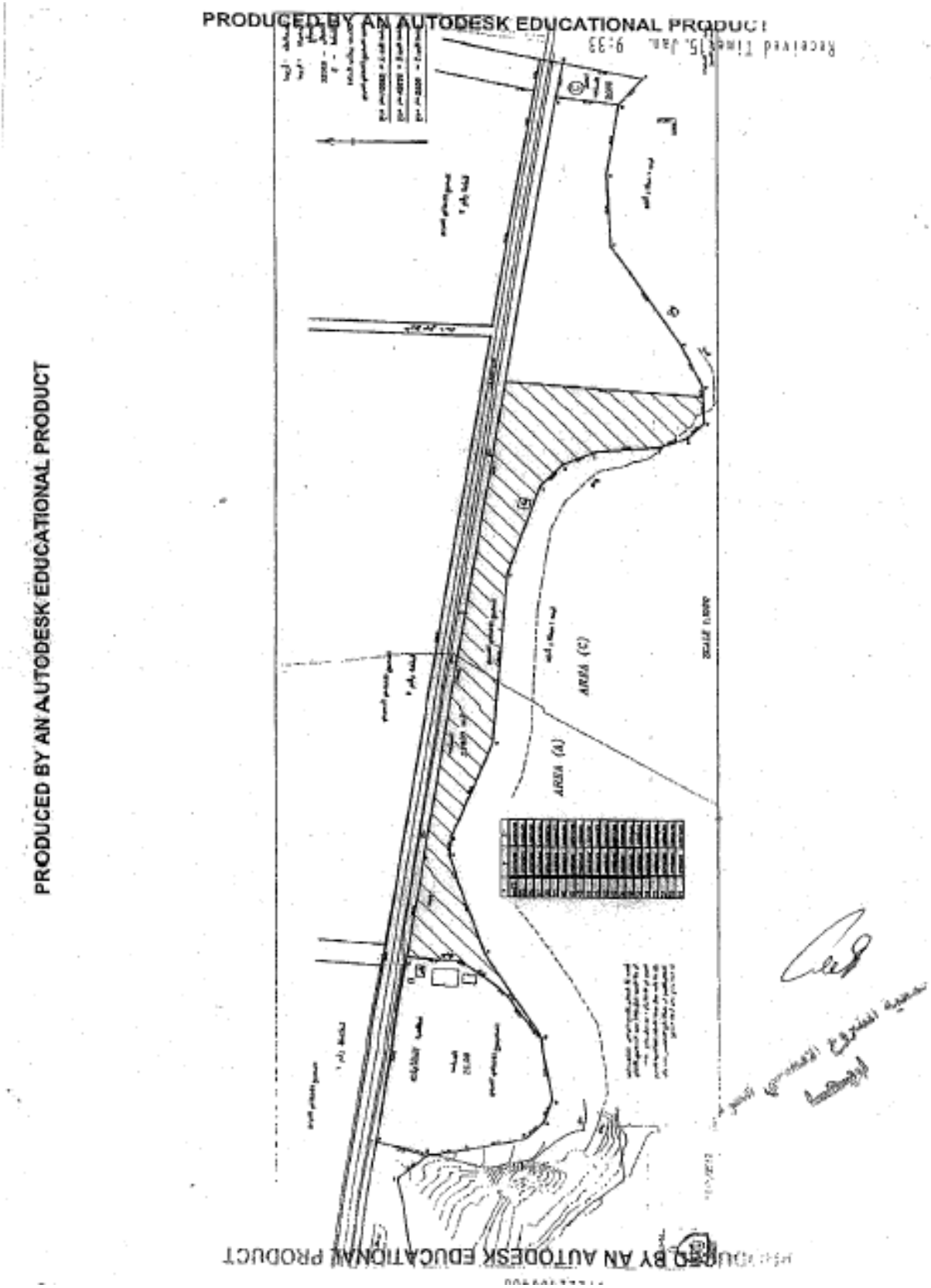
Lease Agreemnet (Arabic 4/4)



Leasing Agreement

First Party: Arab Development Society

Second Party: Jericho Municipality

Introduction:

As the first party has the ownership and the authority to use and benefit from the land No. 5 pond 33038 of Jericho area, and since the second party wants to rent part of this land to be used as a landfill site, with an area of 29 dunnums (29000 m^2), the tow parties agreed on:

1. The introduction and the attached map as main part of this agreement.
2. The land included in this leasing agreement is part of the land No. 5 pond 33038 as of the attached map.
3. The rental cost is 35 JD/ dunnum with annual rental cost 1015 JD paid on tow payments the first on April, 1st, and the second on October, 1st each year.
4. Duties of the second party:
    a. The econd party should give consideration for reserving the public health, and should use the land without affecting the assists of Arab Society.
    b. The second party should not use and addition part of land without agreement with the first party.
    c. The second party should put signs that show the boundaries of the rent land.
5. Duties of the first party:
    a. The first part admit that he agreed on renting the mentioned part of land to be used as landfill site as of the rental fee in article 3 of this agreement.
    b. The first party adheres the boundaries as of the attached map.
    c. The first party adheres that he agreed to rent this land to be used as a landfill site as part on his cooperation and preserving both environment and public health.
    d. The first party adheres that he reviewed on field the part of land which is adjacent the current landfill site with the first party.
    e. The first part has no objection to the necessary field works including; excavation, filling, and usage of necessary equipments.
6. It is understood and agreed between the tow parties that:
    a. The second party has the right to start using the land directly after signing of this agreement.

b. If the first party desire to make any changes in the rented land such as; planting of trees and educational site visits, he should coordinate with the second party previously.
c. The first party commit that he will not object or retard the second party or anyone related his works necessity. And in any case that the first party has and objection he should refer to the second party to solve.

7. This agreement submits to the laws of PNA, and Jericho court is the responsible authority to take the decisions in any conflict that might be occurred.
8. This agreement started from Jan, 1st, 2012.

This agreement which consist of the introduction and 8 articles was signed on tow copies, and both parties should obey to their duties.

First Party	Second Party
Arab Development Society	Jericho Municipality
Dr. Mohammad Al Qutob	Hasan Saleh

ANNEX 5

Official Letter addressed to Ministry of Local Government
from Ministry of Environment Affairs

Palestinian National Authority	**السلطة الوطنية الفلسطينية**
Ministry of Environment Affairs (MEnA)	وزارة شؤون البيئة

No :
Date:

الرقم: [illegible]
التاريخ: 2012-7-15

الأخ سليمان أبو مفرح المحترم
نائب مدير عام الإدارة العامة للمجالس المشتركة / وزارة الحكم المحلي

تحية طيبة وبعد

الموضوع: مشروع توسيع مكب النفايات في أريحا

تهديكم وزارة شؤون البيئة أطيب التحيات، وبالإشارة إلى الموضوع أعلاه، وإلى كتابنا السابق لكم بخصوص رقم (2012/148) بتاريخ 2012/6/24، وعلى اثر الزيارة الميدانية للموقع التي قام بها فريق من وزارة شؤون البيئة بتاريخ 2012/7/9، وباعتبار الحجم المحدود لكل من المكب والتوسعة المقترحة، وانسجاما مع سياسة التقييم البيئي الفلسطينية، فقد أوصت اللجنة بإعداد دراسة تقييم بيئي أولي لمشروع التوسعة، بحيث تشمل كافة عناصر ومكونات المشروع بما فيها محطات الفرز والترحيل.

واقبلوا فائق الاحترام و التقدير،

السلطة الوطنية الفلسطينية
سلطة جودة البيئة
الإدارة العامة لحماية البيئة

محمود أبو شنب
نائب مدير عام الإدارة العامة لحماية البيئة

نسخة /

- مكتب الوزير
- دائرة التقييم البيئي
- دائرة الموافقات البيئية
- دائرة النفايات الصلبة والخطرة
- مكتب رئيس الوزراء

Ramallah-Nablus St. Tel: 2403495/8 or 2403985/6
E-mail: eqa@gov.ps Fax: 2403494

البيرة- الشرفة- ت: 2403495/8 فاكس 2403494

Dear Suliman Abu Mofreh
Vice Director/ DJCspd
MoLG

Greetings,

Subject: Expansion of Jericho LFS

MEnA send you its best regards, and referring to the declaration topic, and to your previous letter no. (148/2012) dated 24/6/2012, and depending on the site visit of the MEnA team on 9/7/2012, and taking into consideration both the limited size of the landfill and its expected expansion, and in consistent with the EIA policy, the authorized team recommended doing IEE for the expansion of the LFS project, which must include all elements and project components including the waste separation and transfer.

With Respect,

Mahmoud Abu Shanab
Vice Director/ Directorate of Environmental Protection
MEnA

ANNEX 6

Environmental Check List and Monitoring Form based on JICA Guidelines for Environmental and Social Considerations issued in April, 2010

Environmental Check List

Category	Environmental Item	Main Check Items	Confirmation of Environmental Considerations
1 Permits and Explanation	(1) EIA and Environmental Permits	① Have EIA reports been officially completed? ② Have EIA reports been approved by authorities of the host country's government? ③ Have EIA reports been unconditionally approved? If conditions are imposed on the approval of EIA reports, are the conditions satisfied? ④ In addition to the above approvals, have other required environmental permits been obtained from the appropriate regulatory authorities of the host country's government?	① The environmental application was submitted to MoEA (Ministry of Environmental Affairs) for the Project and is currently under process. The type of EIA (EIA or IEE) will be decided based on the TOR which will be specified by MoEA. Jericho JC will prepare the relevant documents in accordance with the type of EIA. ② The environmental application is under process for future approval of MoEA. ③ The conditions for approval of the EIA will be confirmed in the future process. ④ Not necessary.
	(2) Explanation to the Public	① Are contents of the project and the potential impacts adequately explained to the public based on appropriate procedures, including information disclosure? Is understanding obtained from the public? ② Are proper responses made to comments from the public and regulatory authorities?	① The project site has no dwelling houses near by. In addition, the proposed project has been widely known to the public because of its high public benefit and its project purpose of improvement of urban sanitary condition. The holding of stakeholder meetings will be discussed in MoEA in the process of EIA. ② Yes, they will be made.
2 Mitigation Measures	(1) Air Quality	① Do air pollutants, such as sulfur oxides (SOx), nitrogen oxides (NOx), and soot and dust, and dioxins emitted from various sources, such as incinerators, and vehicles used for waste collection and transportation comply with the country's emission standards and ambient air quality standards?	① EURO V will be applied to the emission control as the specification of proposed collection / transfer vehicles. Incinerator is not covered in the components of the Project.
	(2) Water Quality	① Do effluents from various facilities comply with the country's effluent standards and ambient water quality standards? ② Does the water quality of leachates from the waste disposal sites comply with the country's effluent standards and ambient water quality standards? ③ Are adequate measures taken to prevent contamination of surface water and groundwater by these effluents and leachates?	① The leachate water from the proposed sanitary landfill will be dried up at the collection pond by utilizing local dry metrological condition in order to avoid its discharge to external water body. ② The leachate water from the proposed sanitary landfill will be dried up at the collection pond by utilizing local dry metrological condition in order to avoid its discharge to external water body. ③ Water quality monitoring will be made at the surrounding wells.

Category	Environmental Item	Main Check Items	Confirmation of Environmental Considerations
2 Mitigation Measures	(3) Wastes	① Are wastes, such as treatment residues, cinder, and fly ash generated from crushing and segregation processes, and diverted wastes from composting process properly treated and disposed of in accordance with the country's standards? ② Are hazardous and dangerous wastes properly segregated from other wastes, stabilized, treated, and disposed of in accordance with the country's standards?	① MRF (Material Recovery Facility) will be constructed by the Project toward reduction of the incoming waste amount at the final disposal facility. The final disposal facility will be designed as a sanitary landfill type which complies with international guidelines or standards for appropriate disposal. ② The proposed project is planned only for general municipal waste.
	(4) Soil Contamination	① Are adequate measures taken to prevent contamination of soil and groundwater by leachates from the waste disposal sites?	① A seepage impermeable liner at the bottom of the proposed final disposal facility will collect the leachate water and convey it through laid perforated pipes to a collection pond also covered with impermeable sheet and dry it up. Therefore, the proposed final disposal facility will not pollute soil and groundwater.
	(5) Noise and Vibration	① Do noise and vibrations generated by the facility operations (especially incinerators, waste segregation and crushing facilities), and vehicle traffic for waste collection and transportation comply with the country's standards?	① No dwelling houses which should be protected from noise impact are identified in and around the project sites. Only few number of vehicles per day runs around the project site and this will not cause adverse impact of noise.
	(6) Odor	① Are there any odor sources? Are adequate odor control measures taken?	① No dwelling houses which should be protected from odor impact are identified in and around the project sites. The proposed facility will carry out soil covering at the landfill area to keep sanitary condition.
3 Natural Environment	(1) Protected Areas	① Is the project site located in protected areas designated by the country's laws or international treaties and conventions? Is there a possibility that the project will affect the protected areas?	① No protected area nor nature reserve has been identified at the project site.
	(2) Ecosystem and biota	① Does the project site encompass primeval forests, tropical rain forests, ecologically valuable habitats (e.g., coral reefs, mangroves, or tidal flats)? ② Does the project site encompass the protected habitats of endangered species designated by the country's laws or international treaties and conventions? ③ If significant ecological impacts are anticipated, are adequate protection measures taken to reduce the impacts on the ecosystem? ④ Is there a possibility that the project will adversely affect aquatic organisms? If impacts are anticipated, are adequate measures taken to reduce the impacts on aquatic organisms? ⑤ Is there a possibility that the project will adversely affect vegetation and wildlife? If impacts are anticipated, are adequate measures taken to reduce the impacts on vegetation and wildlife?	① No important ecosystem has been identified at the project site. ② There is no habitat of important species of flora and fauna because the surrounding area of the project site is adjacent to existing final landfill. ③ The adverse impact on ecosystem will be minimum because the surrounding area of the project site is adjacent to existing final landfill. ④ The surrounding area is an arid land and no aquatic organism has been identified. ⑤ No important ecosystem has been identified.

Category	Environmental Item	Main Check Items	Confirmation of Environmental Considerations
3 Natural Environment	(3) Management of Abandoned Sites	① Are environmental protection and restoration plans (such as landfill gas and leachate collection and treatment systems, prevention of illegal dumping, and reforestation) after facility closure considered? ② Is a sustainable management framework for the abandoned sites established? ③ Are adequate financial provisions secured to manage the abandoned sites?	① Mitigation measures of gas vent pipes and impermeable seepage control liner is planned for the proposed final disposal facility. ② The management structure of the decommissioning of the abandoned sites will be discussed with PNA (Palestinian National Authority) toward its realization. ③ The management structure of the decommissioning of the abandoned sites will be discussed with PNA (Palestinian National Authority) in order to secure appropriate amount of budget for its management.
4 Social Environment	(1) Resettlement	① Is involuntary resettlement caused by project implementation? If involuntary resettlement is caused, are efforts made to minimize the impacts caused by the resettlement? ② Is adequate explanation on relocation and compensation given to affected persons prior to resettlement? ③ Is the resettlement plan, including proper compensation, restoration of livelihoods and living standards developed based on socioeconomic studies on resettlement? ④ Does the resettlement plan pay particular attention to vulnerable groups or persons, including women, children, the elderly, people below the poverty line, ethnic minorities, and indigenous peoples? ⑤ Are agreements with the affected persons obtained prior to resettlement? ⑥ Is the organizational framework established to properly implement resettlement? Are the capacity and budget secured to implement the plan? ⑦ Is a plan developed to monitor the impacts of resettlement?	No resettlement will occur because no dwelling houses nor offices have been identified at the project sites.

Category	Environmental Item	Main Check Items	Confirmation of Environmental Considerations
4 Social Environment	(2) Living and Livelihood	① Is there a possibility that the project will adversely affect the living conditions of inhabitants? Are adequate measures considered to reduce the impacts, if necessary? ② Are considerations given to the existing recovery systems, including waste pickers? ③ Is there a possibility that waste transportation will adversely affect the regional traffic? ④ Is there a possibility that effluents from the project and leachates form the waste disposal sites will adversely affect fisheries and other water uses by local inhabitants (especially drinking water)? ⑤ Is there a possibility that pathologic insects or other disease vectors will breed as a result of the project?	① The adverse impact on local residents will be minimum by the Project. However, some measures on employment of the waste pickers at the existing final landfill site will be taken into consideration. ② Some measures of employment of the waste pickers will be considered for the operation of the proposed MRF (Material Recovery Facility). ③ The traffic amount near the project site is very few and the planned number of procured vehicles is also few numbers and it will not cause significant impact on local traffic. ④ The leachate water from the proposed final disposal facility will not be discharged to surrounding water area. However, water quality monitoring is planned at the surrounding wells not to cause adverse impact on water use of surrounding farmers. ⑤ Soil covering will be implemented to prevent the generation of hygiene pests.
	(3) Heritage	① Is there a possibility that the project will damage the local archeological, historical, cultural, and religious heritage sites? Are adequate measures considered to protect these sites in accordance with the country's laws?	① No important heritage or historical sites have been identified at the surrounding area of the project site.
	(4) Landscape	① Is there a possibility that the project will adversely affect the local landscape? Are necessary measures taken?	① There is no important landscape near the project site.
	(5) Ethnic Minorities and Indigenous Peoples	① Does the project comply with the country's laws for rights of ethnic minorities and indigenous peoples? ② Are considerations given to reduce the impacts on culture and lifestyle of ethnic minorities and indigenous peoples?	① No ethnic minorities nor indigenous peoples to be affected by the project have been identified.

Category	Environmental Item	Main Check Items	Confirmation of Environmental Considerations
5 Others	(1) Impacts during Construction	① Are adequate measures considered to reduce impacts during construction (e.g., noise, vibrations, turbid water, dust, exhaust gases, and wastes)? ② If construction activities adversely affect the natural environment (ecosystem), are adequate measures considered to reduce impacts? ③ If construction activities adversely affect the social environment, are adequate measures considered to reduce impacts? ④ Are intangible measures being planned and implemented for individuals involved in the project, such as safety training (including traffic safety and public sanitation) for workers etc.?	① Measures of pollution control for air, noise and traffic will be taken at construction stage. ② No important ecosystem has been identified at the surrounding area of the project site. ③ No adverse impact on social environment is estimated by the construction work of the proposed project. ④ The selected contractor will carry out safety training (including traffic safety and public sanitation) for workers during construction stage.
	(2) Monitoring	① Does the proponent develop and implement monitoring program for the environmental items that are considered to have potential impacts? ② Are the items, methods and frequencies included in the monitoring program judged to be appropriate? ③ Does the proponent establish an adequate monitoring framework (organization, personnel, equipment, and adequate budget to sustain the monitoring framework)? ④ Are any regulatory requirements pertaining to the monitoring report system identified, such as the format and frequency of reports from the proponent to the regulatory authorities?	① Environmental monitoring of air (dust), noise, water quality and traffic will be implemented before, during and after construction. ② The monitoring items, method and frequency will be decided by referring international standards and other projects. ③ The monitoring framework of the project proponent will be discussed with PNA to build its framework. ④ The reporting method and its frequency will be discussed with MoEA.
6 Note	Reference to Checklist of Other Sectors	① Where necessary, pertinent items described in the Forestry Projects checklist should also be checked (e.g., projects including large areas of deforestation).	① Not applicable.
	Note on Using Environmental Checklist	① If necessary, the impacts to transboundary or global issues should be confirmed (e.g., the project includes factors that may cause problems, such as transboundary waste treatment, acid rain, destruction of the ozone layer, or global warming).	① The proposed project will not cause transboundary or global issues.

1) Regarding the term "Country's Standards" mentioned in the above table, in the event that environmental standards in the country where the project is located diverge significantly from the World Bank Safeguard general rule, or the International Finance Corporation Performance Standards for private sector limited or non-recourse project finance cases, or other standards established by other international financial internationally recognized standards or good practices established by developed countries such as Japan regarding environmental and social considerations, the background and rationale for this deviation, and the m rectify it if necessary, are to be confirmed. In cases where local environmental regulations are yet to be established in some areas, considerations should be based on comparisons with international standards such as Bank Safeguard Policy, and appropriate standards of other countries(including Japan).
2) Environmental checklist provides general environmental items to be checked. It may be necessary to add or delete an item taking into account the characteristics of the project and the particular circumstances of the country and locality in which it is located.

Monitoring Form

1. Responses/Actions to Comments and Guidance from Government Authorities and the Public

	Monitoring item	Monitoring Results during Report Period
1	Application by the project proponent	Project proponent (MOLG/Jericho JC) made an application of environmental permit to EQA (MEnA) in may 7th, 2012.
2	Screening of the proposed project	An issuance of IEE preparation and TOR for the IEE was made and by EQA (MEnA) in July 31th, 2012 for the proposed project.
3	Preparation of IEE Report	Project proponent (Jericho JC) prepared a draft IEE report from the beginning of August. Project proponent submitted the draft IEE report to MEnA in October 3rd, 2012.
4	Comments to the draft IEE report	Project proponent (Jericho JC) received comments on the draft IEE report in October 26th, 2012.
5	Submission of Final IEE report	Project proponent (Jericho JC) submitted a final IEE report to MEnA in December 9th, 2012.
6	Expected final approval for the IEE	The final approval of the IEE is expected to be granted by MEnA by the end of December of 2012.

2. Mitigation Measures

Environmental monitoring will be conducted for the items of air (dust), water quality, noise and vibration to monitor mitigation measures for the project component of the transfer station / materials recovery facility (MRF) and the final disposal facility. The detail of the monitoring is shown as below.

(1) Air Quality (Dust) (for the mitigation measures by the transfer station / MRF and the final disposal facility)

Project Phase: Before Construction, During and After Construction

The monitoring of dust (SPM) will be carried out to examine the impacts on air quality to be potentially caused by the project (by the running of construction vehicles or collection vehicles) before construction (baseline), during construction and after construction (operation).

Air Quality（Ambient Air Quality - SPM: Boundary of project site）

Item (Unit)	Measured Value （Mean）	Measured Value （Max.）	Country's Standards	Standards specified for the Project	Referred International Standards	Referred International Standards
SPM (μg/m3)	Monitoring will be carried	Monitoring will be carried	N/A	N/A	Japan 1hour mean	Monitoring point (Recommended):

	out by the implementation of the project.	out by the implementation of the project.			value: 100μg/m^3 Value for 1 hour: 100μg/m^3 EU Total number of days with its concentration exceeding 50μg/m^3 <= 35 days per year Or Annual mean value of concentration <= 40μg/m^3	Boundary of the facility Frequency: Before construction: Once (Continuous measurement for 7 days) During construction: - Ditto - After construction:

(2) Water Quality（Wastewater/Ambient Water Quality）(for the mitigation measures by the final disposal facility)

Water quality monitoring will be carried out to examine the adverse impacts on the water use in the surrounding water body (wells for irrigation) for the following three (3) monitoring points;

- Collection pond (inside the final disposal facility) at operation stage
- Surrounding water body: 2 wells for irrigation as baseline and during construction

Time for Monitoring

- Before construction (Baseline): Once
- During construction: Once
- Operation: Once per year up to the year when the measured concentration of each parameter is stabilized

Item (Unit)	Measured Value（Mean）	Measured Value（Max.）	Country's Standards	Standards specified for the Project	Referred International Standards	Referred International Standards
pH	Monitoring	Monitoring	N/A	N/A	FAO or Japan	• Collection

	will be carried out at each project phase.	will be carried out at each project phase.			(Standards for irrigation water use, 1970, the Ministry of Agriculture, Forestry and Fisheries)	pond (inside the final disposal facility) at operation stage • Surrounding water body: 2 wells for irrigation as baseline and during construction • Before construction (Baseline): Once • During construction : Once • Operation: Once per year
Temperature (℃)	Ditto	Ditto	Ditto	Ditto	－	Ditto
Electric conductivity (mS)	Ditto	Ditto	Ditto	Ditto	FAO or Japan (Standards for irrigation water use, 1970, the Ministry of Agriculture, Forestry and Fisheries)	Ditto
Dissolved Oxygen (mg/l)	Ditto	Ditto	Ditto	Ditto	Japan (Standards for irrigation water use, 1970, the	Ditto

					Ministry of Agriculture, Forestry and Fisheries)	
BOD (mg/l)	Ditto	Ditto	Ditto	Ditto	Ditto	Ditto
COD (mg/l)	Ditto	Ditto	Ditto	Ditto	Ditto	Ditto
SS (mg/l)	Ditto	Ditto	Ditto	Ditto	Ditto	Ditto
Arsenic （mg/l）	Ditto	Ditto	Ditto	Ditto	Ditto	Ditto
Copper （mg/l）	Ditto	Ditto	Ditto	Ditto	Ditto	Ditto
Total Nitrogen （mg/l）	Ditto	Ditto	Ditto	Ditto	Ditto	Ditto
Ammonium Nitrogen （mg/l）	Ditto	Ditto	Ditto	Ditto	FAO	Ditto
Zinc（mg/l）	Ditto	Ditto	Ditto	Ditto	FAO	Ditto
Boron（mg/l）	Ditto	Ditto	Ditto	Ditto	FAO	Ditto
Chloride （mg/l）	Ditto	Ditto	Ditto	Ditto	FAO or Japan (Standards for irrigation water use, 1970, the Ministry of Agriculture, Forestry and Fisheries)	Ditto

(3) Noise & Vibration (for the mitigation measures by the transfer station / MRF and the final disposal facility)

Monitoring of noise will be carried out to examine the impacts of the noise potentially to be caused by the construction vehicles or equipment during construction, collection / transfer vehicles and heavy equipment at the final disposal facility at operation stage.

Time for Monitoring:

- Before construction (Baseline): Once
- During construction: Once
- Operation: Once

Monitoring Point: At site boundary of final disposal facility)

Item (Unit)	Measured Value (Mean)	Measured Value (Max.)	Country's Standards	Standards specified for the Project	Referred International Standards	Referred International Standards
Noise Level (dB)	Monitoring will be carried out at each project phase.	Monitoring will be carried out at each project phase.	N/A	N/A	World bank, EU, etc.	At site boundary • Before construction (Baseline): Once • During construction: Once • At Operation: Once

(4) Traffic (for the mitigation measures by the transfer station / MRF and the final disposal facility)

Monitoring of traffic volume will be carried out to examine the impacts of the traffic potentially to be caused by the construction vehicles during construction and collection / transfer vehicles at operation stage.

Time for Monitoring:

- Before construction (Baseline): Once
- During construction: Once
- Operation: Once

Monitoring Point: Surrounding road of final disposal facility)

Item(Unit)	Measured Value (Mean)	Measured Value (Max.)	Country's Standards	Standards specified for the Project	Referred International Standards	Referred International Standards
Traffic volume (number/day)	Monitoring will be carried out at each project phase.	Monitoring will be carried out at each project phase.	N/A	N/A	—	Time or frequency • Before construction (Baseline): Once • During construction: Once • At Operation:

						Once

3. Natural Environment

No protected area, nature reserve nor important ecosystem exists in and around the project site.

4. Social Environment (for the mitigation measures by the transfer station / MRF and the final disposal facility)

(1) Resettlement

There is no dwelling house in and around the project site. Therefore, no resettlement will be caused by the project.

(2) Living and Livelihood

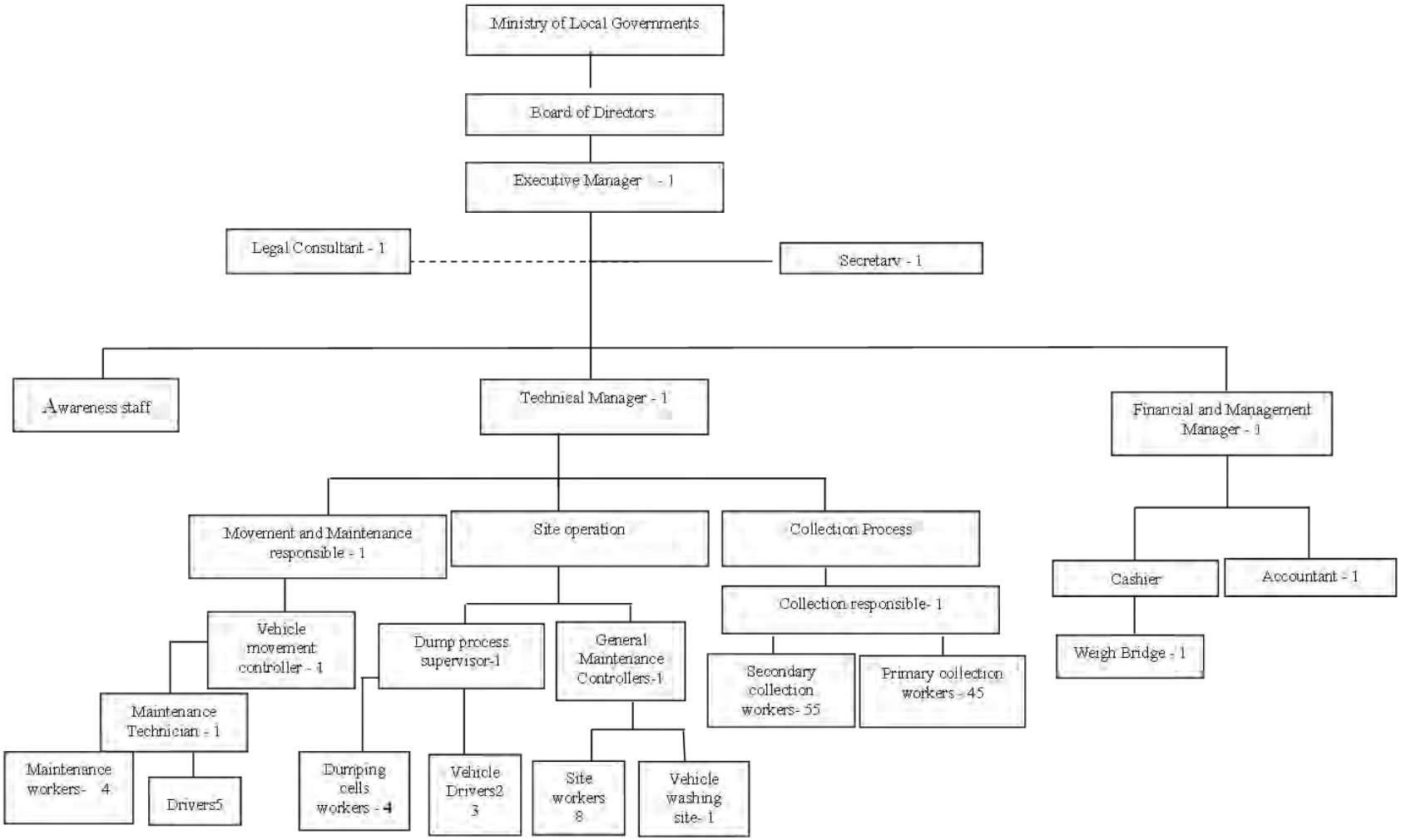
The following monitoring will be carried out to examine the project proponent's measures on employment of waste pickers.

Monitoring Item	Monitoring Results during Report Period
Mitigation measures on employment • Number of employees at MRF • Waste pickers' awareness • Livelihood	Monitoring will be carried out at the operation of MRF.

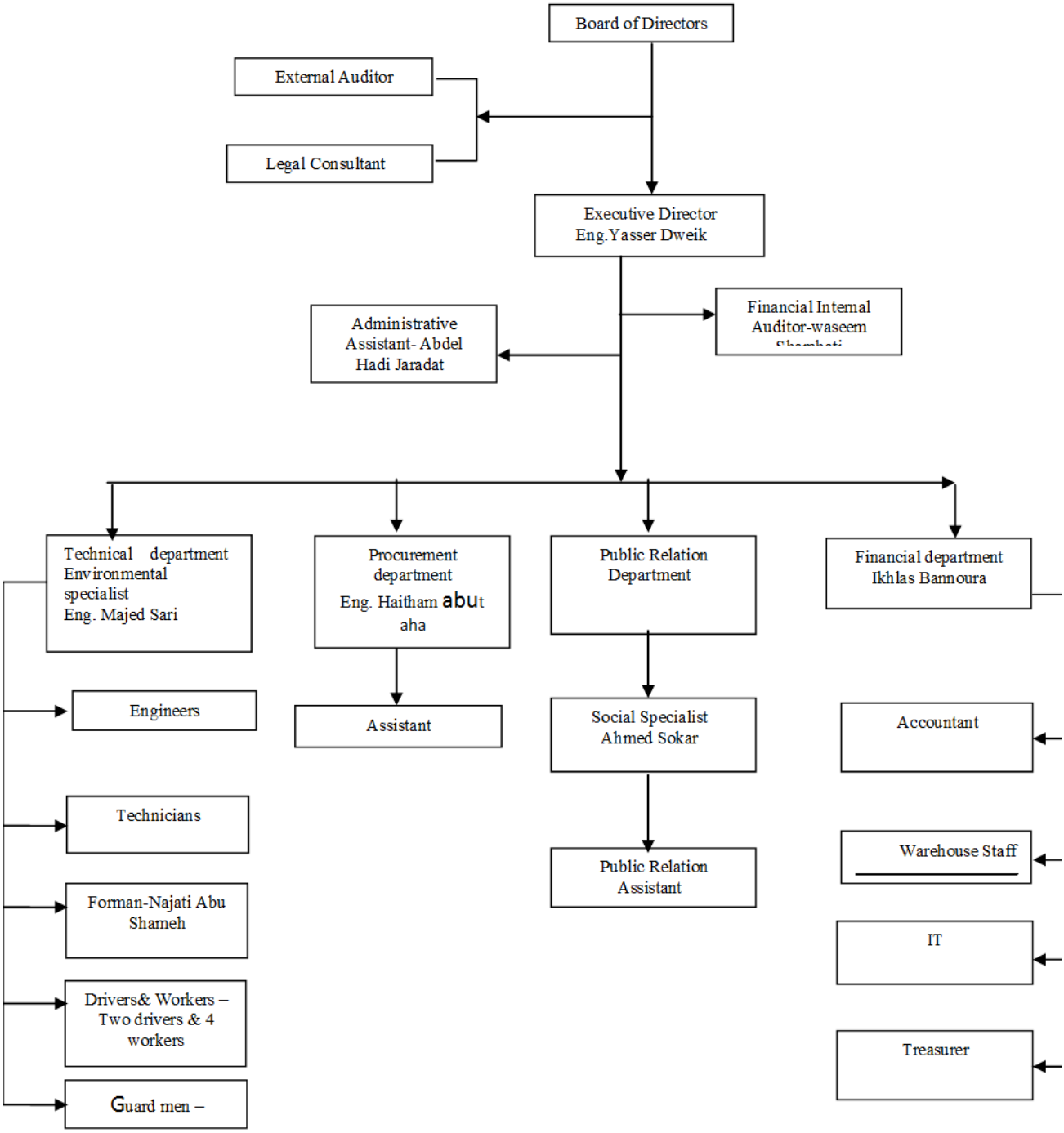
ANNEX 7

Organization Chart of each JC

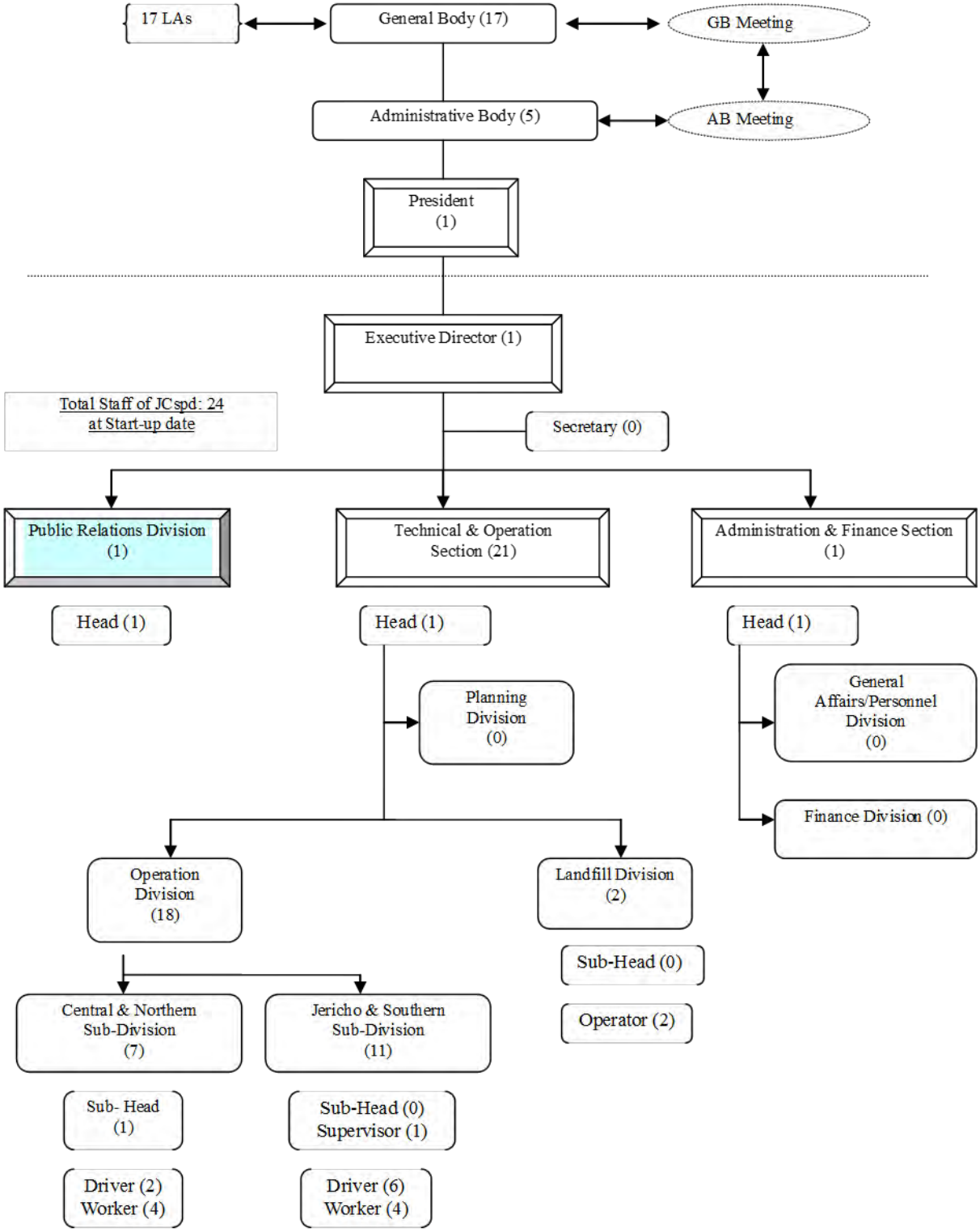
Organization Chart of Jenin JC



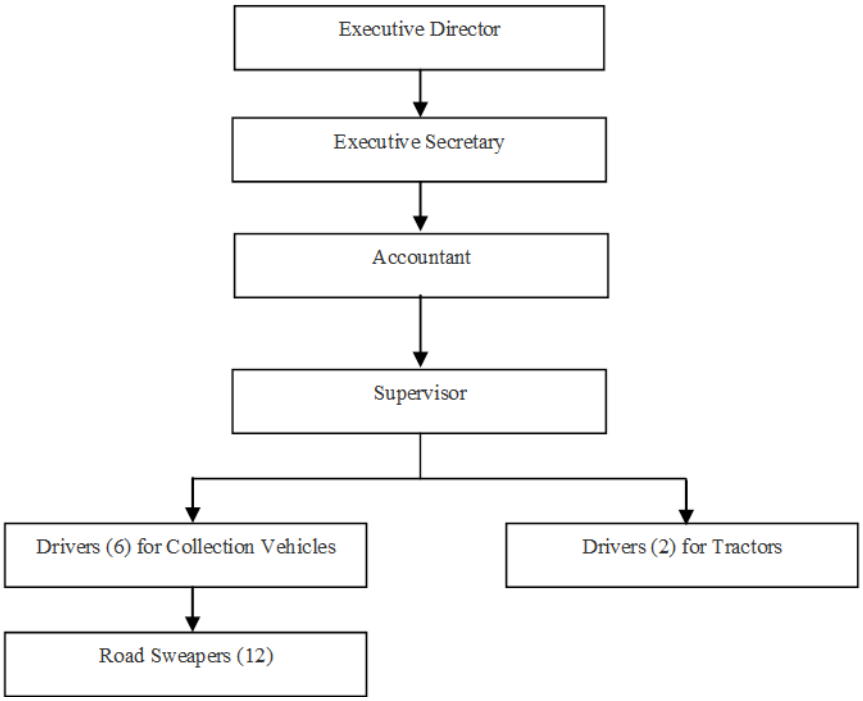
Organization Chart of Hebron JC



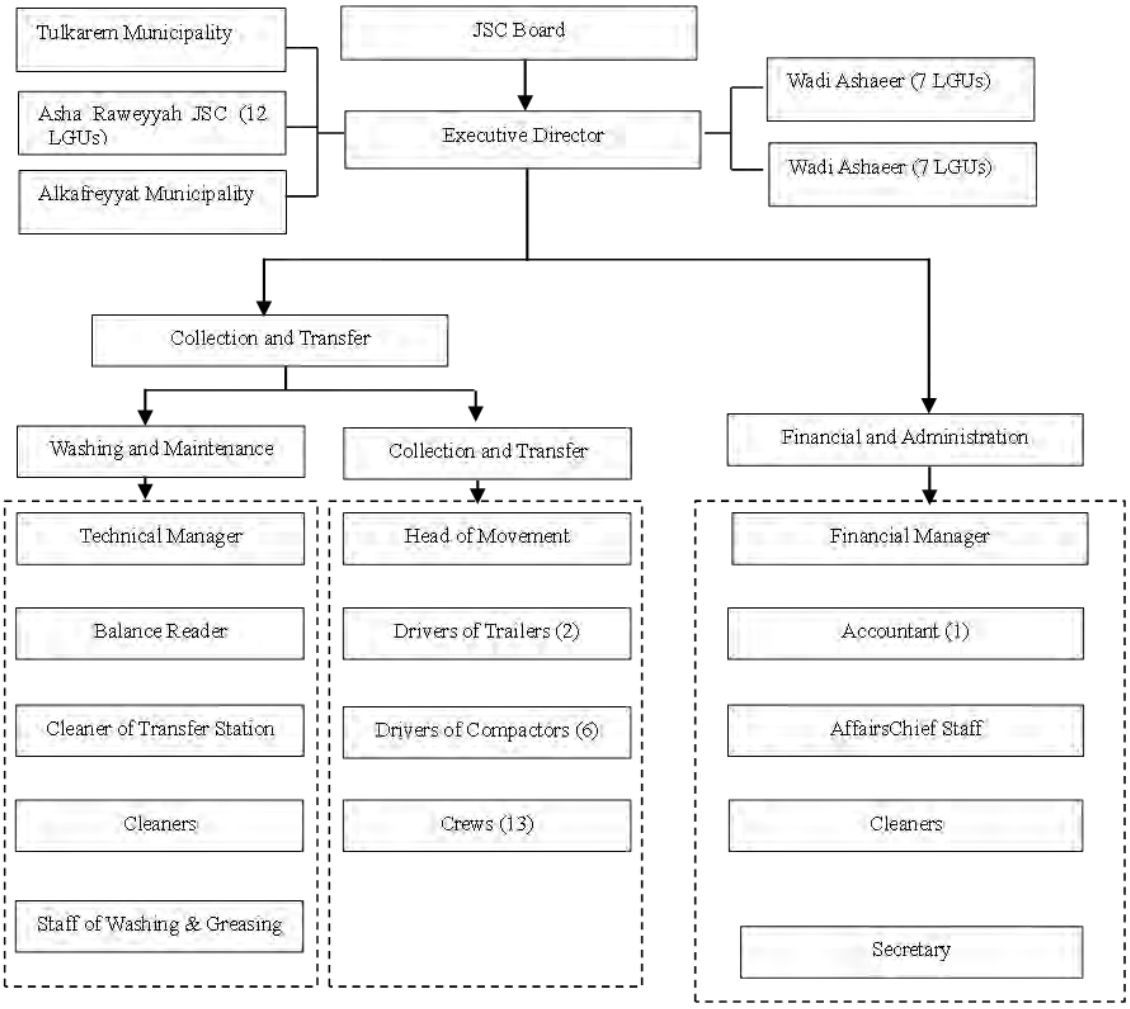
Organization Chart of Jericho JC



Organization Chart of Salfit JC



Organization Chart of Tulkarem JC



ANNEX 8

Geological Investigation Report at Jericho New landfill Site

Interpretive Ground Investigation Report

At

Jericho Solid Waste Landfill

Submitted to

NJS Consultants Co. LTD

On behalf of

JICA

Job No. SI-12-058
April 2012

Alquds Center for Civil and Environmental Engineering studies
Al-Medan St
Al-Bireh
Tel: 02 2961011
02 2971011
Fax: 02 2971012
Email: acceeslab@yahoo.com

	Title, Company	Name	Signature	Date
Originator	**General Manager, Ziad Adi**	**Ziad Adi**		**28/04/2012**
Approved	**General Manager, Ziad Adi**	**Ziad Adi**		**28/04/2012**

Document Revision History:

01	28/04/2012	Z. Adi	-	-
Revision	Date	By	Section Amended	Details of Amendments

Messrs.: NJS Consultants Co. LTD

Subject: Site Investigation Report for Proposed Solid waste Landfill in Jericho.

Dear Sir,

It is of our pleasure to submit you this geotechnical report for the site mentioned above. This investigation was carried out according to your request.

This report includes the results of field investigation, laboratory results, and the required conclusions recommendations needed for design & construction of the most safe and economical foundation.

For any further information or clarifications, please don't hesitate to contact us.

Yours Sincerely,
General Manager
Eng. Ziad Adi

EXECUTIVE SUMMARY

Alquds Center for Civil and Environmental Engineering Studies (ACCEES) was commissioned by NJS Consultants Co. LTD to undertake a ground investigation at the site of the proposed Solid Waste Landfill in Jericho.

The purpose of the investigation was to provide geotechnical information on the subsoil to aid in the design of the wastewater treatment plant.

Six boreholes were sunk to a maximum depth of 10.0 meters below ground level (mbgl). Selected soil samples were submitted to our geotechnical laboratory for both geotechnical and contamination analysis.

Stratigraphic records from the boreholes indicate that at the location of the proposed building the ground is underlain by CLAYEY soil and WADI material.

The permeability of the existing soil ranges from $6*10^{-6}$ to $1*10^{-8}$. Thus, the natural existing soil could not be considered a natural barrier for the control of leachate draining into the groundwater. Thus, it is recommended to design a geotexile barrier for the control of leachate.

Groundwater was not encountered at any of the boreholes. However, according to information gathered from different sources, the site is underlain by an aquifer with a substantial source of groundwater.

Qualitative seismic analysis was undertaken using previous information about the site and using UBC code and the site was found not to inhibit any serious risk of seismic activity. The estimated ground peak acceleration that should be used is 0.20g.

Contents

List of Tables

List of Figures

1.0 INTRODUCTION

This report includes the final results of the foundation ground inspection at the location of the proposed solid waste landfill in Jericho.

2.0 PURPOSE OF STUDY

The aim of this study is to determine the physical and mechanical properties of the subsurface soil to provide the structural engineer with information needed for safe and economical foundation design and construction. This report provides information relating to the allowable bearing capacity of the soil recommended as foundation ground, recommended foundation depth and type, expected elastic settlement of soil under foundations, safe side slope excavation, suitable backfill material, geotechnical consideration for earthquake design and other recommendations that would result in safe structure.

3.0 SCOPE OF WORK

The work undertaken consisted of the following:

1. Collecting general information such as site plan, geological maps, topographic maps and other information related to the site.
2. Undertaking site visits in order to collect information about site nature, topography of the site, geological features and other properties concerning the project site.
3. Drilling three boreholes and sampling of disturbed and undisturbed samples.
4. Carrying out necessary field and laboratory tests.
5. Performing classification and description of the sampled soil.
6. Analysis of field and laboratory tests results.
7. Developing comprehensive conclusions and recommendations for design and construction of the most safe and economical foundation system.

4.0 GEOTECHNICAL EXPLORATION & FIELD TESTING

4.1 Borehole Schedule

Table 1 shows the finished drilling program of the boreholes within the plot:

Table 1**: Finished Drilling Program of Boreholes**

Borehole No.	Depth	Date of drilling	Location	Elevation*
BH 1	10.00	09/04/2012	See Appendix A	**-322.88**
BH 2	10.00	09/04/2012		**-327.96**
BH 3	10.00	09/04/2012		**-319.60**
BH 4	10.00	09/04/2012		**-321.52**
BH 5	10.00	09/04/2012		**-321.70**
BH 6	10.00	09/04/2012		**-321.80**

* This level is at the level of the existing excavation.

4.2 Methods of Sampling

Samples were obtained continuously from the boreholes every half meter or when change in the sampled soil was detected. Down the hole hammer was used at layers of hard bands of rock or highly cemented soil were encountered.

The collected samples were placed in waterproof plastic bags to keep their moisture content, and then they were placed in proper sequence in wooden boxes. These samples were taken to our laboratory to be classified and described by our geological and geotechnical engineers.

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5.0 RESULTS OF LABORATORY TESTING

5.1 Laboratory Testing

After carrying out the geological description on the obtained samples, a laboratory tests program was issued. The program included all required tests on selected samples in order to determine the physical and mechanical properties of the encountered materials. The following tests were performed in accordance with **American Society for Testing and Materials** (**ASTM**) Standards listed below:

1. **ASTM D 2488-93**, "Description and Identification of Soils (Visual-Manual Procedure).

2. **ASTM D 2216-92**, "Laboratory Determination of Water (Moisture) Content of Soil, Rock and Soil Aggregate Mixtures"

3. **ASTM D 1586**; "Standard Test Method for Standard Penetration Test"

4. **ASTM D 3080**, "Standard Test Method for Direct Shear"

5. **ASTM D 6913**, "Standard Test method for Particle-size Distribution"

6. **ASTM D 2434**, "Standard test Method for Permeability"

7. ASTM D 4318, "Standard test Method for Liquid Limit, Plastic Limit, and Plasticity Index for Soil"

5.2 Laboratory Tests Results:

- **Visual Description:**

The ground is underlain by:

- CLAYEY SOIL
- WADI material

- **Moisture Content:**

- The moisture content of the CLAYEY soil ranges from 21.4% to 32.6%
- The moisture content of the WADI material ranges from 10.7% to 19.3%

- **Liquid Limit**
  - The Liquid Limit for the CLAYEY soil ranges from 32.2 to 43.3
  - The Liquid Limit for the WADI Material ranges from 35.7 to 44.9

- **Plastic Index**
  - The Plastic Index for the CLAYEY soil ranges from 10.4 to 17.4
  - The Plastic Index for the WADI material ranges from 9.7 to 15.2

- **Cohesion of soil**
  - The cohesion of the CLAYEY soil ranges from 38 KN/m^2 to 41 KN/m^2.
  - The cohesion of the WADI material ranges from 36 KN/m^2 to 39 KN/m^2.

- **Angle of friction**
  - The angle of friction of the soil ranges from 14^o to 16^o
  - The angle of friction of the WADI material ranges from 15^o to 17^o

- **The permeability**
  - Permeability of the CLAYEY soil ranges from 3 x 10^{-7} m/s to 1 x 10^{-8} m/s
  - Permeability of the WADI material ranges from 6 x 10^{-6} m/s to 3 x 10^{-7} m/s

6.0 Ground Water and Cavities

Groundwater was not encountered at any of the boreholes. No cavities were encountered in any of the boreholes.

7.0 CONCLUSIONS AND RECOMMENDATIONS FOR FOUNDATION SYSTEM.

According to field exploration, laboratory testing, subsurface conditions, and engineering analysis, it can be concluded that the existing ground at the site can support the expected building loads, provided that the following recommendations are strictly followed.

7.1 Foundation Ground, Depth & Type

Foundation Ground:

According to our findings and the encountered materials, the clayey soil and wadi material shall not be considered as a natural barrier for the control of leachate draining into groundwater. Thus, it is essential to design a geotexile barrier for the landfill.

7.2 Allowable Bearing Pressure

The allowable bearing capacity for the MARL is calculated using Terzaghi;s equation. y applying a factor of safety (F) to the unconfined compression strength of the intact samples as expressed:

$$q_{ult} = 1.3N_c c + qN_q + 0.4B\gamma N_\gamma$$

$$q_{net} = q_{ult} - q$$

$$q_{all} = q_{net}/FS$$

Where:
q_{utl} = Ultimate bearing Capacity;
q_{net} = Net bearing Capacity ;
q_{all} = Allowable bearing Capacity
FS = Factor of Safety.
c = cohesion of soil =
$q = \gamma D_f =$
γ = unit weight of soil
D_f = Depth of bottom of footing from ground level
B = width of footing
N_c, N_q, N_γ = bearing Capacity factors

Table 2: Bearing Capacity of soil

Soil Type	BH #	c	ϕ	q_{ult} (KN/m^2)	q_{net} (KN/m^2)	FS	q_{all} (Kg/cm^2)
Clayey soil	1	41	14	855	807	4	2.06
	2	41	14	855	807	4	2.06
	3	39	15	885	837	4	2.13
	4	40	14	839	791	4	2.02
	5	38	16	935	887	4	2.26
	6	39	15	885	837	4	2.13
Wadi Material	1	39	15	900	849	4	2.16
	2	36	17	991	940	4	2.40
	3	36	17	991	940	4	2.40
	4	38	15	883	832	4	2.12
	5	37	16	934	883	4	2.25
	6	39	15	900	849	4	2.16

7.3 Settlement Determination

In general the settlement of any foundation can be divided into two major categories:

a) Elastic or Immediate Settlement: which takes place during or immediately after the construction of the structure.
b) Consolidation Settlement: this occurs over time.

The elastic settlement of a footing after application of load can be computed from the theory of elasticity equation:

$$\Delta H = q.B\frac{(1-\mu^2)}{E_S}I_W$$

Where:
ΔH = settlement;
q = intensity of contact pressure in units of Es;
B = least lateral dimension of footing in units of ΔH;
Iw = influence factor, Table (5);
Es, μ = elastic properties of rock, (Poisson's ratio m is assumed; (0.15-0.25).

7.4 Modulus of Elasticity Determination

The modulus of elasticity for the CLAYEY soil is 780 Kg/cm^2.

The modulus of elasticity for the WADI material is 785 Kg/cm^2.

The modulus of elasticity for the basecoarse material is 875 Kg/cm^2.

7.5 Modulus of Sub grade Reaction Ks

The modulus of sub grade Reaction Ks for the CLAYEY soil is 390 Kg/cm^3.

The modulus of sub grade Reaction Ks for the CLAYEY soil is 392 Kg/cm^3.

The modulus of sub grade Reaction Ks for the CLAYEY soil is 392 Kg/cm^3.

7.6 Excavation Methods:

It is expected that the excavation will be through CLAYEY soil and WADI material. Therefore, machine mounted jack hammers with compression and rock breakers in

addition to the conventional excavation equipment such as loaders and dozers will be needed for the excavation works.

7.7 Surface & Subsurface Drainage:

It is recommended to protect the foundation ground and excavation from surface water both during and after construction by providing proper drainage and protection system. Surface water, if existed, should be diverted away from the edges of the excavations. The side walk should be extended beyond the building line for a distance of at least 2.5 meters in every direction. A slope of 1.5 cm in 100 cm is suggested to allow proper drainage.
However, the slab on grade and the foundation system shall be isolated using a proper isolation material. This material shall be selected by the supervisor engineer according to the required specifications.

7.8 Material for Backfilling Purposes:

CLAYEY soil and WADI material excavated is not suitable for backfilling material.

1) The materials to be used for backfilling purposes shall be a soil or soil-rock mixture which is free from organic matter or other deleterious substances. It shall not contain rocks or lumps over 15 cm in greatest dimension, and not more than 15 percent larger than 7 cm. The Liquid limit and plasticity index for the backfill material shall not be more than 35 % and 10 %, respectively.
2) Selected backfill material should not contain more than 25% of fine materials pass sieve #200 (particle size =0.075 mm).
3) It shall be spread in lifts not exceeding 25 cm in uncompacted thickness, moisture conditioned to its optimum moisture content, and compacted to a dry density not less than 95 percent of the maximum dry density as obtained by standard proctor compaction test **(ASTM D 698).**
4) Foundation must be safe against overturning, rotation, sliding or soil rupture; especially for retaining walls. The following parameters for wall design are suggested:

- Height of fill to be retained by the wall (1-3.0 m).

- If surcharge loads are available, take it in consideration.

- Weight of earth (γ) =1.80 ton/cu.m, fill is level (fill is non expansive soil-selected engineering fill).

- Angle of internal friction (ϕ) = 30 degrees and cohesion (c) = 0.5 Kg/Sq.cm. (For more safety)

- Angle of friction between soil and base slab (δ) = 22 deg.

7.9 Earth Pressure

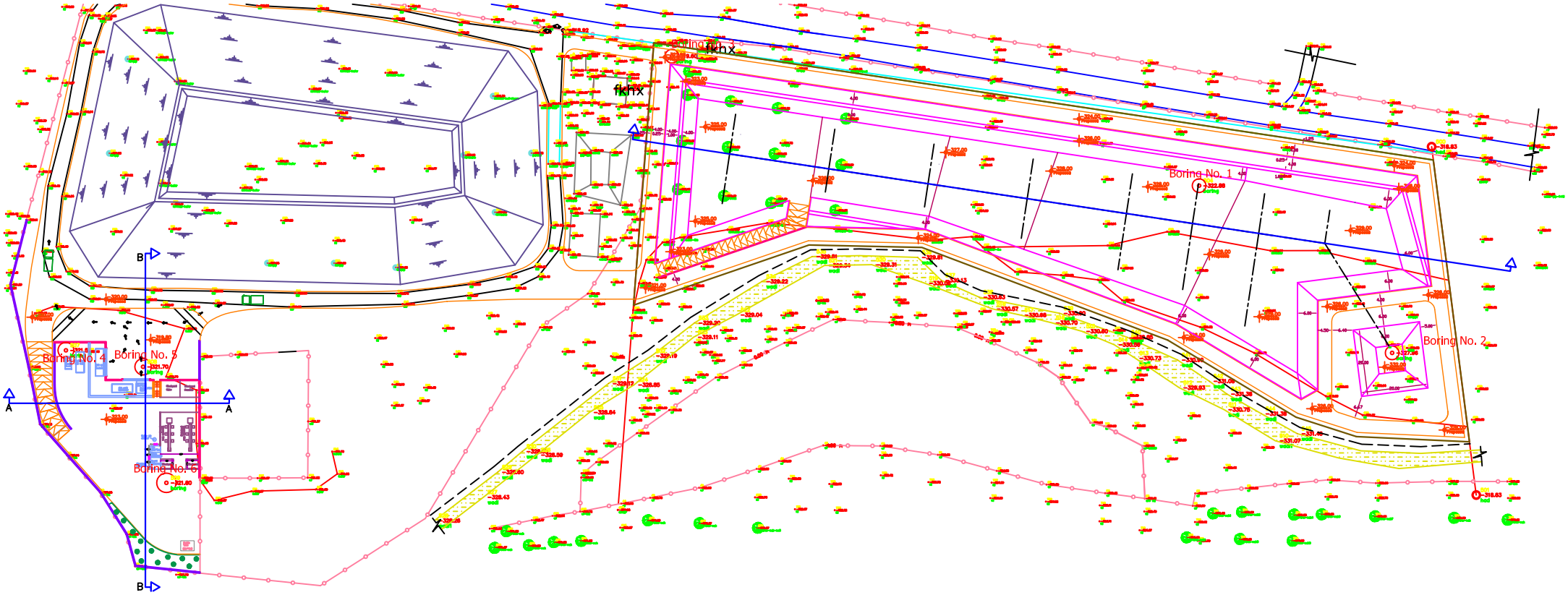
The underground basement walls of the building, if any, shall be designed for an equivalent fluid pressure of 0.8 gm/cm^3 (800 kg/m^3) plus a uniform lateral pressure which corresponds to the maximum expected surface loads.

7.10 Site Seismicity:

- Peak Ground Acceleration: PGA = 0.3g
- Soil Profile = S_E
- C_a = 0.36
- C_v = 0.84

Appendices

Appendix A – Site Plan and Location of Boreholes


Boring No. 1
Boring No. 2
Boring No. 3
Boring No. 4
Boring No. 5
Boring No. 6
A
A
B
B

Appendix B – Borehole Log

AL-QUDS CENTER for CIVIL & ENVIRONMENTAL ENGINEERING STUDIES	BORHEHOLE No. 1	Ground Level	-322.88
START DATE: 09/04/2012 END DATE: 09/04/2012	BORHEHOLE Diameter: 79 mm		

Drilling Method: Down the Hole Hammer for Disturbed Samples

DATE	DEPTH (m)	SPT				Strata		Depth (m)	Level (Relative)	Moisture Content %	Unit Weight KN/m3	LL	PL	PI	c KN/m2	ϕ	Soil Classification		Permeability m/s
		15	15	15	N	LITHOLOGY	Description of Strata										AASHTO	USCS	
09/04/2012	0.00	7	15	18	33	CLAY	Brownish CLAYEY soil with organic material	-0.00	-322.88	32.6	14.1	32.2	18.6	13.6	41	14	A-6	OL	3*10-7
	1.00					WADI Material	WADI material	-0.60	-323.48	19.3	17.7	41.8	32.1	9.7	38	16	A-5	OL	6*10-6
	2.00																		
	3.00																		
	4.00																		
	5.00							-5.5	-328.38										
	6.00	8	17	18	35	CLAY	Dark grayish CLAYEY soil			22.4	16.5	35.9	20.7	15.2	40	15	A-6	CL	4*10-8
	7.00	7	12	17	29														
	8.00	8	12	19	31														
	9.00	8	14	18	32			-10.0	-332.88										

Notes:

SPT = Standard Penetration Test

LL = Liquid Limit

PL = Plastic Limit

PI = Plastic Index

c = cohesion of Soil

ϕ = Friction angle of soil

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Project:	Job Number: SI-12-058	Status: FINAL	Sheet Number: 1 of 1
Jericho Solid Waste Landfill			

AL-QUDS CENTER for CIVIL & ENVIRONMENTAL ENGINEERING STUDIES	BORHEHOLE No. 2	Ground Level	-327.96
START DATE: 09/04/2012 END DATE: 09/04/2012	BORHEHOLE Diameter: 79 mm		

Drilling Method: Down the Hole Hammer for Disturbed Samples

DATE	DEPTH (m)	SPT				Strata		Depth (m)	Level (Relative)	Moisture Content %	Unit Weight KN/m3	LL	PL	PI	c KN/m2	ϕ	Soil Classification		Permeability m/s
		15	15	15	N	LITHOLOGY	Description of Strata										AASHTO	USCS	
09/04/2012	0.00					WADI Material	WADI material	-0.00	-327.96	15.4	16.9	35.7	25.3	10.4	39	15	A-6	CL	3*10-6
	1.00	6	14	19	33	CLAY	Grayish CLAYEY soil	-1.00	-328.96	25.7	15.9	35.7	20.5	15.2	38	15	A-6	OL	1*10-8
	2.00	7	17	17	34														
	3.00	8	15	16	31														
	4.00	7	14	15	29														
	5.00	6	16	16	32														
	6.00	8	13	18	31														
	7.00	7	11	17	28	CLAY	Dark grayish CLAYEY soil	-7.00	-334.96	23.1	16.2	43.3	25.9	17.4	40	14	A-7	CL	2*10-8
	8.00	6	11	19	30														
	9.00	8	14	18	32			-10.0	-337.96										

Notes:

SPT = Standard Penetration Test

LL = Liquid Limit

PL = Plastic Limit

PI = Plastic Index

c = cohesion of Soil

ϕ = Friction angle of soil

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Project:	Job Number: SI-12-058	Status: FINAL	Sheet Number: 1 of 1
Jericho Solid Waste Landfill			

AL-QUDS CENTER for CIVIL & ENVIRONMENTAL ENGINEERING STUDIES	BORHEHOLE No. 3	Ground Level	-319.60
START DATE: 09/04/2012 END DATE: 09/04/2012	BORHEHOLE Diameter: 79 mm		

Drilling Method: Down the Hole Hammer for Disturbed Samples

DATE	DEPTH (m)	SPT				Strata		Depth (m)	Level (Relative)	Moisture Content %	Unit Weight KN/m3	LL	PL	PI	c KN/m2	ϕ	Soil Classification		Permeability m/s
		15	15	15	N	LITHOLOGY	Description of Strata										AASHTO	USCS	
09/04/2012	0.00	8	15	16	31	CLAY	Creamy stiff CLAYEY soil	-0.00	-319.60	22.1	16.1	42.6	32.6	10.0	38	15	A-5	CL	2*10-7
	1.00	5	11	18	29														
	2.00	7	14	17	31														
	3.00	7	16	16	32	CLAY	Grayish CLAYEY soil	-2.50	-322.10	25.6	15.8	37.2	24.6	12.6	41	14	A-6	CL	4*10-8
	4.00	6	16	18	34														
	5.00	7	15	15	30	CLAY	Creamy stiff CLAYEY soil	-5.00	-324.60	23.9	16.0	33.5	22.3	11.2	39	15	A-6	CL	5*10-8
	6.00	8	17	18	35														
	7.00	6	13	16	29														
	8.00	7	14	18	32	CLAY	Dark grayish CLAYEY soil	-8.00	-327.60	24.6	16.1	34.8	17.4	17.4	40	14	A-6	CL	3*10-7
	9.00	8	14	16	30			-10.0	-329.60										

Notes:

SPT = Standard Penetration Test

LL = Liquid Limit

PL = Plastic Limit

PI = Plastic Index

c = cohesion of Soil

ϕ = Friction angle of soil

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Project: Jericho Solid Waste Landfill	Job Number: SI-12-058	Status: FINAL	Sheet Number: 1 of 1

AL-QUDS CENTER for CIVIL & ENVIRONMENTAL ENGINEERING STUDIES	BORHEHOLE No. 4	Ground Level	-321.52
START DATE: 09/04/2012 END DATE: 09/04/2012	BORHEHOLE Diameter: 79 mm		

Drilling Method: Down the Hole Hammer for Disturbed Samples

DATE	DEPTH (m)	SPT				Strata		Depth (m)	Level (Relative)	Moisture Content %	Unit Weight KN/m3	LL	PL	PI	c KN/m2	ϕ	Soil Classification		Permeability m/s
		15	15	15	N	LITHOLOGY	Description of Strata										AASHTO	USCS	
09/04/2012	0.00	7	14	17	31	CLAY	Brownish CLAYEY soil with organic material	-0.0	-321.52	23.4	16.2	40.6	26.5	14.1	41	15	A-7	OL	4*10-8
	1.00																		
	2.00					WADI Material	WADI material	-1.50	-323.02	12.1	17.5	38.9	27.3	11.6	39	16	A-6	CL	3*10-7
	3.00																		
	4.00																		
	5.00							-5.5	-327.02										
	6.00	8	13	18	31	CLAY	Dark grayish CLAYEY soil			22.4	16.4	39.7	23.0	16.7	40	14	A-6	CL	5*10-8
	7.00	7	12	16	28														
	8.00	8	17	17	34														
	9.00	8	13	19	32			-10.0	-331.52										

Notes:

SPT = Standard Penetration Test

LL = Liquid Limit

PL = Plastic Limit

PI = Plastic Index

c = cohesion of Soil

ϕ = Friction angle of soil

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Project: Jericho Solid Waste Landfill	Job Number: SI-12-058	Status: FINAL	Sheet Number: 1 of 1

AL-QUDS CENTER for CIVIL & ENVIRONMENTAL ENGINEERING STUDIES	BORHEHOLE No. 5	Ground Level	-321.70
START DATE: 09/04/2012 END DATE: 09/04/2012	BORHEHOLE Diameter: 79 mm		

Drilling Method: Down the Hole Hammer for Disturbed Samples

DATE	DEPTH (m)	SPT				Strata		Depth (m)	Level (Relative)	Moisture Content %	Unit Weight KN/m3	LL	PL	PI	c KN/m2	ϕ	Soil Classification		Permeability m/s
		15	15	15	N	LITHOLOGY	Description of Strata										AASHTO	USCS	
09/04/2012	0.00	7	15	14	29	CLAY	Creamy stiff CLAYEY soil	-0.0	-321.70	23.5	12.6	37.1	24.5	12.6	41	14	A-6	CL	1*10-8
	1.00					WADI Material	WADI material	-1.50	-323.20	13.4	17.5	44.9	27.7	17.2	41	14	A-7	CL	6*10-6
	2.00																		
	3.00																		
	4.00																		
	5.00							-5.5	-327.20										
	6.00	6	13	15	28	CLAY	Dark grayish CLAYEY soil			21.4	16.7	42.1	30.6	11.5	41	14	A-7	CL	3*10-7
	7.00	8	16	17	33														
	8.00	8	14	19	33														
	9.00	7	15	17	32			-10.0	-331.70										

Notes:

SPT = Standard Penetration Test

LL = Liquid Limit

PL = Plastic Limit

PI = Plastic Index

c = cohesion of Soil

ϕ = Friction angle of soil

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Project: Jericho Solid Waste Landfill	Job Number: SI-12-058	Status: FINAL	Sheet Number: 1 of 1

AL-QUDS CENTER for CIVIL & ENVIRONMENTAL ENGINEERING STUDIES	BORHEHOLE No. 6	Ground Level	-321.80
START DATE: 09/04/2012 END DATE: 09/04/2012	BORHEHOLE Diameter: 79 mm		

Drilling Method: Down the Hole Hammer for Disturbed Samples

DATE	DEPTH (m)	SPT				Strata		Depth (m)	Level (Relative)	Moisture Content %	Unit Weight KN/m3	LL	PL	PI	c KN/m2	ϕ	Soil Classification		Permeability m/s
		15	15	15	N	LITHOLOGY	Description of Strata										AASHTO	USCS	
09/04/2012	0.00	6	15	16	31	CLAY	Creamy stiff CLAYEY soil	-0.0	-321.80	23.6	16.4	35.6	25.6	10.0	40	15	A-4	CL	4*10-8
	1.00																		
	2.00					WADI Material	WADI material	-1.50	-323.30	17.2	16.4	37.2	24.8	12.4	39	15	A-6	CL	1*10-6
	3.00																		
	4.00																		
	5.00							-5.5	-327.30										
	6.00	7	17	17	34	CLAY	Dark grayish CLAYEY soil			21.5	16.7	43.3	31.8	11.5	38	16	A-7	CL	3*10-7
	7.00	8	14	18	32														
	8.00	8	12	18	30														
	9.00	8	16	17	33			-10.0	-331.80										

Notes:

SPT = Standard Penetration Test

LL = Liquid Limit

PL = Plastic Limit

PI = Plastic Index

c = cohesion of Soil

ϕ = Friction angle of soil

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Project: Jericho Solid Waste Landfill	Job Number: SI-12-058	Status: FINAL	Sheet Number: 1 of 1