

No. 1

**BASIC DESIGN STUDY REPORT
ON
THE PROJECT FOR
IMPROVEMENT OF WASTE DISPOSAL EQUIPMENT
IN THE
PALESTINIAN INTERIM SELF-GOVERNMENT AUTHORITY**

JANUARY 1999

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**JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
YACHIYO ENGINEERING CO. LTD.**

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PREFACE

In response to a request from the Palestinian Interim Self-Government Authority, the Government of Japan decided to conduct a basic design study on the Project for Improvement of Waste Disposal Equipment in the Palestinian Interim Self-Government Authority and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to the Palestinian Interim Self-Government Authority a study team from June 14 to July 23, 1998.

The team held discussions with the officials concerned of the Palestinian Interim Self-Government Authority, and conducted a field study at the study area. After the team returned to Japan, further studies were made. Then, a mission was sent to the Palestinian Interim Self-Government Authority in order to discuss a draft basic design, and as this result, the present report was finalized.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

I wish to express my sincere appreciation to the officials concerned of the Palestinian Interim Self-Government Authority for their close cooperation extended to the teams.

January, 1999

A handwritten signature in black ink, appearing to read 'Kimio Fujita', written in a cursive style.

Kimio Fujita

President

Japan International Cooperation Agency

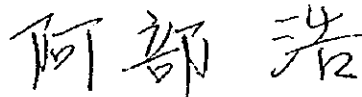
Letter of Transmittal

We are pleased to submit to you the basic design study report on the Project for Improvement of Waste Disposal Equipment in the Palestinian Interim Self-Government Authority.

This study was conducted by Yachiyo Engineering Co., Ltd., under a contract to JICA, during the period from June 1, 1998 to February 12, 1999. In conducting the study, we have examined the feasibility and rationale of the project with due consideration to the present situation of the Palestinian Interim Self-Government Authority and formulated the most appropriate basic design for the project under Japan's grant aid scheme.

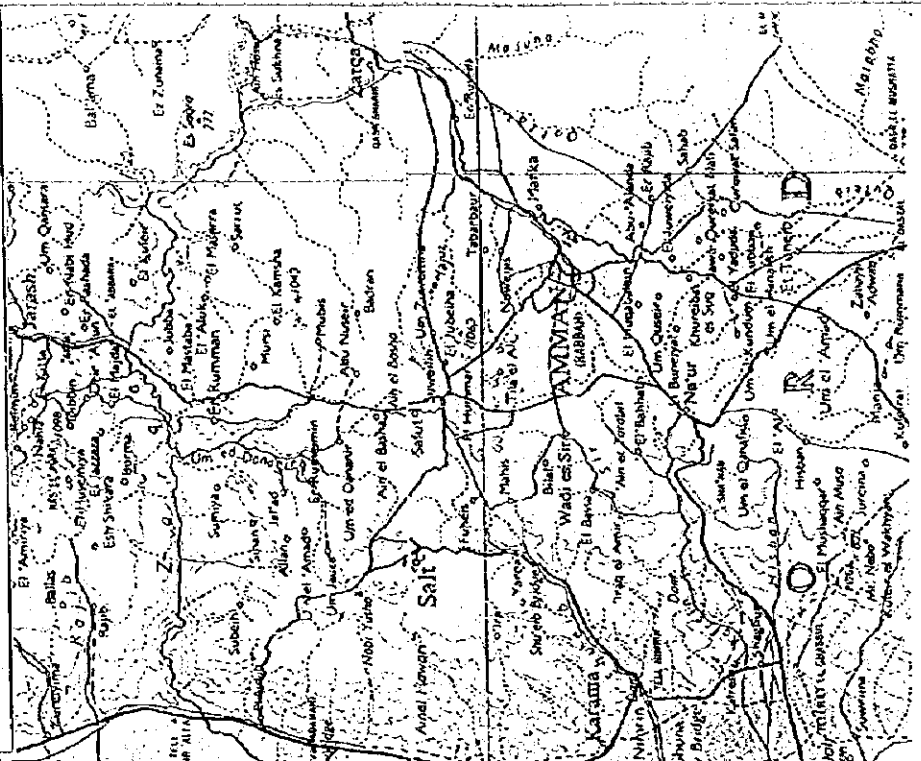
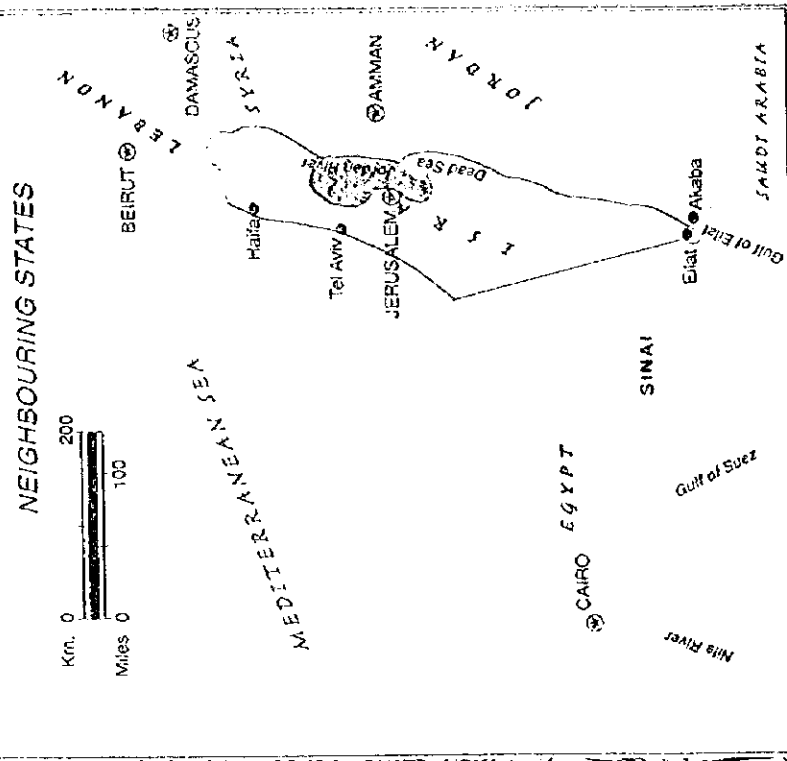
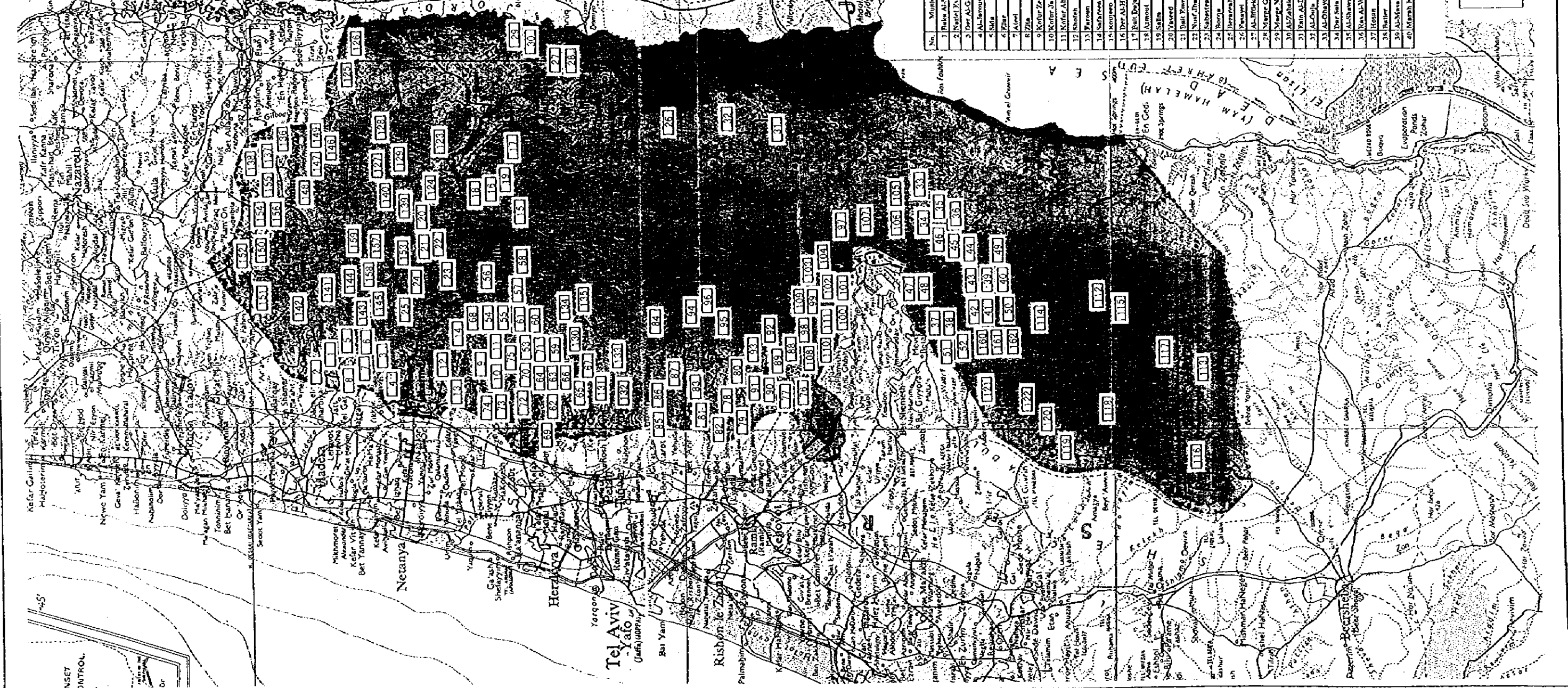
Finally, we hope that this report will contribute to further promotion of the project.

Very truly yours,

Handwritten signature of Hiroshi Abe in black ink, consisting of three characters: '阿', '部', and '浩'.

Hiroshi Abe
Project Manager,
Basic design study team on the
Project for improvement of Waste
Disposal Equipment in the Palestinian
Interim Self-Government Authority
Yachiyo Engineering Co., Ltd.

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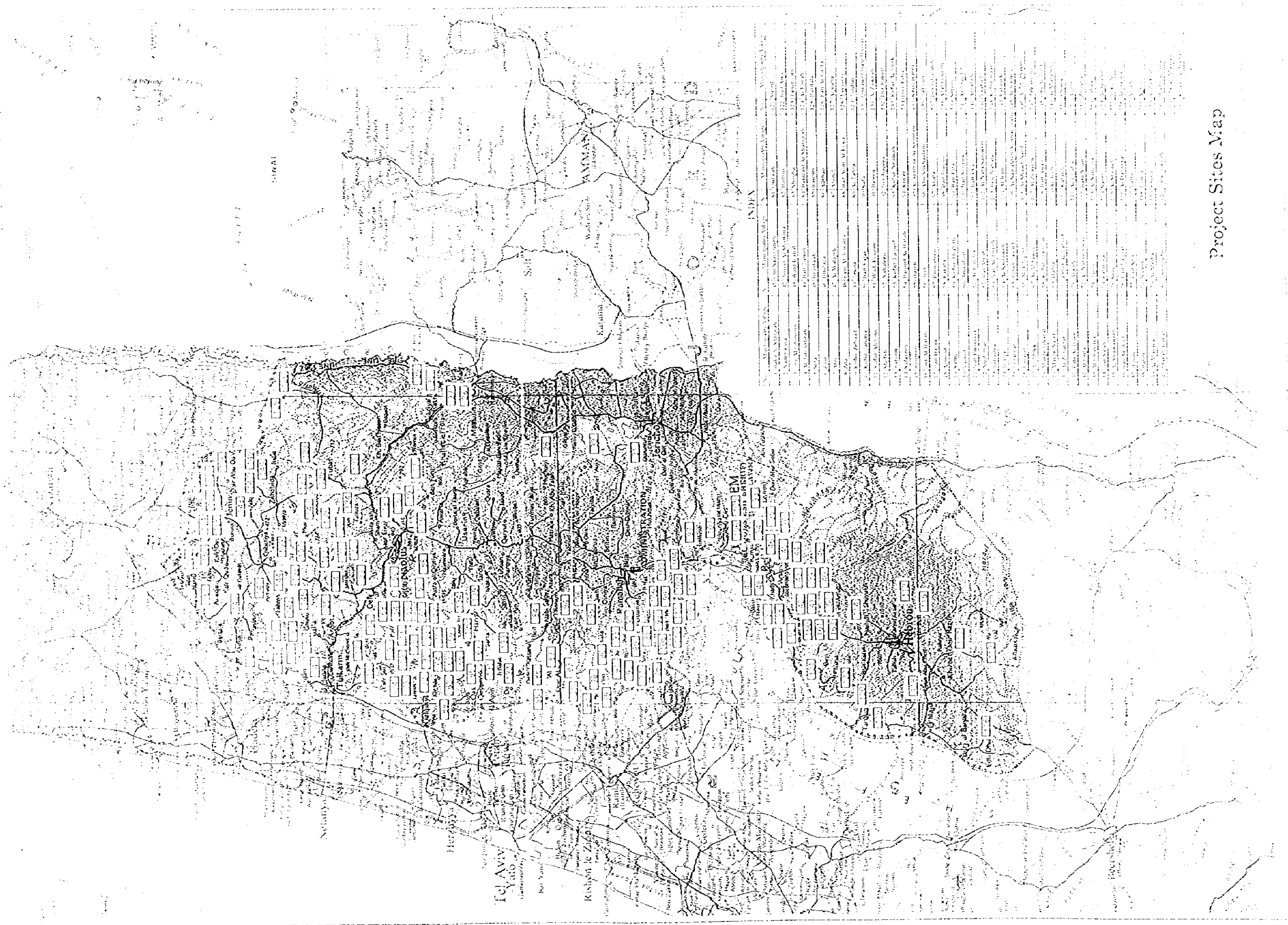


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No.	Municipality/Village	No.	Municipality/Village	No.	Municipality/Village
1	Baka Al-Shaykh	41	Om Salimoun	71	Qubbeh
2	Beit Fata	42	Zouat Al-Shamra	72	Beit Awa
3	Der Al-Ghousur	43	Wadi Zabal	73	Tombouan
4	Al-Amoushah	44	Beit Tamir	74	Beit Al-Farhan
5	Sika	45	Bendab	75	Bendab
6	Elar	46	Al-Sheban	76	Em Al-Baida
7	Alwad	47	Al-Walajah	77	Aqabat
8	Beit Anur Al-Paka	48	Beit Anur Al-Paka	78	Tawasser
9	Al-Tobas	49	Al-Tobas	79	Tobas
10	Beit Fajr	50	Sala	80	Qirawat Bent Hassan
11	Kofur Jemal	51	Wadi Wakers	81	Al-Zaweh
12	Shuruf	52	Nabateh	82	Der Tabout
13	Peroon	53	Kofur Nawah	83	Kofur Al-Dek
14	Saqer Al-Harab	54	Kofur	84	Der Ede
15	Hijrah	55	Hijrah	85	Kroo Harra
16	Der Al-Bitab	56	Abu Shalikh	86	Jaliban
17	Beit Dejan	57	Yimstein	87	Der Chirah
18	Ararat	58	Parata	88	Arnahoun
19	Salih	59	Kofur Thubath	89	Beit Eisa
20	Yareed	60	Yonafour	90	Beit Sere
21	Beit Zimmeh	61	Al-Kofuk	91	Al-Mudrah
22	Shuf Dhal	62	Al-Kofuk	92	Arabah
23	Sabirah	63	Beit Nabih	93	Yareed
24	Burya	64	Beit Al-Tereh	94	Kofur Raa
25	Bersabah	65	Al-Shaweh	95	Beit Fakh
26	Parawi	66	Al-Shaweh	96	Al-Saweh
27	Al-Firak	67	Al-Majd	97	Al-Saweh
28	Marge Ghazal	68	Kofur Qiroun	98	Beit Anan
29	Marge Shakh	69	Haba	99	Al-Jub
30	Al-Zhadat	70	Elher Al-Tebah	100	Kudrah
31	Kain Al-Duk	71	Alsh	101	Beit Naim
32	Al-Ohja	72	Al-Shor Pies	102	Zhouba
33	Der Sawah	73	Shos	103	Al-Samrah
34	Der Sawah	74	Palansa	104	Beit Sere
35	Al-Shawweh	75	Ser	105	Al-Shedih
36	Ras Al-Wad	76	Beit Lagash	106	Al-Dahab
37	Hissan	77	Beit Sira	107	Deran
38	Beit	78	Beit Sira	108	Alsh
39	Al-Shawra	79	Al-Mudra	109	Beit Sere
40	Marah Bahah	80	Der-Qubbeh	110	Wade Al-Nem
				111	Marah Bahah
				112	Khaer Al-Sereh

Project Sites Map





No.	Name of the Site	Latitude	Longitude	Area (Acres)	Remarks
1
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Project Sites Map

Abbreviations

The PA	The Palestinian Interim Self-Government Authority
MOPIC	Ministry of Planning and International Cooperation
MOLG	Ministry of Local Government
JICA	Japan International Cooperation Agency
The Project	The Project for Improvement of Solid Waste Disposal Equipment in the PA
E/N	Exchange of Notes
IBRD	International Bank for Reconstruction and Development
GDP	Gross Domestic Product
NIS	New Israeli Shekel

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Chapter 1 Background of the Project

In the Palestinian Interim Self-Government Authority (hereinafter referred to as "the PA"), shortage of waste disposal equipment and final disposal sites has resulted in the open dumping and field burning of waste on the periphery of urban areas, a cause for serious environmental contamination. Piling of uncollected waste and open dumping in urban areas provide a breeding ground for flies, rats and other vectors which spread communicable disease, and open burning of waste pollutes the atmosphere. Accordingly, lack of an appropriate waste collection and disposal system, and insufficient related equipment are serious issues confronting the PA.

Although the PA is pursuing establishment of a waste collection and disposal system in order to upgrade sanitary conditions in the Gaza Strip and West Bank, delays have been incurred due to lack of funding source.

Against this background, the PA made a request to the Japanese government for grant-aid assistance in (i) the procurement of solid waste collection equipment and final disposal equipment, (ii) incinerator and collection equipment for medical waste, and (iii) the construction of final disposal sites.

Upon receipt of this request, the Japanese side carried out a preliminary study of the request content, and adopted a policy of cooperation directly on the procurement of waste collection and disposal site equipment for the West Bank area, in consideration of factors of urgency and the present status of the waste collection/disposal system, and related operation and maintenance system therein. Toward this end, it was subsequently determined to execute a Basic Design Study.

During the field survey, it was identified that there are numerous areas in the West Bank where either no waste disposal service is available at all, or the level of service is low. It was also confirmed that a project is under planning by the World Bank for sanitary landfill site construction. In light of the above and after detailed discussions with the PA side, the original strategy for the Project was reaffirmed. Accordingly, the scope of the Project will be limited to the West Bank where establishment of a waste collection and disposal system is significantly lagging. Due to the urgency of establishing a general solid waste disposal system in the said area, it was decided to put off cooperation directed at measures for disposal of medical waste, and new disposal site construction. On this basis, it was resolved to carry out a Basic Design Study aiming at the establishment of an effective waste collection and disposal system in the West Bank, incorporating to the extent possible existing equipment and facilities.

In the original request document, equipment supply was requested on the District basis. However, the executing agency at present for waste collection and disposal under the PA is in principal the individual municipality/village, and not the District as indicated in the original request document. In this regard, the PA accordingly compiled a list of target municipalities/villages in the West Bank applying criteria of present population size, existing equipment on hand, assistance forthcoming from other donor agencies, importance and urgency within the PA, etc., and submitted

equipment request for 159 municipalities/villages out of 398 in the West Bank. In the case of small municipalities/villages where independent operation and maintenance of waste collection/disposal service would pose problems, the request called for grouping these with other nearby municipalities/villages for joint implementation of service. The number of these groups in the request was 79.

Also, the PA has requested disposal equipment for five (5) of 10 regional disposal sites to improve their operation because regional disposal sites which will be used by the target municipalities/villages are open dumping sites and are resulting degradation of their surrounding environment.

The above request was described in the Minutes of Discussion signed on 29 June, 1998.

However, it was found during the field survey that there are some points to be modified concerning the target municipality/ village as follows.

Municipalities/Villages in the Minutes	Municipalities/ Villages after modification
a. Group 20 consists of 5 villages (No 39, 40, 41, 42, 43)	Group 20 consists of 8 village (No 39 – 43 and 160 – 162)
b. Village 45 (Baraidaah) and 46 (Hindaza)	Integrated in one village 46/47 Baraidaah / Hindaza
c. Village 47 (Al-Walajeh) and 48 (Eain Al-Jowaiza)	Integrated in one village 47/48 Al-Walajeh/ Eain Al-Jowaiza
e. No. 84 Banazaide Al-Sharqeah	No. 84 Banazaide Al-Gharbiah
f. No 122 Bait Awa	No. 122 Bait Awla

As a result of these change, the target municipalities/villages become 160 arranged into 79 groups as shown in Table 1.1.1 and Table 1.1.2.

Table 1.1.1 Collection equipment requested by the PA

(1/4)

Group No.	Municipality/Village	Request		
		12m ³ Compactor	1.1m ³ Container	Tractor
1	1 Baka Al-Shrqeah	1	60	
	2 Nazlet Bssa			
2	3 Der Al-Ghosoun	1	100	
	4 Al-Jarousheah			
3	5 Sida	1	100	
	6 Ellar			
4	7 Ateel	1	50	
	8 Zita			
5	9 Kofur Zebaad	1	60	
	10 Kofur Jammal			
	11 Kofur Abbous			
6	12 Shofeh	1	60	
	13 Faroun			
	14 Safareen			
7	15 Roujeeb	1	100	
	16 Der Al-Hatab			
8	17 Bait Dajan	1	100	
	18 Azmout			
	19 Salim			
9	20 Yaseed	1	60	
	21 Bait Emmreen			
	22 Nusf Jbail			
	23 Sabastea			
10	24 Borqa	1	40	
	25 Bezareah			
11	26 Fasayel			1
12	27 Al-Jifilek			1
13	28 Marge Ghazal			1
14	29 Marge Najeh			1
15	30 Al-Zobaidat			1
16	31 Eain Al-Duke	1	50	
	32 Al-Ouja			
17	33 Al-Obaydya	1	50	
18	34 Dar Salah	1	60	
	35 Al-Shawawreh			
	36 Ras Al-Wad			
19	37 Hosan	1	60	
	38 Batier			
20	39 Al-Masara	1	60	
	40 Marah Rabah			
	41 Om Salmounch			
	42 Jouret Al-Shamma			
	43 Waid Rahal			
	160 Wade Al-Neas			
	161 Marah Maalah			
	162 Khalet Al-Hadadh			
21	44 Bait Tamer	1	60	
	45/46 Braidaah/Hindaza			

Table 1.1.1 Collection equipment requested by the PA

(2/4)

Group No.	Municipality/Village	Request		
		12m ³ Compactor	1.1m ³ Container	Tractor
22	47/48 Al-Walajeh/Eain Al-Jowaiza	1	50	
23	49 Tekoa	1	25	
24	50 Bait Fajar	1	30	
25	51 Wadi Fokeen	1	40	
	52 Nahaleen			
26	53 Kofur Laquef	1	60	
	54 Baquet Al-Hatab			
	55 Hajeh			
	56 Jeet			
	57 Emmateen			
	58 Farata			
27	59 Kofur Thuluth	1	50	
28	60 Jensafout	1	40	
	61 Al-Fondok			
29	62 Ras Ateah	1	50	
	63 Ras Al-Tierch			
	64 Al-Kheameh			
	65 Ezbet Jaloud			
	66 Al-Ashquer			
	67 Al-Mdawer			
30	68 Kofur Qudoom	1	30	
31	69 Habla	1	30	
32	70 Ezbet Al-Tabeeb	1	50	
	71 Asaleh			
	72 Al-Nabee Eleas			
	73 Jayos			
	74 Falamea			
	75 Seer			
33	76 Bait Laqeah	1	50	
	77 Bait Sira			
34	78 Naleen	1	60	
	79 Al-Media			
	80 Der Qudees			
35	81 Qubeah	1	60	
	82 Bodrus			
	83 Shoqba			
36	84 Banizaid Al-Gharbiah		1	1
37	85 Ranties	1	60	
	86 Alleban			
	87 Aboud			
38	88 Bait Aour Al-Foka	1	60	
	89 Al-Tahta			
	90 Safa			
39	91 Baleen	1	60	
	92 Der Bazeea			
	93 Kofur Neamah			
40	94 Kober	1	60	
	95 Al-Mazraa Al-Kebleah			
	96 Abu Shkhaidem			

Table 1.1.1 Collection equipment requested by the PA

(3/4)

Group No.	Municipality/Village	Request		
		12m ³ Compactor	1.1m ³ Container	Tractor
41	97 Anata	1	50	
42	98 Bait Doquo	1	70	
	99 Bait Bja			
43	100 Bait Souriek	1	70	
	101 Bait Exa			
	102 Al-Nabi Samweel			
44	103 Beir Nabala	1	50	
45	104 Al-Ram	1	50	
46	105 Al-Sawahreh Al-Sharqeah	1	60	
	106 Al-Shaikh Saed			
47	107 Al-Zuayem	1	50	
48	108 Bait Anan	1	60	
	109 Al-Jeeb			
49	110 Katanh	1	50	
	111 Al-Kpaba			
50	112 Bani Noaim	1	50	
51	113 Al-Samoua	1	50	
52	114 Saeer	1	50	
	115 Al-Sheukh			
53	116 Al-Dahreyah	1	50	
54	117 Yatta	1	100	
55	118 Doura	1	30	
56	119 Ezna	1	30	
57	120 Tarkoumeah	1	30	
58	121 Sureif	1	30	
59	122 Bait Awla	1	30	
60	123 Tammoun	1	50	
	124 Al-Farah			
61	125 Bardala	1	60	
	126 Ean Al-Baida			
62	127 Aquaba	1	30	
63	128 Tayaseer			1
64	129 Toubas	1	30	
65	130 Qurawet Bani Hassan	1	60	
	131 Al Zaweah			
66	132 Der Balout	1	50	
	133 Kofur Al-Deek			
67	134 Dier Estia	1	30	
	135 Kefel Hares			
68	136 Jalboun			1
69	137 Der Ghazaleh			1
	138 Arabbouneh			
70	139 Serees			1
71	140 Al-Jdaydeh			1
72	141 Arrabeh	1	50	
73	142 Yaabad	1	60	
74	143 Kofur Raae	1	60	
	144 Fahmeh			
	145 Al-Rameh			

Table 1.1.1 Collection equipment requested by the PA

Group No.	Municipality/Village	Request		
		12m ³ Compactor	1.1m ³ Container	Tractor
75	146 Al-Moghayer	1	80	
	147 Jalkamous			
	148 Om Al-Tout			
	149 Al-Matalleh			
76	150 Etenek	1	60	
	151 Aneen			
	152 Zbouba			
77	153 Jabaa	1	50	
78	154 Al-Jalameh	1	60	
	155 Araneh			
	156 Al-Dahea			
79	157 Anzeh	1	80	
	158 AjjeH			
	159 Al-Zaweah			
Total		68	3,706	11

Table 1.1.2 Disposal Equipment Requested by the PA

Disposal site	Request		
	Bulldozer	Track loader	Dump truck
Jenin	1	1	1
Tulkarem	1	1	1
Tubas	1	1	1
Ramallah	1	1	1
Jericho	1	1	1
Total	5	5	5

Chapter 2 Project Components

2-1 Project Objectives

Under the PA, waste collection and disposal is carried out by each individual municipality/village acting as an independent executing agency. Since the size of these administrative units is small, however, it is difficult to effectively procure and maintain sanitation equipment, secure adequate sites for final waste disposal, and otherwise effectively carry out waste collection and disposal operations. As a result, (i) there are municipalities/villages which are unable to provide any waste collection service at all; (ii) even where municipalities/villages directly provide such service, waste collection equipment on hand is insufficient to achieve a satisfactory collection rate, (iii) in the case of municipalities/villages which subcontract this service to private companies, waste is not collected regularly with a resultant general dissatisfaction in the performance of such contractors, and (iv) majority of municipalities/villages using tractor which have poor transportation capacity. Under such circumstances and overall lack of transport capacity, the majority of municipalities/villages are forced to openly burn or dump waste at sites located on the periphery of human settlement, resulting in a degradation of sanitary conditions in the municipalities/villages targeted under the Project. Against this background, the PA has formulated a program to (i) deploy waste collection equipment to each municipality/village in the West Bank for waste collection service, and (ii) set up a regional waste disposal system using existing major disposal sites at ten locations in the West Bank for common municipality/village use as a means of putting a stop to the open burning and dumping of waste at the local municipality/village level. As of the present, the supply of collection equipment, and the establishment of a regional disposal system has been steadily pursued with the cooperation of other donor agencies.

As one part of this effort, this Project aims to procure collection equipment for deployment to municipalities/village in the West Bank where such equipment is significantly lacking in order to upgrade collection rates and enable waste hauling to the regional disposal sites. At the same time, application of covering soil shall be introduced at regional disposal sites to improve sanitary conditions.

2-2 Basic Project Concept

In the West Bank under the PA, improvement of waste collection in major cities with assistance from Spain, and a plan for construction of sanitary landfill sites with the cooperation of the World Bank are being pursued. In the case of other municipalities/villages, however, various problems exist in terms of procuring waste collection equipment, securing disposal sites, cost burden to be borne by residents, equipment operation and maintenance, etc. This has rendered many such municipalities/villages unable to provide waste collection service. Furthermore, even where this service is available, collection equipment on hand is insufficient to achieve an adequate waste collection rate, compounded by the practice of open dumping and burning of collected waste at sites on the outskirts of each municipality.

As a measure to resolve this situation, the PA has formulated a plan to expand waste collection service in municipalities/villages other than major cities, transport the collected waste to regional disposal sites at ten locations, and apply soil cover at these regional sites. This Project targets 160 small municipalities out of a total of 398 in the West Bank for the supply of waste collection equipment, and five regional disposal sites for the supply of disposal equipment. The PA has adopted a policy of joint implementation of waste collection service in the case of small municipalities/villages which would have difficulty in independently maintaining such service, and is also preparing regional workshops for maintenance of waste collection equipment. These efforts are seen as an effective approach to expanding waste collection service in small municipalities/villages, as well as contributing to appropriate equipment operation and maintenance.

Waste collection and disposal works entail operation and maintenance costs, and securing funding to meet these is an extremely important issue. In the case of the PA, a service charge is collected from each household to cover these costs. Under this Project as well, it will be necessary to collect service charges from each household as a funding source for operation and maintenance expenses. Accordingly, it will be required that groups for joint operation of waste collection service in the case of small municipalities/villages be of suitable size as to ensure that the service fee burden remains within an appropriate range.

With regard to waste collection equipment, it is the general approach to supply the targeted small municipalities/villages under this Project as well with the standard type of equipment which has been adopted in the case of major cities, i.e. a large compactor truck (12 m³) combined with 1.1 m³ containers. However, in light of the many narrow roads in the target municipalities/villages and the fact that many of the small municipalities/villages generate a small volume of waste, it is recommended that waste collection vehicles comprise mainly medium and small vehicles. Also, one portion of the groups under the Project have requested tractors; however, the transport efficiency of tractors is poor and they are accordingly not suited for waste hauling to regional disposal sites. These will be replaced instead with small compactor trucks.

With regard to containers, 1.1 m³ size containers are to be used with the large and medium compactor truck, while 0.6 m³ size containers are to be used in conjunction with the small compactor truck.

Request has been made for disposal site equipment at the five disposal sites located at Jenin, Tulkarem, Toubas, Jericho and Ramallah.

With regard to type of disposal site equipment, it is considered necessary to supply bulldozers, backhoes and dump trucks to the disposal sites which receive large volumes of waste, considering the required works of spreading/compacting waste and covering soil, and excavating/transporting covering soil. In the case of disposal sites which receive smaller volumes of waste, on the other hand, it is necessary that works be carried out by a tract-loader to minimize operational costs.

Also, although not specifically contained in the request, it will be necessary to procure spare parts as well for appropriate equipment maintenance.

In line with the above basic concept, results of study on the request content by the PA side is as shown in Table 2.2-1.

Table 2.2-1 Results of Study on Request Content

Item	Request content	Results of study
1. Waste collection equipment		
(1) Municipality/village groups	79 groups	Reduced to 68 groups
(2) Waste collection trucks	Large compactor truck (12 m ³) Tractor	Large compactor truck Medium compactor truck Small compactor truck
(3) Container	1.1 m ³ container	1.1 m ³ container 0.6 m ³ container
2. Disposal site equipment		
(1) Targeted disposal sites	5 locations	5 locations
(2) Disposal site equipment	Bulldozer Track-loader Dump truck	Bulldozer Backhoe Dump truck Track-loader (disposal sites with small waste volume)
3. Others		Procurement of spare parts

Points of difference, and justification therefor, between request content and the results of study are as follows.

(1) Collection Equipment

Of the 160 target municipalities/villages, joint collection service is planned for multiple municipalities/villages where such administrative units are too small to effectively carry out such service on their own. On this basis, the PA side organized the 160 target municipalities/villages into 79 groups, and requested collection equipment on a group-wise basis. This grouping was established on the basis of distances and the nature of cooperative relations between municipalities/villages within a said group, and the size of these groups is generally appropriate for the joint execution of waste collection works. However, a re-examination of this grouping was carried out due to the fact that it was judged some groups could be integrated from the standpoint of more rational operation. As a result, it was concluded that the number of groups could be modified to 68.

Also, the requested equipment for each group centered on large (12 m³) compactor trucks in combination with 1.1 m³ containers, and tractors for a portion of the groups. However, there are many narrow roads in the target municipalities/villages where large compactor trucks would be difficult to operate, as well as groups where the 12 m³ compactor truck would be excessively large given the volume of waste generated. In the case of these groups, it was decided to deploy medium (8 m³) and small (5 m³) compactor trucks instead of the large 12 m³ version. Also, the tractor item was replaced with a small 5 m³ compactor truck, given the low transport efficiency of the former and its unsuitability for hauling waste to the regional disposal sites.

Since the PA is pursuing a uniform container collection system throughout the entire West Bank, procurement under the Project as well will entail a combination of compactor truck and container. Appropriate quantity of containers is calculated on the basis of design population and generated volume of waste in each group. Also, 0.6 m³ containers are to be procured in the case of the small (5 m³) compactor truck since the 1.1 m³ type container is inappropriate for this size of compactor vehicle.

(2) Disposal Site Equipment

The five disposal sites targeted under the request are operated and maintained by the cities of Jenin, Tulkarem, Toubas, Jericho and Ramallah, respectively. Of these, the Toubas and Tulkarem disposal sites are sites to be newly constructed. Accordingly, it will be necessary to confirm the construction plan and progress in the case of the Tubas site and Tulkarem site. Furthermore, it will be necessary that the operational costs for these disposal sites be borne by the multiple municipalities using the same.

Equipment supply under the Project will be accordingly targeted at the five disposal sites at Jenin, Tulkarem, Toubas, Jericho and Ramallah.

In the case of the disposal sites at Toubas, Tulkarem and Jericho which receive a small volume of waste, it is planned that necessary operations be performed by a tractor-loader. Also, it is planned to supply a set of bulldozer, backhoe and dump truck to the disposal sites at Jenin and Ramallah which are subject to a large waste volume.

On the basis of the above, the basic Project concept is to provide equitable waste collection service, identical with that in major cities, to the small municipalities/villages in the West Bank based on joint collection service by groups of municipalities/villages, waste disposal at regional sites, and equipment maintenance by planned workshops. The resultant upgrading of waste collection rate and appropriate disposal is expected to improve the sanitary environment in the target municipalities/villages. Also, the local administration system in the PA is still in the process of establishment at present, and it is expected in this regard that the expansion of waste collection service under the Project will contribute to accelerate establishment of appropriate local administration system.

2-3 Basic Design

2-3-1 Design Strategy

(1) Strategy regarding Natural Conditions

i) Climatic Conditions

The West Bank lies roughly between 31° and 32° north latitude, and 34° and 35° east longitude. It belongs to the Mediterranean climatic zone which has a long, dry summer and short, rainy winter.

Temperatures in the West Bank vary depending on the location. Monthly mean temperatures are around 10° C in the winter and 25° C in the summer. Annual precipitation tends to be higher in the western part of the region (roughly 700 mm around Tulkarem), and less in the eastern part (roughly 150 mm around Jericho).

In implementing the Project, it is concluded that no special equipment design considerations are necessary to prevent damage from climatic conditions.

ii) Topographical Conditions

The West Bank is a hilly region with heavy relief. Areas around Nablus, Jerusalem and Hebron are mountainous, with elevations ranging 800~1,000 m. In contrast, elevations in the deep Jordan valley at the border with Jordan range -200 ~ -300 m. Maximum elevation in the West Bank is 1,020 m on the outskirts of Hebron, and minimum elevation is -375 m around the Dead Sea.

As a result of this topography, road gradients in the West Bank are steep and consideration must accordingly be given to vehicle hill climbing power in the procurement of collection equipment. The approach under the Project will be to procure vehicles with a 30~35% hill climbing capability.

Since there are numerous instances of narrow roads in the target municipalities/villages, it is recommended that waste collection vehicles comprise mainly medium and small vehicles.

(2) Strategy regarding Social Conditions

The Project aims at the implementation of appropriate waste collection service for residents of the West Bank. Inhabitants of the Project area are requesting equal public service by the PA the content of which does not vary depending on the area. Accordingly, it is necessary under the Project to ensure that the same quality of service can be provided in all the municipalities/villages targeted under the Project.

Public offices on the West Bank are closed one day a week (in most cases Friday is a holiday). Number of work days per year is thus 313. Furthermore, number of operational days for equipment is computed at 289 days considering two days per month for equipment maintenance (this represents a 92% operational rate with respect

month for equipment maintenance (this represents a 92% operational rate with respect to total annual work days, and a 79% operational rate with respect to total days in a year). Project planning assumes an 8 hour work day (actual working hours: 7 hours).

(3) Strategies regarding Special Conditions in the Project Area

a. Target Collection Rate

In order to cover the waste collection service cost, each municipality will directly collect service fees from residents. However, failure to sufficiently provide service will correspondingly make it difficult to collect enough service fees, thereby rendering system maintenance difficult. Accordingly, target collection rate for each municipality is to be 100%.

b. Project Target Year

The target year for the Project is 2004, corresponding to the fifth year after equipment procurement.

c. Equipment Supply

With regard to collection and disposal equipment, type and quantity of equipment will be decided to meet the requirement of collection and disposal of the amount of solid waste generated in 2004. But it is also considered that one (1) or two (2) hours per day overtime operation work in 2004 will be introduced in order to avoid having excessive equipment in the procurement year 2000, as the waste amount gradually increases year by year.

The reasons for this are as follows:

- a. Refugees who previously fled to neighboring countries are now beginning to return to the West Bank. As discussed in a separate section, the population growth rate for the region is thus extremely high. This high population growth is expected to continue for several years after 2000, with population in 2004 forecast at 125% that in 2000.
- b. If sufficient equipment to cope with population expected in 2004 is actually supplied during the equipment procurement year (2000), this would represent excessive equipment capacity with respect to the actual population for the ensuing period up to 2004 with resultant exorbitant burden on local residents.
- c. Most of the groups are small and can be covered by only one or two collection vehicles. In some cases, capacity of equipment will be too large to use equipment efficiently if the equipment will be procured to meet with solid waste generated in 2004 at the procurement year 2000. In this case, it will be suitable to procure required equipment in year 2000 which could cover 100% collection rate with one (1) or two (2) hours overtime per day in 2004.

(4) Utilization of Local Suppliers and Equipment

Of the equipment to be procured under the Project, locally fabricated containers will be adopted since there are local suppliers with good production capability and experience, and this equipment can be obtained cheaply.

(5) Operation and Maintenance Capacity of the Executing Agency

a. Equipment Maintenance and Repair

The Project is targeted at small municipalities/villages, most of which will be subject to deployment of a single unit of waste collection vehicle. Since it would be inefficient to carry out operation and maintenance of equipment by establishing workshops in each separate municipality/village, it will be the strategy under the Project to implement equipment maintenance and repair at either the four regional workshops planned by the Ministry of Local Government, or the existing workshops at Jericho and Nablus. These workshops are considered capable of performing periodic inspection, maintenance and minor repairs. In the case of the four regional workshops planned by the Ministry of Local Government, necessary repair equipment is to be procured under assistance from Spain.

Nevertheless, these workshops are not necessarily located close to the target municipalities/villages under the Project (there are many cases where the nearest such workshop is some 30 km away), making it difficult to bring in equipment for everyday inspection and repairs. Accordingly, the subject workshops would be utilized for periodic inspection and maintenance to be carried out monthly, and the more daily type of simple equipment check would be performed at the most convenient vehicle repair shop (private workshop) either in or near the municipality/village.

Also, since the above workshops do not have on hand the equipment necessary for major repairs, such major repair works would be carried out at properly equipped workshops of the manufacturer's agent, etc. Major equipment manufacturers are in the process of establishing workshops in the West Bank, and several of these agents have already set up workshop facilities. In addition, major world-wide equipment manufacturers have agents in neighboring Israel, making it possible for subcontracting of major repair works to this private sector.

Maintenance of equipment will be carried out as follow.

- | | |
|---------------------------------------------|------------------------------------------------------|
| (i) Daily inspection | Driver and convenient repair shop (private workshop) |
| (ii) Monthly inspection
and minor repair | Regional workshop |
| (iii) Major repair | Private workshop (Agent workshop of manufacturers) |

Since the above regional workshops are to be newly established, it is extremely important that staff training be carried out at the time of equipment procurement for the workshops. Under this Project as well, it is planned to conduct training of workshop staff under the tutelage of personnel dispatched from the nominated suppliers.

b) Waste Collection and Disposal Works

Under the PA, service fees are collected from residents to cover the cost for waste collection service. As a result, it will be necessary in implementing the Project to not only newly hire the required personnel, but that the full amount for essential costs be duly collected from residents by each municipality/village.

The PA is currently in the process of establishing a local administration system. The principal responsibilities at present of each municipality/village are the collection of utility fees for water and electricity, and collection of service fees for waste collection. Thus staff of municipality/village governments are small. Among these, are municipalities/villages with no public staff at all (service charges for water, electricity and waste collection are collected by the mayor and council members on a volunteer basis).

Thus it has been observed that an operational structure for waste collection is insufficient for many of the target municipalities/villages under the Project. However, in consideration of the fact that the PA is in a special period of transition to establish the local administration system and that in the future it will be essential to collect service fees for waste collection, the strategy under the Project will be to establish an operational structure whereby target municipalities/villages would be grouped with villages already engaged in collection of service fees for water and electricity. If the necessary service fees are subsequently collected, securing drivers and workers would pose no particular problem given the combined factors of high unemployment rate and high levels of education.

(6) Design Scope and Level for Equipment

1) Equipment Scope

At present, waste is collected in many municipalities/villages by tractor. Due to the low transport capacity of tractors, however, waste is openly dumped at nearby sites. In order to prevent this, waste collection equipment with good transport capacity will be introduced under the Project.

Also, the container collection system will be adopted under the Project, as this is the approach currently being promoted by the PA. The 1.1 m³ container is the standard being utilized at present, and this will be the basic criteria in considering container equipment under the Project as well. However, in the case of areas where small compactor trucks are more appropriate due to narrow roads, small volume of generated waste, etc., the 0.6 m³ container will be adopted since the 1.1 m³ container is not suited to operate in tandem with the small compactor truck.

Disposal site equipment will be in principal a combination of bulldozer, backhoe and dump truck. In the case of the smaller disposal sites at Jericho, Tulkarem and Toubas (small target populations), however, a truck-loader will be procured under the Project. This equipment is capable of multiple tasks, and will serve to save operational costs.

2) Technical Level

Equipment with a specification level to maintain and repair beyond the capability of manufacturer's agents in the PA area and Israel will not be introduced under the Project. Specifically, equipment specification and technical level will be such as to facilitate operation and maintenance to the extent possible. Compactor trucks are already being used in the major cities in the West Bank, and it is recommended that the specifications for this item under the Project be to the extent possible the same as the equipment already on hand.

(7) Implementation Period

The principal equipment under the Project comprises waste collection trucks and disposal equipment. As this type of equipment is not manufactured in the PA, procurement will be from Japan or a third country. Presently envisioned sources of procurement would be Europe (Germany, Sweden, Belgium, Netherlands, France, etc.). The implementation schedule for the Project will accordingly be formulated with consideration to business and labor practices in Europe and the PA.

As discussed below, it is currently considered that 15 months will be necessary from signing of E/N (Exchange of Note) to final handing over.

- i) Since the specification of the equipment will be prepared during the basic design study period, the time-frame up to contract signing with equipment suppliers would entail a total of 3.0 months, comprising consultant contract (0.5 months), tender document preparation and approval (1.0 months), tendering procedures (1 month), and tender evaluation and contract negotiation with suppliers (0.5 months).
- ii) Following the above, equipment fabrication would be carried out by the nominated supplier(s) and equipment manufacturers. Time-frame up to equipment lading would entail 9.5 months, comprising preparatory period for equipment order (0.5 months), and drawing approval and factory production (9 months).
- iii) Transport is anticipated to take around 2 months, including shipping, customs transit and inland transport. Equipment inspection on site and handing over would require 0.5 months.

2-3-2 Basic Plan

2-3-2-1 Overall Plan

(1) Operational Structure for Waste Collection

Waste collection and disposal service in the West Bank is carried out independently by each municipality/village. There are a total of 398 such municipalities/villages in the West Bank area. However, many of these are small communities with populations ranging from several hundred to several thousand. In the case of these small municipalities/villages, it is difficult to independently maintain self-contained collection services including disposal sites and equipment maintenance.

In order to improve this situation, it is urgently required to make joint service groups whereby multiple municipalities/villages jointly operate and manage collection equipment, disposal sites and workshops.

1) Joint Collection Service

Many of the 160 municipalities/villages targeted under the Project are small communities with populations ranging from several hundred to several thousand, making it difficult to independently maintain collection services. Accordingly, these small municipalities/villages are to be formed into groups (associations) for joint implementation of waste collection service.

In order to effect such joint collection service, the PA plan called for organizing the 160 target municipalities/villages into 79 groups, and on this basis request for equipment supply was made to Japan. The appropriateness of this grouping was subsequently studied according to the following criteria:

- i) Relationship between population size of the group, and the operation and maintenance cost burden required.
- ii) Relationship between group size and collection equipment capacity.
- iii) Locational relationship (distance, etc.) among the municipalities/villages within a given group.
- iv) Distance from groups to the most convenient, regional disposal site.

As a result of the above study, it was identified that (i) certain small groups would have difficulty in the sustained bearing of the operation and maintenance cost burden for collection equipment, and (ii) certain groups exhibited a population significantly small in comparison to the capacity of the requested equipment. A portion of these groups were subsequently integrated as shown in Table 2.3.1, taking into consideration the nature of existing cooperative relations and physical distance between municipalities/villages.

Table 2.3.1

Plan for Reorganizing Municipality/Village Grouping

Integrated Groups No.	Municipalities/villages comprising group after integration	Population		Status of municipality/village
		Each municipality/Village	Overall group	
11	26 Fasayel	650		Waste collection structure: Yes; Staff: 1; Population: small
12	27 Al- Liflek	2050		Waste collection structure: No; Staff: 0
13	28 Marge Ghazal	278		Waste collection structure: No; Staff: 0; Population: small
14	29 Marge Najeh	583		Waste collection structure: No; Staff: 0; Population: small
15	30 Al Zobaida	964	4,525	Waste collection structure: No; Staff: 1
19	37 Hosan	4,175		Waste collection structure: Yes; Staff: 1
	38 Batier	3,095		Waste collection structure: Yes; Staff: 2
22	47/48 Al-Wakaheg/ Eain Al- Jowaiza	1,234	8,504	Waste collection structure: No; Staff: 0
28	60 Jansafout	1,618		Waste collection structure: Yes; Staff: 3
	61 Al-Fondok	468		Waste collection structure: Yes; Staff: 1; Population: small
30	68 Kofur Qudoom	2,484	4,570	Waste collection structure: Yes; Staff: 2
29	62 Ras Ateah	1,137		Waste collection structure: Yes; Staff: 1
	63 Ras Al- Tierah	282		Waste collection structure: Yes; Staff: 0; Population: small
	64 Al-Kheameh	300		Waste collection structure: Yes; Staff: 0; Population: small
	65 Ezbet Jaloud	101		Waste collection structure: No; Staff: 0; Population: small
	66 Al-Ashquer	297		Waste collection structure: No; Staff: 0; Population: small
	67 Al-Mdawer	157		Waste collection structure: No; Staff: 0; Population: small
31	69 Habla	4,368	6,642	Waste collection structure: Yes; Staff: 13
46	105 Al-Sawahereh Al-Sharqaah	6,577		Waste collection structure: No; Staff: 4
	106 Al -Shaikh Saed	5,771		Waste collection structure: No; Staff: 4
47	107 Al-Zuayem	1,840	14,188	Waste collection structure: Yes; Staff: 3
61	125 Bardala	1,154		Waste collection structure: No; Staff: 1
	126 Ean Al-Baida	789		Waste collection structure: Yes; Staff: 1; Population: small
63	128 Tayaseer	1,748	3,691	Waste collection structure: Yes; Staff: 0
68	136 Jaboun	2,170		Waste collection structure: No; Staff: 1
69	137 Der Ghazaleh	637		Waste collection structure: Yes; Staff: 3; Population: small
	138 Arabbouneh	743	3,549	Waste collection structure: Yes; Staff: 2; Population: small
70	139 Sarees	3,770		Waste collection structure: No; Staff: 0
71	140 Al-Jadaydeh	4,680	8,450	Waste collection structure: Yes; Staff: 3

As a result of the above, the target municipalities/villages under the Project were reorganized into a total of 160, and 68 groups as shown in Table 2.3.2. An appropriate waste collection equipment plan was thus formulated for each group on the basis of this reorganized grouping.

Table 2.3.2 Grouping of Municipality and Village under the Project

(1/4)

Grouping in the Request		Grouping after Integration	
Group No.	Municipality/Village	Group No.	Municipality/Village
1	1 Baka Al-Shrqeah	1	* 1 Baka Al-Shrqeah
	2 Nazlet Essa		2 Nazlet Essa
2	3 Der Al-Ghosoun	2	* 3 Der Al-Ghosoun
	4 Al-Jarousheah		4 Al-Jarousheah
3	5 Sida	3	5 Sida
	6 Ellar		* 6 Ellar
4	7 Ateel	4	* 7 Ateel
	8 Zita		8 Zita
5	9 Kofur Zebaad	5	9 Kofur Zebaad
	10 Kofur Jammal		* 10 Kofur Jammal
	11 Kofur Abbous		11 Kofur Abbous
6	12 Shofeh	6	12 Shofeh
	13 Faroun		* 13 Faroun
	14 Safareen		14 Safareen
7	15 Roujeeb	7	* 15 Roujeeb
	16 Der Al-Hatab		16 Der Al-Hatab
8	17 Bait Dajan	8	17 Bait Dajan
	18 Azmout		18 Azmout
	19 Salim		* 19 Salim
9	20 Yaseed	9	20 Yaseed
	21 Bait Emmreen		21 Bait Emmreen
	22 Nusf Jbail		22 Nusf Jbail
	23 Sabastea		* 23 Sabastea
10	24 Borqa	10	* 24 Borqa
	25 Bezareah		25 Bezareah
11	26 Fasayel	11, 12, 13	26 Fasayel
12	27 Al-Jiflek	14, 15	* 27 Al-Jiflek
13	28 Marge Ghazal		28 Marge Ghazal
14	29 Marge Najeh		29 Marge Najeh
15	30 Al-Zobaidat		30 Al-Zobaidat
16	31 Eain Al-Duke	16	31 Eain Al-Duke
	32 Al-Ouja		* 32 Al-Ouja
17	33 Al-Obaydya	17	* 33 Al-Obaydya
18	34 Dar Salah	18	34 Dar Salah
	35 Al-Shawawreh		* 35 Al-Shawawreh
	36 Ras Al-Wad		36 Ras Al-Wad
19	37 Hosan	19, 22	* 37 Hosan
	38 Batier		38 Batier
			47/48 Al-Wadajh/Eain Al-Iowaza

Table 2.3.2 Grouping of Municipality and Village under the Project

(1/4)

Grouping in the Request		Grouping after Integration	
Group No.	Municipality/Village	Group No.	Municipality/Village
1	1 Baka Al-Shrqeah	1	* 1 Baka Al-Shrqeah
	2 Nazlet Essa		2 Nazlet Essa
2	3 Der Al-Ghosoun	2	* 3 Der Al-Ghosoun
	4 Al-Jarousheah		4 Al-Jarousheah
3	5 Sida	3	5 Sida
	6 Ellar		* 6 Ellar
4	7 Ateel	4	* 7 Ateel
	8 Zita		8 Zita
5	9 Kofur Zebaad	5	9 Kofur Zebaad
	10 Kofur Jammal		* 10 Kofur Jammal
	11 Kofur Abbous		11 Kofur Abbous
6	12 Shofch	6	12 Shofch
	13 Faroun		* 13 Faroun
	14 Safareen		14 Safareen
7	15 Roujeeb	7	* 15 Roujeeb
	16 Der Al-Hatab		16 Der Al-Hatab
8	17 Bait Dajan	8	17 Bait Dajan
	18 Azmout		18 Azmout
	19 Salim		* 19 Salim
9	20 Yaseed	9	20 Yaseed
	21 Bait Emmreen		21 Bait Emmreen
	22 Nusf Jbail		22 Nusf Jbail
	23 Sabastea		* 23 Sabastea
10	24 Borqa	10	* 24 Borqa
	25 Bezareah		25 Bezareah
11	26 Fasayel	11,12,13	26 Fasayel
12	27 Al-Jifllek	14,15	* 27 Al-Jifllek
13	28 Marge Ghazal		28 Marge Ghazal
14	29 Marge Najeh		29 Marge Najeh
15	30 Al-Zobaidat		30 Al-Zobaidat
16	31 Eain Al-Duke	16	31 Eain Al-Duke
	32 Al-Ouja		* 32 Al-Ouja
17	33 Al-Obaydya	17	* 33 Al-Obaydya
18	34 Dar Salah	18	34 Dar Salah
	35 Al-Shawawreh		* 35 Al-Shawawreh
	36 Ras Al-Wad		36 Ras Al-Wad
19	37 Hosan	19,22	* 37 Hosan
	38 Batier		38 Batier
			47/48 Al-Walajeh/Eain Al-Jowai/a

Table 2.3.2 Grouping of Municipality and Village under the Project

(2/4)

Grouping in the Request		Grouping after Integration	
Group No.	Municipality/Village	Group No.	Municipality/Village
20	39 Al-Masara	20	39 Al-Masara
	40 Marah Rabah		40 Marah Rabah
	41 Om Salmouneh		41 Om Salmouneh
	42 Jouret Al-Shanuna		* 42 Jouret Al-Shamma
	43 Waid Rahal		43 Waid Rahal
	160 Wade Al-Neas		160 Wade Al-Neas
	161 Marah Maalah		161 Marah Maalah
	162 Khalet Al-Hadadh		162 Khalet Al-Hadadh
21	44 Bait Tamer	21	* 44 Bait Tamer
	45/46 Braidaah/Hindaza		45/46 Braidaah/Hindaza
22	47/48 Al-Walajeh/Eain Al-Jowaiza		(Joined with Group no.19)
23	49 Tekoa	23	* 49 Tekoa
24	50 Bait Fajar	24	* 50 Bait Fajar
25	51 Wadi Fokeen	25	51 Wadi Fokeen
	52 Nahaleen		* 52 Nahaleen
26	53 Kofur Laquef	26	53 Kofur Laquef
	54 Baquet Al-Hatab		54 Baquet Al-Hatab
	55 Hajeh		* 55 Hajeh
	56 Jeet		56 Jeet
	57 Emmateen		57 Emmateen
	58 Farata		58 Farata
27	59 Kofur Thuluth	27	* 59 Kofur Thuluth
28	60 Jansafout	28,30	60 Jansafout
	61 Al-Fondok		61 Al-Fondok
29	62 Ras Ateah	29,31	* 62 Ras Ateah
	63 Ras Al-Tierch		63 Ras Al-Tierch
	64 Al-Kheameh		64 Al-Kheameh
	65 Ezbet Jaloud		65 Ezbet Jaloud
	66 Al-Ashquer		66 Al-Ashquer
	67 Al-Mdawer		67 Al-Mdawer
	68 Kofur Qudoom		* 68 Kofur Qudoom
30	69 Habla		* 69 Habla
31	70 Ezbet Al-Tabeeb	32	70 Ezbet Al-Tabeeb
	71 Asaleh		71 Asaleh
	72 Al-Nabee Eleas		72 Al-Nabee Eleas
	73 Jayos		* 73 Jayos
	74 Falamea		74 Falamea
	75 Seer		75 Seer
33	76 Bait Laqeah	33	* 76 Bait Laqeah
	77 Bait Sira		77 Bait Sira
34	78 Naleen	34	* 78 Naleen
	79 Al-Media		79 Al-Media
	80 Der Qudees		80 Der Qudees

Table 2.3.2 Grouping of Municipality and Village under the Project

(2/1)

Grouping in the Request		Grouping after Integration	
Group No.	Municipality/Village	Group No.	Municipality/Village
20	39 Al-Masara	20	39 Al-Masara
	40 Marah Rabah		40 Marah Rabah
	41 Om Salmouch		41 Om Salmouch
	42 Jouret Al-Shamma		* 42 Jouret Al-Shamma
	43 Waid Rahal		43 Waid Rahal
	160 Wade Al-Neas		160 Wade Al-Neas
	161 Marah Maalah		161 Marah Maalah
	162 Khalet Al-Hadadh		162 Khalet Al-Hadadh
21	44 Bait Tamer	21	* 44 Bait Tamer
	45/46 Braidaah/Hindaza		45/46 Braidaah/Hindaza
22	47/48 Al-Walajeh/Eain Al-Jowaiza		(Joined with Group no.19)
23	49 Tekoa	23	* 49 Tekoa
24	50 Bait Fajar	24	* 50 Bait Fajar
25	51 Wadi Fokeen	25	51 Wadi Fokeen
	52 Nahaleen		* 52 Nahaleen
26	53 Kofur Laquef	26	53 Kofur Laquef
	54 Baquet Al-Hatab		54 Baquet Al-Hatab
	55 Hajeh		* 55 Hajeh
	56 Jeet		56 Jeet
	57 Emmateen		57 Emmateen
	58 Farata		58 Farata
27	59 Kofur Thuluth	27	* 59 Kofur Thuluth
28	60 Jensafout	28,30	60 Jensafout
	61 Al-Fondok		61 Al-Fondok
			* 68 Kofur Qudoun
29	62 Ras Ateah	29,31	62 Ras Ateah
	63 Ras Al-Tiereh		63 Ras Al-Tiereh
	64 Al-Kheameh		64 Al-Kheameh
	65 Ezbet Jaloud		65 Ezbet Jaloud
	66 Al-Ashquer		66 Al-Ashquer
	67 Al-Mdawer		67 Al-Mdawer
			* 69 Habla
30	68 Kofur Qudoun		
31	69 Habla		
32	70 Ezbet Al-Tabeeb	32	70 Ezbet Al-Tabeeb
	71 Asaleh		71 Asaleh
	72 Al-Nabee Eleas		72 Al-Nabee Eleas
	73 Jayos		* 73 Jayos
	74 Falamea		74 Falamea
	75 Seer		75 Seer
33	76 Bait Laqeah	33	* 76 Bait Laqeah
	77 Bait Sira		77 Bait Sira
34	78 Naleen	34	* 78 Naleen
	79 Al-Media		79 Al-Media
	80 Der Qudees		80 Der Qudees

Table 2.3.2 Grouping of Municipality and Village under the Project

(3/4)

Grouping in the Request		Grouping after Integration	
Group No.	Municipality/Village	Group No.	Municipality/Village
35	81 Qubeah	35	* 81 Qubeah
	82 Bodrus		82 Bodrus
	83 Shogba		83 Shogba
36	84 Banizaid Al-Gharbiah	36	* 84 Banizaid Al-Gharbiah
37	85 Ranties	37	* 85 Ranties
	86 Alleban		86 Alleban
	87 Aboud		87 Aboud
38	88 Bait Aour Al-Foka	38	88 Bait Aour Al-Foka
	89 Al-Tahta		* 89 Al-Tahta
	90 Safa		90 Safa
39	91 Baleen	39	91 Baleen
	92 Der Bazeea		92 Der Bazeea
	93 Kofur Neamah		* 93 Kofur Neamah
40	94 Kober	40	94 Kober
	95 Al-Mazraa Al-Kebleah		* 95 Al-Mazraa Al-Kebleah
	96 Abu Shkhaidem		96 Abu Shkhaidem
41	97 Anata	41	* 97 Anata
42	98 Bait Doquo	42	* 98 Bait Doquo
	99 Bait Ejza		99 Bait Ejza
43	100 Bait Souriek	43	* 100 Bait Souriek
	101 Bait Exa		101 Bait Exa
	102 Al-Nabi Samweel		102 Al-Nabi Samweel
44	103 Beir Nabala	44	* 103 Beir Nabala
45	104 Al-Ram	45	* 104 Al-Ram
46	105 Al-Sawahreh Al-Sharqeah	46,47	* 105 Al-Sawahreh Al-Sharqeah
	106 Al-Shaikh Saed		106 Al-Shaikh Saed
47	107 Al-Zuayem		107 Al-Zuayem
48	108 Bait Anan	48	108 Bait Anan
	109 Al-Jeeb		* 109 Al-Jeeb
49	110 Katanh	49	* 110 Katanh
	111 Al-Kpaba		111 Al-Kpaba
50	112 Bani Noaim	50	* 112 Bani Noaim
51	113 Al-Samoua	51	* 113 Al-Samoua
52	114 Saeer	52	* 114 Saeer
	115 Al-Sheukh		115 Al-Sheukh
53	116 Al-Dahreyah	53	* 116 Al-Dahreyah
54	117 Yatta	54	* 117 Yatta
55	118 Doura	55	* 118 Doura
56	119 Ezna	56	* 119 Ezna
57	120 Tarkoumeah	57	* 120 Tarkoumeah
58	121 Sureif	58	* 121 Sureif
59	122 Bait Awla	59	* 122 Bait Awla

Table 2.3.2 Grouping of Municipality and Village under the Project


(3/4)

Grouping in the Request		Grouping after Integration	
Group No.	Municipality/Village	Group No.	Municipality/Village
35	81 Qubeah	35	* 81 Qubeah
	82 Bodrus		82 Bodrus
	83 Shoqba		83 Shoqba
36	84 Banizaid Al-Gharbiah	36	* 84 Banizaid Al-Gharbiah
37	85 Ranties	37	* 85 Ranties
	86 Alleban		86 Alleban
	87 Aboud		87 Aboud
38	88 Bait Aour Al-Foka	38	88 Bait Aour Al-Foka
	89 Al-Tahta		* 89 Al-Tahta
	90 Safa		90 Safa
39	91 Baleen	39	91 Baleen
	92 Der Bazeca		92 Der Bazeca
	93 Kofur Neamah		* 93 Kofur Neamah
40	94 Kober	40	94 Kober
	95 Al-Mazraa Al-Kebleah		* 95 Al-Mazraa Al-Kebleah
	96 Abu Shkhaidem		96 Abu Shkhaidem
41	97 Anata	41	* 97 Anata
42	98 Bait Doquo	42	* 98 Bait Doquo
	99 Bait Ejza		99 Bait Ejza
43	100 Bait Souriek	43	* 100 Bait Souriek
	101 Bait Exa		101 Bait Exa
	102 Al-Nabi Samweel		102 Al-Nabi Samweel
44	103 Beir Nabala	44	* 103 Beir Nabala
45	104 Al-Ram	45	* 104 Al-Ram
46	105 Al-Sawahreh Al-Sharqeah	46/47	* 105 Al-Sawahreh Al-Sharqeah
	106 Al-Shaikh Saed		106 Al-Shaikh Saed
47	107 Al-Zuayem		107 Al-Zuayem
48	108 Bait Anan	48	108 Bait Anan
	109 Al-Jeeb		* 109 Al-Jeeb
49	110 Katanh	49	* 110 Katanh
	111 Al-Kpaba		111 Al-Kpaba
50	112 Bani Noaim	50	* 112 Bani Noaim
51	113 Al-Samoua	51	* 113 Al-Samoua
52	114 Sacer	52	* 114 Sacer
	115 Al-Sheukh		115 Al-Sheukh
53	116 Al-Dahreyah	53	* 116 Al-Dahreyah
54	117 Yatta	54	* 117 Yatta
55	118 Doura	55	* 118 Doura
56	119 Ezna	56	* 119 Ezna
57	120 Tarkoumeah	57	* 120 Tarkoumeah
58	121 Sureif	58	* 121 Sureif
59	122 Bait Awla	59	* 122 Bait Awla

Table 2.3.2 Grouping of Municipality and Village under the Project

(4/4)

Grouping in the Request		Grouping after Integration	
Group No.	Municipality/Village	Group No.	Municipality/Village
60	123 Tammoun	60	* 123 Tammoun
	124 Al-Farah		124 Al-Farah
61	125 Bardala	61,63	125 Bardala
	126 Ean Al-Baida		126 Ean Al-Baida
			* 128 Tayaseer
62	127 Aquaba	62	* 127 Aquaba
63	128 Tayaseer		
64	129 Toubas	64	* 129 Toubas
65	130 Qurawet Bani Hassan	65	130 Qurawet Bani Hassan
	131 Al-Zaweah		* 131 Al-Zaweah
66	132 Der Balout	66	132 Der Balout
	133 Kofur Al-Deek		* 133 Kofur Al-Deek
67	134 Dier Estia	67	* 134 Dier Estia
	135 Kefel Hares		135 Kefel Hares
68	136 Jalboun	68,69	* 136 Jalboun
69	137 Der Ghazaleh		137 Der Ghazaleh
	138 Arabbounch		138 Arabbounch
70	139 Serees	70,71	139 Serees
71	140 Al-Jdayeh		* 140 Al-Jdayeh
72	141 Arrabeh	72	* 141 Arrabeh
73	142 Yaabad	73	* 142 Yaabad
74	143 Kofur Raae	74	* 143 Kofur Raae
	144 Fahmeh		144 Fahmeh
	145 Al-Rameh		145 Al-Rameh
75	146 Al-Moghayer	75	* 146 Al-Moghayer
	147 Jalkamous		147 Jalkamous
	148 Om Al-Tout		148 Om Al-Tout
	149 Al-Matalleh		149 Al-Matalleh
76	150 Etenek	76	150 Etenek
	151 Aneen		* 151 Aneen
	152 Zbouba		152 Zbouba
77	153 Jabaa	77	* 153 Jabaa
78	154 Al-Jalameh	78	154 Al-Jalameh
	155 Araneh		155 Araneh
	156 Al-Dahea		* 156 Al-Dahea
79	157 Anzeh	79	157 Anzeh
	158 AjjeH		* 158 AjjeH
	159 Al-Zaweah		159 Al-Zaweah


 : New grouping

* : Representative municipality/village

Table 2.3.2 Grouping of Municipality and Village under the Project

(1/4)

Grouping in the Request		Grouping after Integration	
Group No.	Municipality/Village	Group No.	Municipality/Village
60	123 Tammoun	60	* 123 Tammoun
	124 Al-Farah		124 Al-Farah
61	125 Bardala	61,63	125 Bardala
	126 Ean Al-Baida		126 Ean Al-Baida
			* 128 Tayascer
62	127 Aquaba	62	* 127 Aquaba
63	128 Tayascer		
64	129 Toubas	64	* 129 Toubas
65	130 Qurawet Bani Hassan	65	130 Qurawet Bani Hassan
	131 Al Zaweah		* 131 Al Zaweah
66	132 Der Balout	66	132 Der Balout
	133 Kofur Al-Deek		* 133 Kofur Al-Deek
67	134 Dier Estia	67	* 134 Dier Estia
	135 Kefel Hares		135 Kefel Hares
68	136 Jalboun	68,69	* 136 Jalboun
69	137 Der Ghazaleh		137 Der Ghazaleh
	138 Arabbounch		138 Arabbounch
70	139 Serees	70,71	139 Serees
71	140 Al-Jdaydeh		* 140 Al-Jdaydeh
72	141 Arrabeh	72	* 141 Arrabeh
73	142 Yaabad	73	* 142 Yaabad
74	143 Kofur Raac	74	* 143 Kofur Raac
	144 Fahneh		144 Fahneh
	145 Al-Rameh		145 Al-Rameh
75	146 Al-Moghayer	75	* 146 Al-Moghayer
	147 Jalkamous		147 Jalkamous
	148 Om Al-Tout		148 Om Al-Tout
	149 Al-Matalleh		149 Al-Matalleh
76	150 Etenek	76	150 Etenek
	151 Aneen		* 151 Aneen
	152 Zbouba		152 Zbouba
77	153 Jabaa	77	* 153 Jabaa
78	154 Al-Jalameh	78	154 Al-Jalameh
	155 Araneh		155 Araneh
	156 Al-Dahea		* 156 Al-Dahea
79	157 Anzeh	79	157 Anzeh
	158 AjjeH		* 158 AjjeH
	159 Al-Zaweah		159 Al-Zaweah

 : New grouping

*: Representative municipality/village

2) Regional Disposal Sites

At present, the PA is pursuing construction of sanitary landfill sites in the West Bank with the cooperation of the World Bank. Due to various constraints including land acquisition and land use authorization, however, it remains uncertain as to whether or not all regional disposal sites can be converted to sanitary landfill site. For the time being, the World Bank has adopted a policy of cooperation in the construction of sanitary landfill at 3 locations. As of the present, land acquisition had been completed for only 2 sites (one comprising expansion of an existing disposal area). Construction completion and start-up of operations for these 2 sites is anticipated after 2002.

However, in light of the urgency of setting up a regional disposal site system for intensive waste disposal in order to put a halt to the practice of open dumping and burning of waste by municipalities/villages, the Project aims at improving major disposal sites (both existing and those which will be able to commence operation by the year 2000) as regional disposal sites for disposing of the waste to be generated by the targeted municipalities/villages.

Locations planned as regional disposal sites are broadly classified into three types as indicated below, and set out in Table 2.3.3. A location map of these sites is given in Figure 2.3.1.

- (i) Existing disposal sites of major municipalities
- (ii) New disposal site of major municipality
- (iii) Existing disposal sites operated by Israel (private companies)

Table 2.3.3 Regional Disposal Sites

	Disposal site	Area to be covered
Existing disposal sites of major municipalities	Jenin	Jenin
	Nablus	Nablus
	Salfit	Salfit
	Jericho	Jericho
	Ramallah	Ramallah
	Hebron	Hebron
New disposal site of major municipality	Toubas	Toubas
	Tulkarem	Tulkarem
Disposal sites operated by Israel	Azaria	Jerusalem, Bethlehem
	Azoun	Qalqileah

It is concluded that the above sites are suitable for use as regional disposal sites due to (i) general availability for continual use until around 2004, and (ii) location so as to effectively cover the entire West Bank. The specific disposal sites to be used by the target municipalities/villages and groups are indicated in Table 2.3.4.

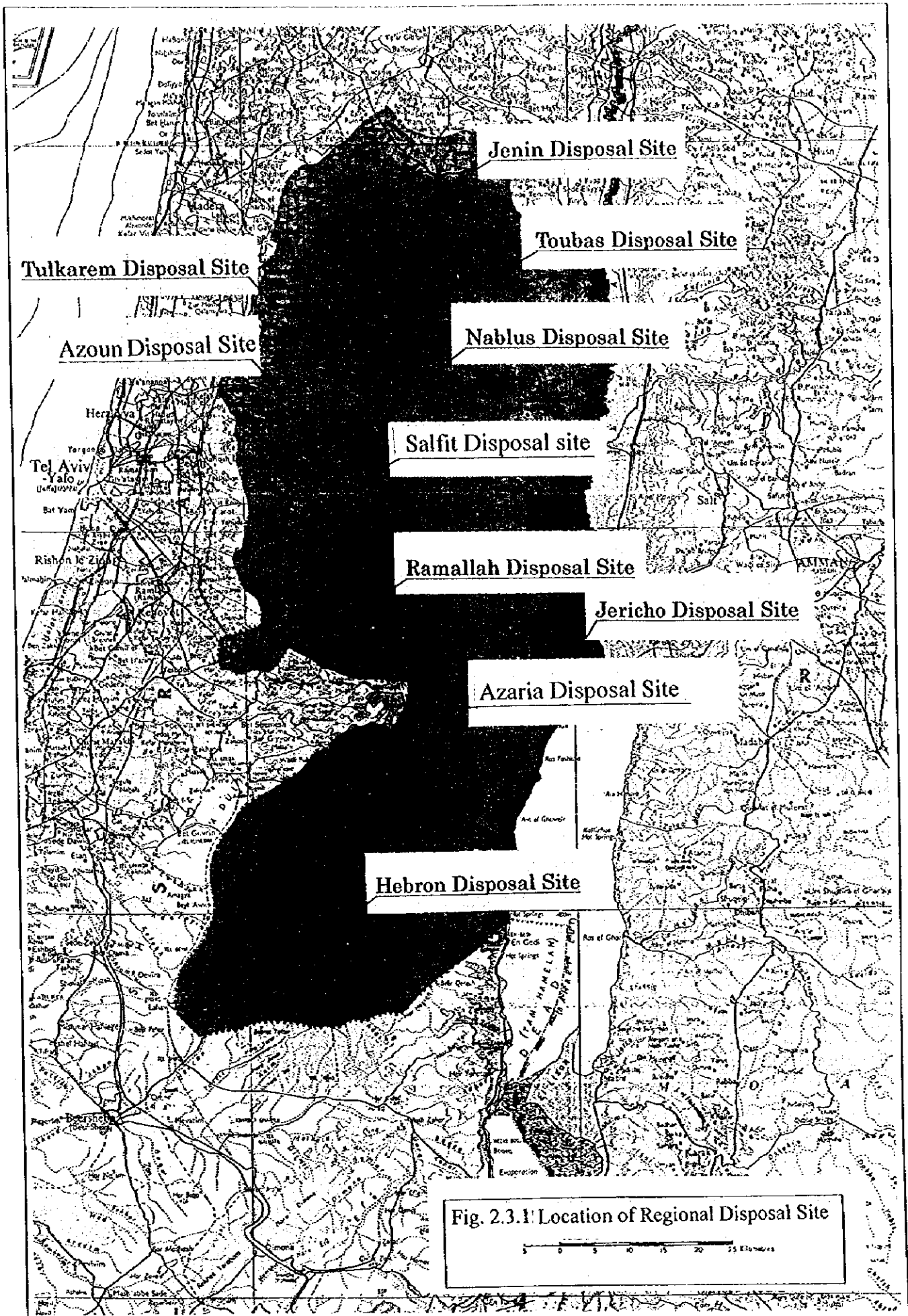


Fig. 2.3.1' Location of Regional Disposal Site

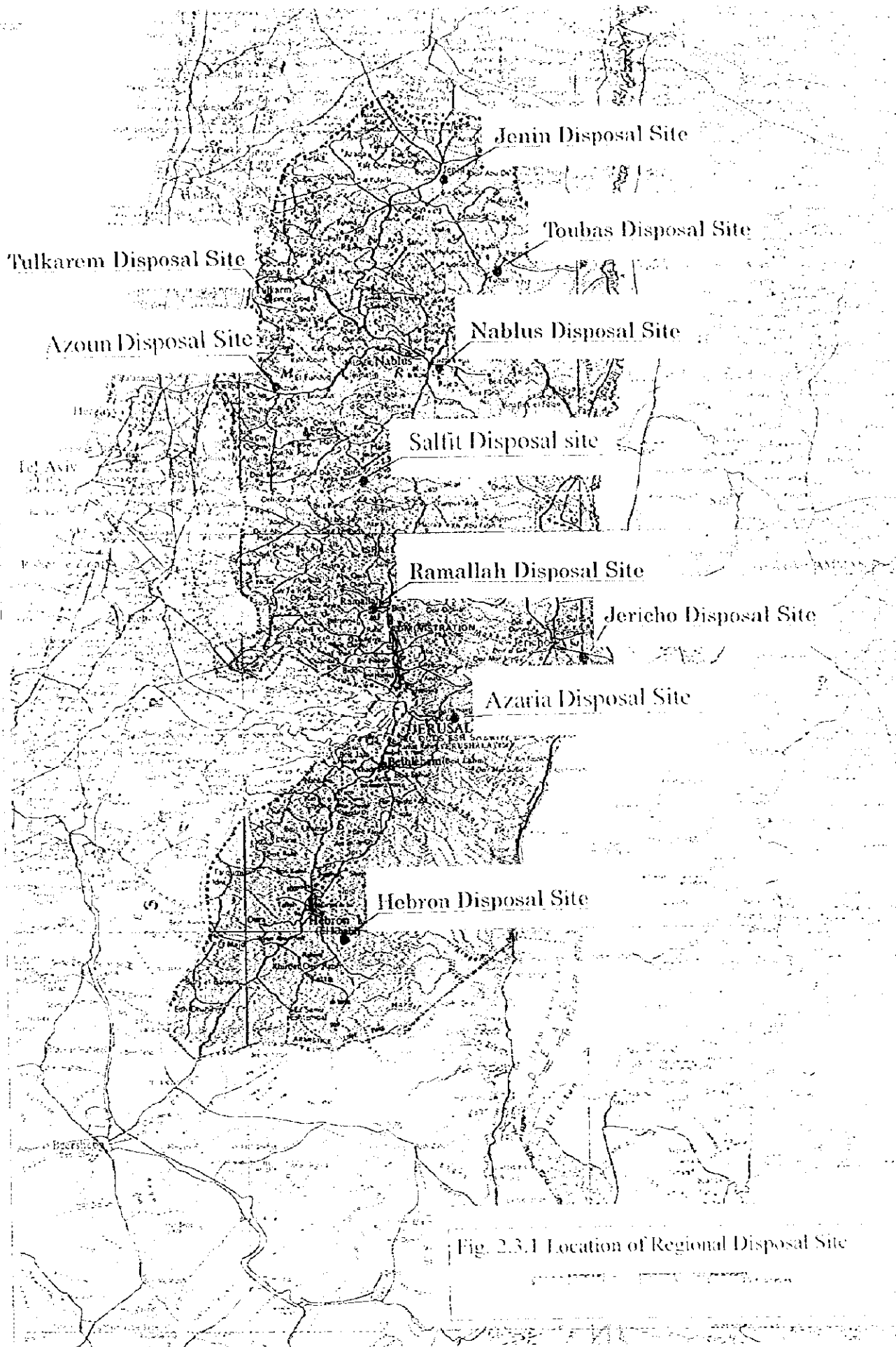


Fig. 2.3.1 Location of Regional Disposal Site

Table 2.3.4 Regional Workshop and Disposal Site Utilized by the Target Municipality/Village

Group No.	Municipality/Village	WS & DS	Group No.	Municipality/Village	WS & DS	Group No.	Municipality/Village	WS & DS	Group No.	Municipality/Village	WS & DS
1	* 1 Baka Al-Shraqeh	Jenin WS	20	40 Marah Rabah	Bethlehem WS	34	80 Der Qudees	Ramallah WS	57	* 120 Tarkoumeah	Hebron WS & DS
2	* 2 Nazlet Essa	Tulkarem DS		* 41 Om Salmounch	WS	35	* 81 Qubeah	WS	58	* 121 Sureif	WS & DS
3	* 3 Der Al-Ghosein			* 42 Jourat Al-Shamma	Azaria DS		* 82 Bodrus	Ramallah WS	59	* 122 Bait Avila	Nabulus WS
4	* 4 Al-Jarousheeh			43 Waid Rahal		36	* 83 Shoqba	WS	60	* 123 Tamimoun	
5	* 5 Sida			160 Wade Al-Neas		37	* 84 Bantizaid Al-Gharbiyah		61,63	* 124 Al-Farah	Toubas DS
6	* 6 Ellar			161 Marah Maalah			* 85 Ranties			* 125 Bardiala	
7	* 7 Atcel		21,22	162 Khalet Al-Hadadh			* 86 Alleban		62	* 126 Ean Al-Baida	
8	* 8 Zita			44 Bait Tamer		38	* 87 Aboud		64	* 128 Tayaseer	
9	* 9 Kofur Zebaad		23	45,46 Braidaah/Hindaza			* 88 Bait Aour Al-Foka		65	* 129 Touba	
10	* 10 Kofur Jammal		24	* 49 Tekoa		39	* 89 Al-Tanha			* 130 Qurawet Bani Massan	Ramallah WS
11	* 11 Kofur Abbous		25	* 50 Bait Fajar			* 90 Safa		66	* 131 Al-Zaweah	WS
12	* 12 Shoteh			* 51 Wadi Fokeen	Nabulus WS		* 91 Baleen			* 132 Der Balout	Salfit DS
13	* 13 Faroun		26	* 52 Nahaleen		40	* 92 Der Bazzea		67	* 133 Kofur Al-Deek	
14	* 14 Safareen	Nabulus WS		53 Kofur Laquef			* 93 Kofur Neamah			* 134 Dier Estia	
15	* 15 Roujbeeb			54 Baguet Al-Hatab	Asoun DS	41	* 94 Kober		68,69	* 135 Kerfel Hanes	Jenin WS
16	* 16 Der Al-Hatab			* 55 Hajeh		42	* 95 Al-Mazraa Al-Kebieah	Ramallah WS		* 136 Jalboun	
17	* 17 Bait Dajan			56 Jec			* 96 Abu Shkhaidem			* 137 Der Ghazaleh	
18	* 18 Azmout	Nabulus DS		57 Ennateen		43	* 97 Anata		70,71	* 138 Arabbouneh	Jenin DS
19	* 19 Salim		27	58 Farata			* 98 Bait Doqoo			* 139 Seeres	
20	* 20 Yaxeed			59 Kofur Thuluth		44	* 99 Bait Erza			* 140 Al-Idaydeh	
21	* 21 Bait Emmreen		28,30	60 Jensafout			* 100 Bait Sourtek	Azaria DS	72	* 141 Arrabeh	
22	* 22 Nust Jbail			61 Al-Fondok		45	101 Bait Exa		73	* 142 Yaabad	
23	* 23 Sabastea			68 Kofur Qudoom			102 Al-Nabi Samweel		74	* 143 Kofur Raac	
24	* 24 Borqa		29,31	62 Ras Al'eah		46,47	* 103 Beir Nabala			* 144 Fahmech	
25	* 25 Bezareah			63 Ras Al-Tereh			* 104 Al-Ram		75	* 145 Al-Rameh	
26	* 26 Passayel	Jericho WS		64 Al-Kheimeh			* 105 Al-Sawahreh Al-Sharqeah			* 146 Al-Moghayer	
27	* 27 Al-Jiftik			65 Ezzet Jaloud			106 Al-Shaikh Saed			* 147 Jalkamous	
28	* 28 Marge Ghazal	Jericho DS		66 Al-Ashquer		48	107 Al-Zuayem			148 Om Al-Tout	
29	* 29 Marge Najeh			67 Al-Mdawer			108 Bait Anan			149 Al-Matalieh	
30	* 30 Al-Zobnidat			* 69 Habla		49	* 109 Al-Jeeb		76	* 150 Etenek	
31	* 31 Ean Al-Duke		32	70 Ezzet Al-Tabeeb			* 110 Katanh			* 151 Aneen	
32	* 32 Al-Ouja			71 Asaleh		50	111 Al-Kpaba	Hebron WS	77	* 152 Zboub	
33	* 33 Al-Obayya	Bethlehem WS		72 Al-Nabee Elias		51	* 112 Bani Noaim			* 153 Jabaa	
34	* 34 Dar Salah			73 Jayos		52	* 113 Al-Samoua		78	* 154 Al-Jalamech	
35	* 35 Al-Shawarreh			74 Falamea			* 114 Saer			* 155 Araneh	
36	* 36 Ras Al-Wad	Azaria DS		75 Seer		53	115 Al-Sheikh	Hebron DS		* 156 Al-Dahes	
37	* 37 Hosan		33	76 Bait Laqaah	Ramallah WS	54	* 116 Al-Dahreyah		79	* 157 Anzeh	
38	* 38 Battier			77 Bait Sira		55	* 117 Yatta			* 158 Al'ej	
39	* 39 Al-Masara	Al-Jowayza	34	* 78 Naleen	Ramallah DS	56	* 118 Doura			* 159 Al-Zaweah	
				79 Al-Media			* 119 Ezma				

* Representative municipality/village

WS Regional workshop

DS Regional disposal site

Of these sites, disposal equipment has been requested for the 5 sites at Jenin, Tulkarem, Tubas, Jericho and Ramallah. In the case of the remaining sites, the PA side will carry out improvement measures, such as soil covering etc., on its own initiative. For the existing disposal sites of Jenin, Ramallah and Jericho, equipment will be procured to cover the respective district. However equipment will be procured to cover target municipality/villages for new disposal sites of Toubas and Tulkarem.

3) Regional Workshop Plan

Many of the targeted municipalities/villages under the Project (including the joint service groups) will be supplied with only a single unit of collection equipment. Also, with the exception of a portion of these, this will represent the only vehicle they have on hand for any purpose, since they at present possess no vehicles for other administrative services as well.

As a result, it would be irrational to establish separate workshops at each municipality/village. Instead, regional workshops would be set up to be operated and managed by multiple municipalities/villages, and serve as a center for equipment inspection and repair.

At present, the PA is pursuing a plan to construct regional workshops at four locations on the West Bank (Jenin, Ramallah, Bethlehem and Hebron), with the Ministry of Local Government acting as coordinating agency. There is a further plan to augment the foregoing facilities by opening up the relatively large workshops at Jericho and Nablus to utilization by other municipalities/villages. This would thus result in the establishment of a total of six regional workshops in the West Bank, and it is planned that these workshops be used for inspection and repair of the equipment to be procured under the Project.

The minimum quantity of spare parts for basic operation of the equipment to be supplied will also be procured under the Project (parts requiring regular replacement, and items for repair works). Of these items for repair works will be kept at the central warehouse of spare parts in Ramallah, planned by the Ministry of Local Government as coordinating agency, and distributed to the regional workshops by request.

(2) Design Population

1) Population Growth Rate

In recent years, there has been a rapid population increase in the West Bank as refugees return from other countries. According to study by the PA, a high population rate of 5-6% per year is reported as indicated in Table 2.3.5.

Table 2.3.5 Annual Population Growth Rates according to PA Study

District	1996	1995	1994
Gaza	6.12	6.26	8.16
West Bank	5.61	5.77	6.65
Total	5.80	5.95	7.22

Since the natural growth rate of population in the PA is reported to be around 3.4%, population growth as a result of influx from foreign countries is estimated at roughly 2-3%. In terms of specific numbers, this portion of population increase due to influx from outside would be in the range of 30,000-50,000 persons vis à vis a total population size in the West Bank of 1.6 million, which is considered a generally appropriate estimate.

Also, since an estimated 700,000 plus persons fled the area during the Third Middle East War in 1967, it is concluded that the present high population growth rate will continue for several years in the future. On this basis, the average population growth rate for 1995 and 1996 (5.7%) in the West Bank is applied under this Project in calculating the design population.

2) Population Forecast

The population figure identified by the PA census in December 1997 is adopted under the Project as the bona fide population in 1997 for the purpose of population forecast.

Population forecasts for 2000 and 2004 in the West Bank overall and the target municipalities/villages (total) specifically are indicated in Table 2.3.6, based on the previously discussed population growth rate. Total population in the Project area (target municipalities/villages) in the Project target year 2004 is estimated at 797,090, accounting for 32% of the overall West Bank population. Population forecasts for each individual target municipality/village are given in Table 2.3.8.

Table 2.3.6 Population Forecasts for the West Bank (persons)

	1997	2000	2004
(1) West Bank overall	1,660,868	1,961,372	2,448,274
(2) Project area	540,732	638,568	797,089

On the other hand, the service populations for the disposal sites targeted for equipment supply under the Project are estimated as shown in Table 2.3.7. Since the regional disposal sites receive waste from municipalities/villages in the entire surrounding area, the service population of existing disposal sites of Jenin, Ramallah and Jericho is computed based on 1997 population figures for the respective district. However, the service population of new disposal sites of Toubas and Tulkarem is computed based on 1997 population of target municipalities/villages of respective district.

Table 2.3.7 *Service Population Forecasts for the Targeted Disposal Sites*

Site name	Target district	1997	2000	2004
Jenin	Jenin	188,294	222,362	277,563
Toubas	Toubas	33,299	39,324	49,086
Tulkarem	Tulkarem	39,007	46,065	57,500
Jericho	Jericho	29,679	35,049	43,750
Ramallah	Ramallah	247,708	292,526	365,145
Total		537,987	635,326	793,044