

[Appendices]

Appendix-1 :	Member List of the Study Team	A1- 1
Appendix-2 :	Study Schedule	A2- 1
Appendix-3 :	List of Parties Concerned.....	A3- 1
Appendix-4 :	Minutes of Discussions	A4- 1
Appendix-5 :	References collected	A5- 1
Appendix-6 :	Other Relevant Data	A6- 1
Appendix-7 :	Technical Note on Hydrogeology	A7- 1

Appendix-1 Member List of the Study Team

1-1. The First Field Survey

Name	In charge of	Belonging
Shigeyuki MATSUMOTO	Team Leader	JICA, Grant Aid Management Department, First Project Management Div. Water and Sanitation Team
Ryoichi KAWASAKI	Chief Consultant/ Groundwater Development	Sanyu Consultants Inc.
Noriyasu KIMATA	Facility Design/ Operation and Maintenance	Sanyu Consultants Inc.
Masatoshi ARAI	Equipment Plan/Procurement	Sanyu Consultants Inc.
Izumi KATO	Environmental Assessment/Water Quality	Sanyu Consultants Inc.

1-2. The Second Field Survey

Name	In charge of	Belonging
Sigeru OTAKE	Team Leader	JICA, Syria Office Deputy Resident Representative
Shigeyuki MATSUMOTO	Planning/Management	JICA, Grant Aid Management Department, First Project Management Div. Water and Sanitation Team
Ryoichi KAWASAKI	Chief Consultant/ Groundwater Development	Sanyu Consultants Inc.
Noriyasu KIMATA	Facility Design/ Operation and Maintenance	Sanyu Consultants Inc.
Izumi KATO	Environmental Assessment/Water Quality	Sanyu Consultants Inc.

1-3. Draft Basic Design Study Report Explanation Mission

Kazuhide NAGASAWA	Team Leader	JICA, Syria Office Resident Representative
Shigeyuki MATSUMOTO	Planning/Management	JICA, Grant Aid Management Department, First Project Management Div. Water and Sanitation Team
Ryoichi KAWASAKI	Chief Consultant/ Groundwater Development	Sanyu Consultants Inc.
Noriyasu KIMATA	Facility Design/ Operation and Maintenance	Sanyu Consultants Inc.

Appendix-2 Study Schedule

2-1. The First Field Survey (2004)

Date	Trip	Stay	Activity
March 15 (Mon.)	Paris → Dam.	Damascus	Arrival at Damascus
March 16 (Tue.)		Damascus	Call on JICA, Embassy, SPC, MoHC, and DAWSSA
March 17(Wed.)		Damascus	Meeting with DAWSSA
March 18 (Thu.)		Damascus	Field Reconnaissance
March 19 (Fri.)		Damascus	Team Meeting
March 20 (Sat.)		Damascus	Field reconnaissance
March 21 (Sun.)		Damascus	Preparation on Sub-contract work
March 22 (Mon.)		Damascus	Discussion on M/D, call on MoE, MOI, and WRIC
March 23 (Tue.)		Damascus	Discussion on M/D
March 24 (Wed.)	T.Leader Leave Dam.	Damascus	Signing on M/D, Report to JICA/Embassy, Team Leader leaving Damascus.
March 25 (Thu)	Equip/Proc. Arrive Dam.	Damascus	Data collection, Field inspection, Discussion with DAWSSA, A team member arrived at Damascus.
March 26 (Fri.) ~ April 6 (Tue)		Damascus	Data collection/review, Field survey/investigation, Discussion with DAWSSA/other agencies, Study.
April 7(Wed.) ~ April 8 (Thu.)	Maadar and Yaboos	Damascus	The first Workshop (Maadar II and Yaboos sites, and DAWSSA conference room)
April 9 (Fri.) ~ April 10 (Sat.)		Damascus	Rearrangement of Workshop results, Arranging of collected data/information.
April 11 (Sun.)	Environ. Left Dam.	Damascus	Arranging of collected data/information. A team member left Damascus.
April 12 (Mon) ~ April 14(Wed.)		Damascus	Data collection/review, Field survey/investigation, Discuss with DAWSSA/other agencies, Study.
April 15 (Thu.)		Damascus	Meeting with DAWSSA, Report to EOJ/JICA.
April 16 (Fri.)	Left Dam.	In Flight	Left Damascus 07:35, April 16.

Dam.: Damascus

2-2. The Second Field Survey (2004)

Date	Trip	Stay	Activity
Oct. 2 (Sat.)	Design member arrive at Dam.	Damascus	A member arrived at Damascus.
Oct. 3 (Sun.)		Damascus	Meeting with DAWSSA/JICA.
Oct. 4 (Mon.)		Damascus	Field inspection, Discuss with sub-contractor.
Oct. 5 (Tue.)		Damascus	Discussion with DAWSSA.
Oct. 6 (Wed.)		Damascus	Field reconnaissance
Oct. 7 (Thu.)		Damascus	Data collection, Signing on Sub-contract.
Oct. 8 (Fri.)	Chief Consul. Left Japan.	Damascus	Field instruction to sub-contractor.
Oct. 9 (Sat.)	Chief Consul. Arrived at Dam.	Damascus	Data arrangement.
Oct. 10 (Sun.)		Damascus	Meeting with DAWSSA/JICA, Field inspection.
Oct. 11 (Mon.)		Damascus	Discussion with DAWSSA, visit Remote Sensing Center.
Oct. 12 (Tue.)		Damascus	Discussion with DAWSSA, Field Reconnaissance.
Oct. 13 (Wed.)		Damascus	Field reconnaissance, Data arrangement.
Oct. 14 (Thu.)		Damascus	Reconnaissance on Lebanon side.
Oct. 15 (Fri.)		Damascus	Data/information arrangement, Interim report.
Oct. 16 (Sat.)	Planning arrived at Damascus	Damascus	Data/information arrangement, Meeting with Planning/Management member.
Oct. 17 (Sun.)		Damascus	Team meeting, call on JICA/EOJ
Oct. 18 (Mon.)		Damascus	Field inspection, Discussion with DAWSSA on M/D. Arrangement pf M/D draft.
Oct. 19 (Tue.)		Damascus	Discussion on M/D, Field Reconnaissance.
Oct. 20 (Wed.)		Damascus	Signing on M/D, Report to EOJ.
Oct. 21 (Thu.)	Planning left Damascus	Damascus	Field reconnaissance, Discuss with DAWSSA. A member left Damascus.
Oct. 22 (Fri.)	Consultants left Damascus	In Flight	All other member left Damascus.

Note: Beside above, Environment member joined Project from Oct 31 to Nov.7.

2-3. Draft Basic design Report Explanation Mission (2005)

Date	Trip	Stay	Activity
Jan. 15 (Sat.)	Consultant arrive at Dam.	Damascus	Consultant member arrived at Damascus. Preparation of study.
Jan. 16 (Sun)	Planning mem. Arrive at Dam.	Damascus	Call on JICA/EOJ/SPC/MoHC/DAWSSA. Submittal of Draft Report.
Jan. 17 (Sun)		Damascus	Explanation/discussion on draft report. Field inspection
Jan. 18 (Sun)		Damascus	Discussion on M/D, Field reconnaissance.
Jan. 19 (Sun)		Damascus	Signing on M/D, Report to EOJ, Field reconnaissance.
Jan. 20 (Sun)	Planning mem. Left Dam.	Damascus	A member left Dam. Field inspection on Yaboos.
Jan. 21 (Sun)		Damascus	Field inspection on transmission pipe line.
Jan. 22 (Sun)		Damascus	Field inspection on facility construction sites.
Jan. 23 (Sun)		Damascus	Discussion with DAWSSA.
Jan. 24 (Sun)	Consultant left Damascus.	In flight	Consultant left Damascus.

Appendix-3 List of Parties Concerned in the Recipient Country

(1) State Planning Commission: SPC

Mr. Bassam Al Sibai : Deputy Head of State Planning Commission

Ms. Elham Morad : Coordinator

(2) Ministry of Housing and Construction: MoHC

Dr. Nabil Al Ashraf : Deputy Minister

(3) Damascus City Water Supply and Sewerage Authority: DAWSSA

Eng. Muwafak Khallouf : General Director

Eng. Khaled Al Shalak : Deputy General Director, Director of Studies & Design

Eng. Mai Al Safadi : Head of Water Resources section

Eng. Nabel Abo Trab : Head of Study section

Eng. Abed Al Naser Hamed : Deputy Head of Water Resources section

Mr. Ahmed Hadaya : Environment section

Eng. Hosam Eddin Al Huraiden : Director of Construction & Supervision

Eng. Marwan Soman : Director of Production

Eng. Bassam Asekria : Director of Distribution

Eng. Hazem Safadi : Director of Planning & Statistics

Eng. Nabeel Lwis : Head of Electric & Mechanical Department

Eng. Dr. M. Chafic Safadi : Water Resources Consultant

Mr. Kanzo SHIMADA: Senior Volunteer (Countermeasure on Leakage)

(4) General Directorate for Irrigation Barada and Awaji Basins, Ministry of Irrigation

Dr. Jamil Fallouh : General Director

Dr. Hassan Al Fayad : Deputy General Director

Eng. Ahmad Abdullah : Head of WRIC

Eng. Kassem Natouf : WRIC Sector

Eng. Zaki Jamal Addin : Hydrogeology Section

Eng. Jan Khiami : Hydrogeology Section

Mr. Maroan Satah

(5) Water Resources Information Center, Ministry of Irrigation: WRIC

Dr. Bachar J. Faiad: Director

Mr. Kazuhisa ITO: JICA Expert (Chief Advisor)

Mr. Takehiko SOMEYA: JICA Expert (Hydrology)

Mr. Nobuo SUGIURA: JICA Coordinator

Mr. Noriyuki MORI: JICA Expert (Chief Advisor)

(6) International Water Bureau, Ministry of Irrigation

Dr. Eng. Abdel Aziz Al Masri : Technical Committee member of International Water Bureau

- (7) General Commission for Scientific Agricultural Research, Ministry of Agriculture
Mr. Ali M. Kaisi: Department Director, ANRR
Mr. Awadi Arslan: Department Director, ANRR
Mr. Akira KOTO: JICA Expert
- (8) Embassy of Japan
Mr. Mituru MURASE: Counselor
Mr. Takeshi OKUDA: Second Secretary (Economic Cooperation)
- (9) JICA, Syria Office
Mr. Kazuhisa NAGASAWA: Resident Representative
Mr. Shigeru OTAKE: Deputy Resident Representative
Ms. Reiko FUNABA: Assistant Resident Representative
Mr. Sakher Mrishih: Programme Officer, Water Resources & Agriculture Sectors
Dr. Hafez Al Sadeq : Consultant
- (10) University of Damascus
Dr. Mohamad K. Kayyal, Faculty of Civil Engineering

MINUTES OF DISCUSSIONS
ON THE BASIC DESIGN STUDY
ON THE PROJECT FOR DEVELOPMENT OF NEW WATER SOURCES
FOR DAMASCUS CITY
IN THE SYRIAN ARAB REPUBLIC

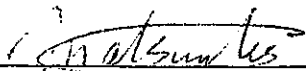
In response to a request from the Government of Syrian Arab Republic (hereinafter referred to as "Syria"), the Government of Japan decided to conduct a Basic Design Study on the Project for Development of New Water Sources for Damascus City (hereinafter referred to as "the Project") and entrusted the study to the Japan International Cooperation Agency (hereinafter referred to as "JICA").

JICA sent to Syria the Basic Design Study Team (hereinafter referred to as "the Team"), which is headed by Mr. Shigeyuki Matsumoto, First Project Management Division, Grant Aid Management Department, JICA, and is scheduled to stay in the country from March 15 to April 20.

The Team held discussions with the officials concerned of the Government of Syria and conducted a field survey at the study area.

In the course of discussions and field survey, both parties confirmed the main items described on the attached sheets. The Team will proceed to further works and prepare the Basic Design Study Report.

Damascus, March 24, 2004



Mr. Shigeyuki Matsumoto
Leader
Basic Design Study Team
Japan International Cooperation Agency
Japan



Eng. Mwafak Khallouf
General Director
Damascus Water Supply and Sewerage
Authority
Syrian Arab Republic

ATTACHMENT

1. Objective of the Project

The objective of the Project is to strengthen water supply capacity of Damascus City Water Supply and Sewerage Authority (DAWSSA) by developing new water sources in order to improve living and sanitary conditions of people in the service areas of Damascus City and its vicinal villages.

2. Project sites

The original requested sites of the Project were the water sources at Yaboos, Maadar and Deir Al Ashayer in the northwestern suburbs of Damascus City. However, through the discussions and site surveys, both sides agreed to change Maadar to Maadar II. The location of the three sites is shown in Annex-1.

3. Responsible and Implementing Agency

3-1. The Responsible Agency is Ministry of Housing and Construction (MOHC).

3-2. The Implementing Agency is Damascus City Water Supply and Sewerage Authority (DAWSSA). The organization chart is shown in Annex-2.

4. Items requested by the Government of Syria

After discussions with the Team, the items described in Annex-3 were finally requested by the Syrian side. JICA will assess the appropriateness of the request and will recommend to the Government of Japan for approval.

5. Japan's Grant Aid Scheme

5-1. The Syrian side understands the Japan's Grant Aid Scheme explained by the Team, as described in Annex-4.

5-2. The Syrian side will take the necessary measures, as described in Annex-5, for smooth implementation of the Project, as a condition for the Japanese Grant Aid to be implemented.

6. Schedule of the Study

6-1. The consultants will proceed to further studies in Syria until April 15, 2004, modified from the original schedule to April 20.

6-2. JICA will dispatch the Second Basic Design Study Team for the second field survey in Syria

around October 2004 upon completion of the construction work of production wells by the Syrian side.

6-3. JICA will prepare the draft report in English and dispatch a mission in order to explain its contents around January 2005.

6-4. In case that the contents of the report is accepted in principle by the Government of Syria, JICA will complete the final report and send it to the Government of Syria by March 2005.

7. Other relevant issues

7-1. Necessity of groundwater development for water supply to Damascus city

The Syrian side explained the future plan for water supply and water sources development for Damascus city as follows;

- (1) DAWSSA is now revising the former master plan prepared with JICA cooperation in 1997,
- (2) The water sources development plan consists of five activities, namely continuation of the rehabilitation of existing facilities, development of the Damascus aquifer, development of the Al Hermon region aquifer (the Project is included in this activity), water transmission from other basins such as the coastal region and Euphrates region, and wastewater reuse for indirect usage, and
- (3) The Fijha Spring, main water source of DAWSSA, has large fluctuation of production depending on the amount of snow and rain. In the past drought years, water shortage was so severe that it badly affected living conditions and economic activities of the capital city by prolonged water suspension. In order to prepare for such an emergency situation, DAWSSA desperately requires additional new water sources to be operated in dry season.

Both sides agreed that the groundwater of the Barada and Awaj basin has been already overexploited so that additional development of groundwater should be kept as temporary and emergency measures to ease severe water shortage in Damascus city before drastic solution is realized. In this aspect, DAWSSA is conducting the study for "The Project of Supplying Part of the Water Demand of Damascus City and its Countryside from the Syrian Coastal Area Water Surplus" and the target year of the first stage of this project is 2020.

The Team indicated that the measures against water leakage and other waste of water should be preceded. DAWSSA explained that the replacement of the old distribution pipelines was carried out

with the cooperation of the Japanese Grant Aid and countermeasures against water leakage would be strengthened continuously by reinforcement of leakage detection capability and introduction of District Meter Area (DMA).

The Team will investigate the water supply plan, water sources development plan, balance between water supply and demand, measures taken for water savings and actual situation of water shortage more in detail during the study to confirm urgent and serious necessity of groundwater development.

7-2. Environmental issues

The Syrian side explained that the procedure of Environmental Impact Assessment (EIA) is based on the guideline and EIA decree set in 1995. It requires EIA for this Project including scoping, preparation of the EIA report by DAWSSA, submission of the EIA report to the General Commission for Environmental Affairs (GCEA) and approval by GCEA.

The Team indicated the possible major environmental impact as follows:

- (1) Change of water balance and drop of the groundwater level in the Barada and Awaj basin,
- (2) Hindrance to water usage by private wells around the new water sources, and
- (3) Influence to the existing water usage in the border area of Lebanese side.

Both sides agreed that the following items should be set as an essential prerequisite for the implementation of the Project in order to make it environmentally and socially acceptable:

- (1) The fact that the water shortage in Damascus city is extremely severe and is desperately serious problem in social and economic aspects should be confirmed,
- (2) The countermeasures against water leakage and other water loss should be sufficiently undertaken,
- (3) There should be positive prospect and solid implementation plan for future drastic solution such as inter-basin water transmission in order to minimize the deterioration of water balance in the Barada and Awaj basin,
- (4) The social consensus for the implementation of the Project should be built through the EIA process. Especially the residents around the new water sources should agree to the groundwater development in the Project,
- (5) The EIA should be undertaken in compliance with related laws and regulations in Syria,
- (6) The adequate monitoring system of environmental impact should be established, and

- (7) There should be decision-making mechanism which can stop the operation of the new water sources when negative influence emerges more than initially envisioned.

Both sides agreed that the Syrian side should complete the EIA procedures before the commencement of the Project. The Team will provide data, information and assistance to the Syrian side in the course of the study. The tentative schedule is shown in Annex-6.

If the influence to water usage in the Lebanese territory is predicted, the Syrian side will take necessary measures for appropriate coordination.

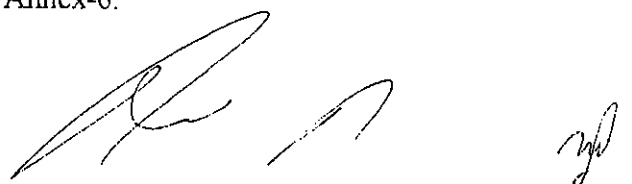
7-3. Change of the project sites

Based on the results of the site survey, the Team recommended to exclude Maadar area from the project sites, because all of the wells were located on the top of ridge which is not suitable to construct a well field. The groundwater table shall easily drop down by group pumping and it may result in drying up of the Maadar Spring downstream.

The Syrian side basically agreed to the above view of the Team and strongly requested to replace Maadar by Maadar II area to keep three different sites for development, because DAWSSA needs to ensure flexibility of water sources operation in emergency with as many options as possible. The Team understood the situation and agreed to include Maadar II area for the Basic Design Study.

7-4. Selection and construction of production wells

After recognition of the existing data and site surveys, the Team found that all the existing wells were not suitable to be converted into the production wells, because of small casing diameter or inadequate well structure in casing and strainer installation, gravel packing and grout sealing. Therefore, both sides agreed that DAWSSA should construct the production wells with enough specification as soon as possible. DAWSSA explained that it had already prepared the draft tender documents for well construction in order to finish it by September and was ready to modify the specification in accordance with requests from the Team. Desirable location, required well specification, necessary number of the production wells and required specification of pumping tests shall be discussed between DAWSSA and the Team. As for the construction schedule, the Team requested to prioritize wells in Yaboos area, which is the most promising site. DAWSSA shall send the information about work progress, well log data and results of the pumping tests to the Team via JICA Syria Office. The tentative schedule is described in Annex-6.



The Team will investigate the existing data and information, hydrogeological characteristics of aquifers, production capacity and water quality. The Team will also conduct pumping tests and groundwater simulation to estimate environmental and social impacts. Based on these surveys, production amount will be examined with due consideration for environmental impact and social acceptability.

The Team strongly recommended for DAWSSA the implementation of group well pumping tests in each of the three new water sources development area promptly after the construction of production wells in order to assure the environmental impact. DAWSSA agreed to do the tests. The Team will provide necessary technical assistance to the Syrian side.

7-5. Modification of the study schedule

Since the construction work of the production wells become necessary, the Team recognized a need to change the study schedule as follows:

- (1) The Second Basic Design Study Team shall be dispatched for the second field work in Syria after the completion of construction work to confirm the new production wells and conduct surveys for collection pipes,
- (2) The first field work, originally scheduled until April 20, shall be shortened until April 15, because some parts of the planned work are postponed to the second field work or omitted, and
- (3) The explanation of the draft report in Syria, originally scheduled in July, shall be postponed after the second field work and successive work in Japan.

The tentative revised schedule is shown in Annex-6.

7-6. Water transmission plan

The route of water transmission pipelines will be determined in consideration with hydraulic performance, permissibility and facility of construction work and economical efficiency. The Team explained the necessity of several pressure breaking reservoirs in the route of transmission pipelines. The Syrian side agreed to construct them.

7-7. Demarcation of procurement

Both sides agreed that the collection pipes under 200mm diameter be prepared by the Syrian side.

The Team mentioned to the budgetary limitation of the Japanese side and the possibility of rearrangement of demarcation at the latter stage of the study. The Syrian side understood the

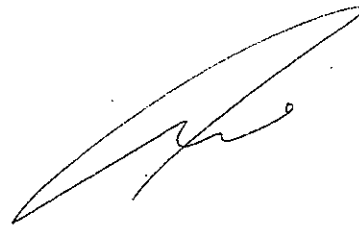
situation of the Japanese side.

7-8. Name of the Project

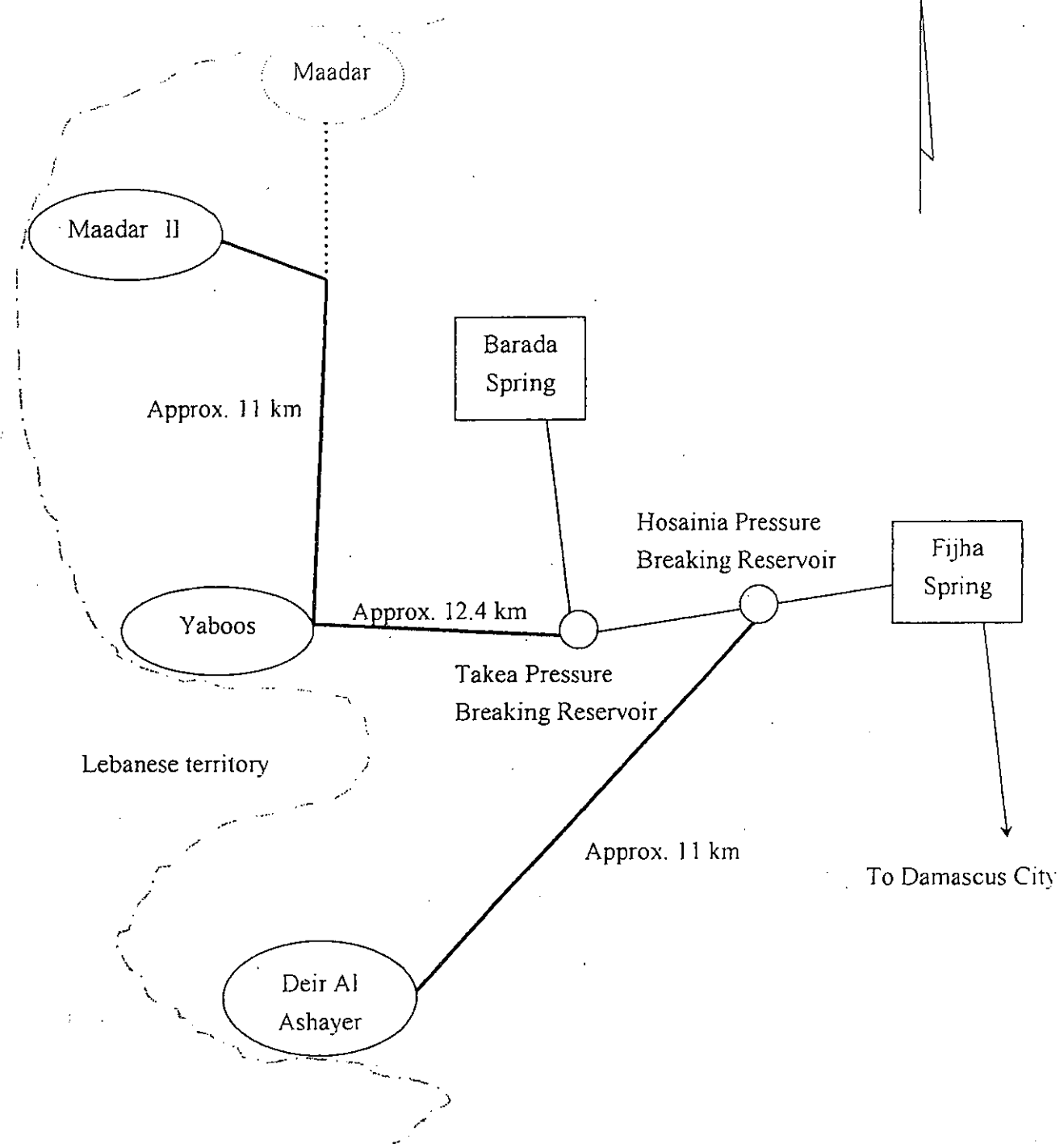
Both sides agreed to name the Project "The Project for Development of New Water Sources for Damascus City".

7-9. Visibility



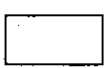




The Syrian side shall take necessary measures to secure high visibility of the Project.

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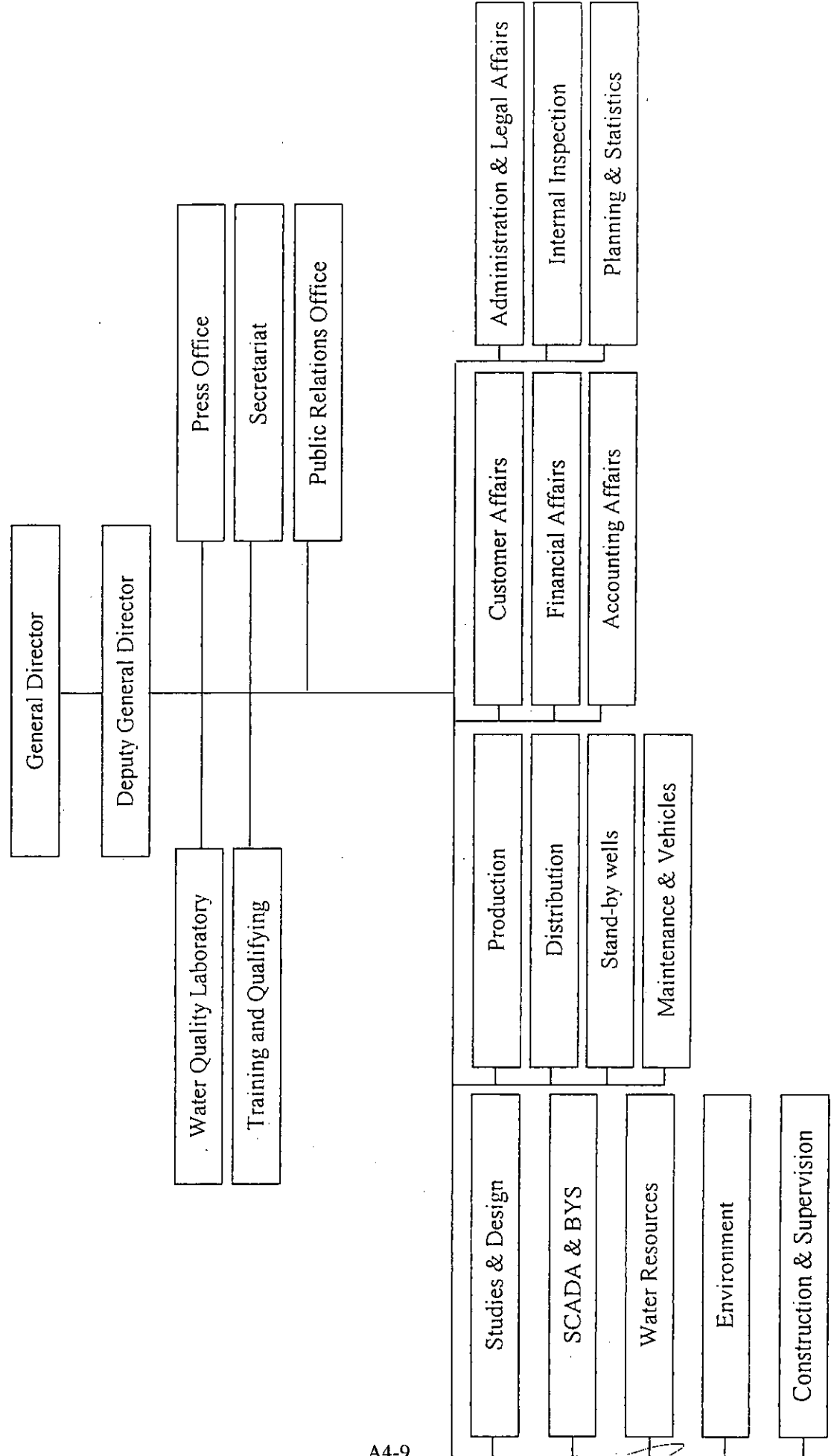
ANNEX-I : Project Sites



Legend

-  : Proposed well field site
-  : Site excluded from the original request
-  : Existing water source
-  : Border between Syria and Lebanon
-  : Proposed water transmission pipeline
-  : Existing water transmission pipeline
-  : Existing pressure breaking reservoir

ANNEX-2 : Organization Chart of the Damascus City Water and Sewerage Authority



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ANNEX-3 : Items requested by the Syrian side

Procurement of the following Equipment:

Yaboos and Maadar II scheme		
1) Submersible pump	Q = 50 m ³ /hr, H = 300 m	15 sets
2) Collection pipe		1 lot
3) Diesel generator	P = 300 kVA	4 sets
4) Transmission pipeline	DN = 500 – 600 mm	24 km
Deir Al Ashayer scheme		
1) Submersible pump	Q = 35 m ³ /hr, H = 100 m	10 sets
2) Collection pipe		1 lot
3) Diesel generator	P = 200 kVA	1 set
4) Transmission pipeline	DN = 300 – 400 mm	11 km

ANNEX-4 : JAPAN'S GRANT AID SCHEME

1. Grant Aid Procedure (Attachment 1)

1) Japan's Grant Aid Program is executed through the following procedures.

- Application (Request made by a recipient country)
- Study (Basic Design Study conducted by JICA)
- Appraisal & Approval (Appraisal by the Government of Japan and Approval by Cabinet)
- Determination of (The Notes exchanged between the Governments of Japan and the recipient country)
- Implementation

2) Firstly, the application or request for a Grant Aid project submitted by a recipient country is examined by the Government of Japan (the Ministry of Foreign Affairs) to determine whether or not it is eligible for Grant Aid. If the request is deemed appropriate, the Government of Japan assigns JICA to conduct a study on the request. If necessary, JICA send a Preliminary Study Team to the recipient country to confirm the contents of the request.

Secondly, JICA conducts the study (Basic Design Study), using Japanese consulting firms.

Thirdly, the Government of Japan appraises the project to see whether or not it is suitable for Japan's Grant Aid Programme, based on the Basic Design Study report prepared by JICA, and the results are then submitted to the Cabinet for approval.

Fourthly, the project, once approved by the Cabinet, becomes official with the Exchange of Notes signed by the Governments of Japan and the recipient country.

Finally, for the implementation of the project, JICA assists the recipient country in such matters as preparing tenders, contracts and so on.

2. Basic Design Study

1) Contents of the Study

The aim of the Basic Design Study (hereinafter referred to as "the Study"), conducted by JICA on a requested project (hereinafter referred to as "the Project"), is to provide a basic document necessary for the appraisal of the Project by the Government of Japan. The contents of the Study are as follows:

- a) confirmation of the background, objectives and benefits of the Project and also institutional capacity of agencies concerned of the recipient country necessary for the Project's implementation;
- b) evaluation of the appropriateness of the Project to be implemented under the Grant Aid Scheme from the technical, social and economic points of view;
- c) confirmation of items agreed on by both parties concerning the basic concept of the Project;
- d) preparation of a basic design of the Project; and
- e) estimation of costs of the Project.



The contents of the original request are not necessarily approved in their initial form as the contents of the Grant Aid project. The Basic Design of the Project is confirmed considering the guidelines of Japan's Grant Aid Scheme.

The Government of Japan requests the Government of the recipient country to take whatever measures are necessary to ensure its self-reliance in the implementation of the Project. Such measures must be guaranteed even through they may fall outside of the jurisdiction of the organization in the recipient country actually implementing the Project. Therefore, the implementation of the Project is confirmed by all relevant organizations of the recipient country through the Minutes of Discussions.

2) Selection of Consultants

For the smooth implementation of the Study, JICA uses a consulting firm selected through its own procedure (competitive proposal). The selected firm participates the Study and prepares a report based upon the terms of reference set by JICA.

At the beginning of implementation after the Exchange of Notes, for the services of the Detailed Design and Construction Supervision of the Project, JICA recommends the same consulting firm which participated in the Study to the recipient country, in order to maintain the technical consistency between the Basic Design and Detailed Design as well as to avoid any undue delay caused by the selection of a new consulting firm.

3. Japan's Grant Aid Scheme

1) What is Grant Aid?

The Grant Aid Program provides a recipient country with non-reimbursable funds to procure the facilities, equipment and services (engineering services and transportation of the products, etc.) for economic and social development of the country under principles in accordance with the relevant laws and regulations of Japan. Grant Aid is not supplied through the donation of materials as such.

2) Exchange of Notes (E/N)


Japan's Grant Aid is extended in accordance with the Notes exchanged by the two Governments concerned, in which the objectives of the project, period of execution, conditions and amount of the Grant Aid, etc., are confirmed.

3) "The period of the Grant" means the one fiscal year which the Cabinet approves the project for. Within the fiscal year, all procedure such as exchanging of the Notes, concluding contracts with consulting firms and contractors and final payment to them must be completed.

However, in case of delays in delivery, installation or construction due to unforeseen factors such as weather, the period of the Grant Aid can be further extended for a maximum of one fiscal year at most by mutual agreement between the two Governments.

4) Under the Grant, in principle, Japanese products and services including transport or those of the recipient country are to be purchased.

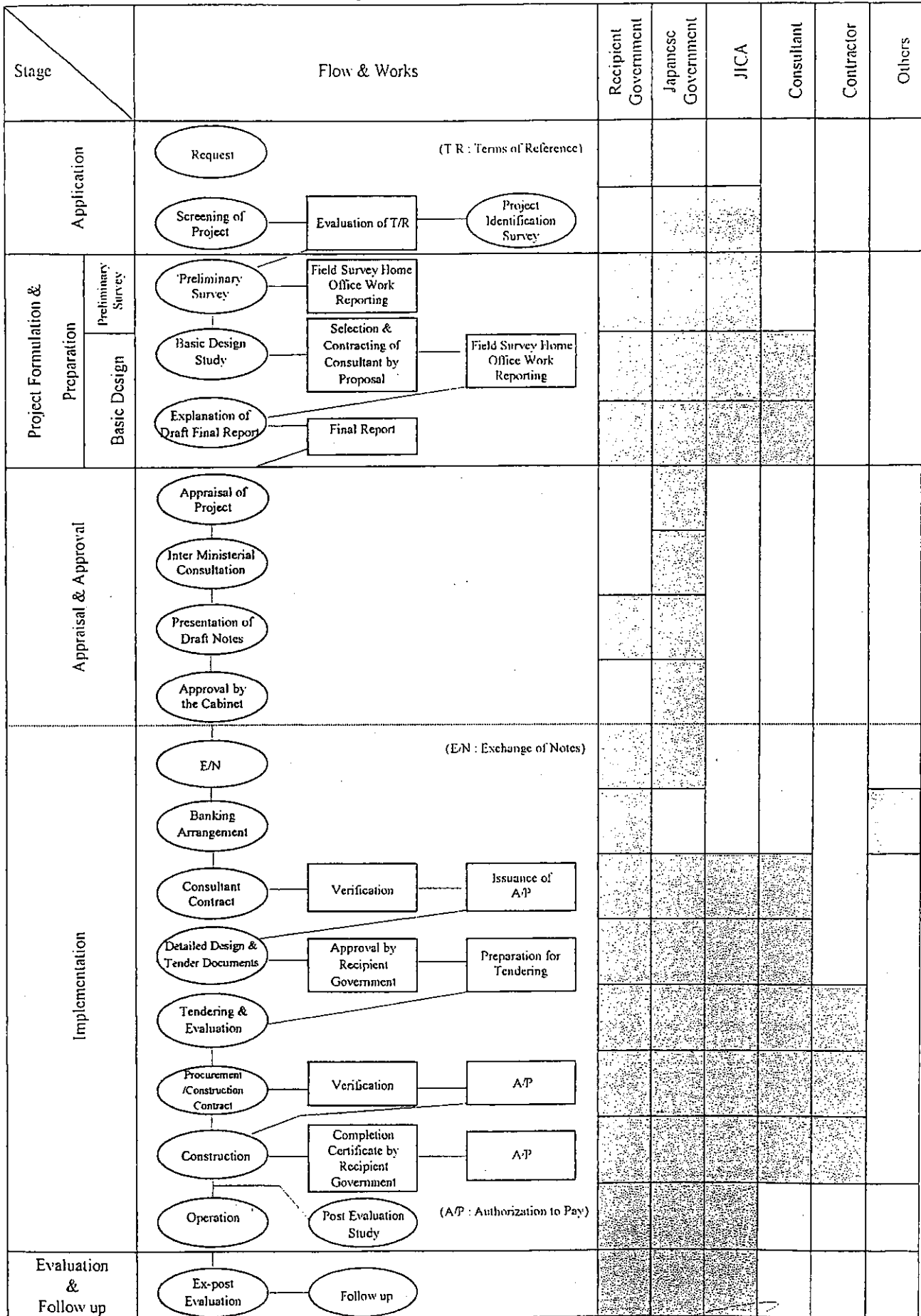
When the two Governments deem it necessary, the Grant Aid may be used for the purchase of the products or services of a third country.



However, the prime contractors, namely consulting, contracting and procurement firms, are limited to "Japanese nationals". (The term "Japanese nationals" means persons of Japanese nationality or Japanese corporations controlled by persons of Japanese nationality.)

- 5) 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 the Government of Japan. This "Verification" is deemed necessary to secure accountability of Japanese taxpayers.
- 6) Undertakings required to the Government of the recipient country (Attachment 2)
 - a) to secure a lot of land necessary for the construction of the Project and to clear the site;
 - b) to provide facilities for distribution of electricity, water supply and drainage and other incidental facilities outside the site;
 - c) to ensure prompt unloading and customs clearance at ports of disembarkation in the recipient country and internal transportation therein of the products purchased under the Grant Aid;
 - d) to exempt Japanese nationals from customs duties, internal taxes and fiscal levies which may be imposed in the recipient country with respect to the supply of the products and services under the verified contracts;
 - e) to accord Japanese nationals whose services may be required in connection with the supply of the products and services under the verified contracts such as facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work;
 - f) to ensure that the facilities constructed and products purchased under the Grant Aid be maintained and used properly and effectively for the Project; and
 - g) to bear all the expenses, other than those covered by the Grant Aid, necessary for the Project.
- 7) "Proper Use"
The recipient country is required to maintain and use the facilities constructed and equipment purchased under the Grant Aid properly and effectively and to assign the necessary staff for operation and maintenance of them as well as to bear all the expenses other than those covered by the Grant Aid.
- 8) "Re-export"
The products purchased under the Grant Aid shall not be re-exported from the recipient country.
- 9) Banking Arrangement (B/A)
 - a) The Government of the recipient country or its designated authority should open an account in the name of the Government of the recipient country in an authorized foreign exchange bank in Japan (hereinafter referred to as "the Bank"). The Government of Japan 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 the Government of Japan under an Authorization to Pay (A/P) issued by the Government of recipient country or its designated authority.

FLOW CHART OF JAPAN'S GRANT AID PROCEDURES



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 land		●
2	To clear, level and reclaim the site when needed		●
3	To construct gates and fences in and around the site when needed		●
4	To supply equipment and materials		
	1) Submersible pumps	●	
	2) Diesel generator	●	
	3) Pipe and fittings	●	
	4) Valves related transmission and collection pipelines	●	
	5) Electric transformer		●
	6) Switch board and control panel		●
	7) Others		●
5	To construct facilities and install equipment and materials		
	1) Civil works, such as receiving tanks from collection pipes, pump houses for submersible pumps, electric houses for generators, pressure breaking reservoirs, connection with existing pressure breaking reservoirs		●
	2) Pipe laying works of collection pipes and transmission pipelines		●
	3) Installation of submersible pumps and diesel generators		●
	4) Installation of electric panels		●
	5) To provide electric distribution lines to the site and circuit breakers/relay		●
6	To bear the following commissions to a bank of Japan for the banking services based upon the B/A		
	1) Advising commission of A/P		●
	2) Payment commission		●
7	To ensure prompt unloading and customs clearance at the port of disembarkation in recipient country		
	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		●
8	To accord Japanese nationals whose services may be required in connection with the supply of the products and the services under the verified contract such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work		●
9	To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the supply of the products and services under the verified contract		●
10	To maintain and use properly and effectively the facilities constructed and equipment provided under the Grant Aid		●
11	To bear all the expenses, other than those to be borne by the Grant Aid, necessary for the transportation and installation of the equipment		●

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

ANNEX-5 : UNDERTAKINGS BY THE GOVERNMENT OF THE RECIPIENT COUNTRY

[Study and Planning Stage]

1. To build the consensus on the implementation of the Project among stakeholders, including residents living around the new water sources;
2. To complete the EIA procedures following the related laws and regulation in Syria;
3. To complete the well construction work for the Project;
4. To establish the monitoring system;

[Procurement Stage (Cooperation by the Japanese Grant Aid)]

5. To ensure prompt unloading and customs clearance of the products purchased under the Japan's Grant Aid at ports of disembarkation in the Recipient Country;
6. To accord Japanese nationals whose services may be required in connection with the supply of the products and services under the verified contracts such facilities as may be necessary for their entry into Syria and stay therein for the performance of their work;
7. To bear commissions, namely advising commissions of an Authorization to Pay (A/P) and payment commissions, to the Japanese foreign exchange bank for the banking services based upon the Banking Arrangement (B/A);
8. To exempt Japanese nationals from customs duties, internal taxes and fiscal levies which may be imposed in Syria with respect to the supply of the products and services under the verified contracts;
9. To bear all the expenses, other than those covered by the Japan's Grant Aid, necessary for the Project;

[Construction Stage]

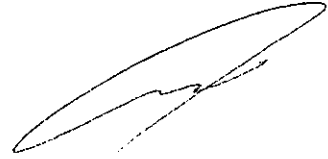
10. To obtain necessary permissions, licenses, and other authorization for implementing the Project, if necessary;
11. To secure a lot of land necessary for the Project;
12. To provide a proper access road to the Project site;
13. To provide facilities for distribution of electricity and other incidental facilities in and around the site;
14. To undertake installation and construction work using equipment and materials provided by the Japanese Grant Aid;

[Operation and Monitoring Stage]

15. To ensure that the equipment and materials purchased under the Japan's Grant Aid be maintained and used properly and effectively for the Project;
16. To monitor the environmental impact appropriately;
17. To operated the new water sources based on the result of the monitoring (bare essential production within the designed permissible amount, appropriate measures in case of

unexpected negative influence); and

18. To enhance comprehensive water resources management including improvement of the existing water distribution systems and the study of inter-basin water transmission.



Annex-6 : Tentative Schedule

	2004												2005		
	March	April	May	June	July	August	September	October	November	December	January	February	March		
Preparation of the production wells [Yaboos] Well Construction Group well pumping test [Deir Al Ashayer] Well Construction Group well pumping test [Maadar II] Well Construction Group well pumping test															
		↕	↕	↕	↕	↕	↕								
EIA		△ 1st Workshop			△ 2nd Workshop			△ 3rd Workshop							
							Preparation and submission of the EIA report		Approval of EIA						
Study Schedule		↕ 1st field survey					2nd field survey		Work in Japan		↕ Explanation of the draft report		△ Submission of the final report		

MINUTES OF DISCUSSIONS
ON THE BASIC DESIGN STUDY (SECOND FIELD SURVEY)
ON THE PROJECT FOR DEVELOPMENT OF NEW WATER SOURCES
FOR DAMASCUS CITY
IN THE SYRIAN ARAB REPUBLIC

In response to the request from the Government of Syrian Arab Republic (hereinafter referred to as "Syria"), the Government of Japan decided to conduct a Basic Design Study on the Project for Development of New Water Sources for Damascus City (hereinafter referred to as "the Project") and entrusted the study to the Japan International Cooperation Agency (hereinafter referred to as "JICA").

JICA sent to Syria the Basic Design Study Team (hereinafter referred to as "the Team"), which is headed by Mr. Shigeru Otake, Deputy Resident Representative, Syria Office, JICA, and is scheduled to stay in the country from October 2 to October 22.

The Team held discussions with the officials concerned of the Government of Syria and conducted a field survey at the study area.

In the course of discussions and field survey, both parties confirmed the main items described on the attached sheets. The Team will proceed to further works and prepare the Basic Design Study Report.

Damascus, October 20, 2004



Mr. Shigeru Otake
Leader
Basic Design Study Team
Japan International Cooperation Agency
Japan



Eng. Mwafak Khallouf
General Director
Damascus Water Supply and Sewerage
Authority
Syrian Arab Republic

ATTACHMENT

1. Background

Based on the request from Syrian Government, JICA conducted the first field survey for the Basic Design Study from March 15 to April 15, 2004. Main items which both sides agreed by the Minutes of Discussions dated on March 24 are as follows:

- (1) The original requested sites of the Project were the water sources at Yaboos, Maadar and Deir Al Ashayer. However, both sides agreed to change Maadar to adjacent Maadar II, because all the wells in Maadar were located on the top of the ridge which was not suitable to construct a well field from the fear of lowering groundwater table.
- (2) The Japanese side found that all the existing wells were not suitable to be converted into the production wells, because of small casing diameter or inadequate well structure in casing and strainer installation, gravel packing and grout sealing. Therefore, both sides agreed that DAWSSA should construct the production wells with enough specification by September.
- (3) Both sides confirmed that EIA would be necessary for the Project and DAWSSA should prepare EIA report and get approval from the General Commission for Environmental Affairs (GCEA), and
- (4) The Second Basic Design Study Team shall be dispatched for the second field work in October after the completion of construction work to confirm the new production wells and conduct surveys for collection pipes.

Following the above agreement, JICA dispatched the Second Basic Design Study Team.

2. Work progress of well construction

DAWSSA has been constructing production wells in the three sites. Here is the progress of the production well construction as of October 15:

Area	Pumping test complete	Drilling complete	Under construction
Yaboos	9	9	4
Maadar II	0	0	8
Deir Al Ashayer	1	3	3

The location of the sites is shown in Annex-1. The well list is shown in Annex-2.



3. Environmental and social consideration

(1) Progress

DAWSSA has established the EIA Team with 13 staff members and Mr. Mohamad Kayyal as an advisor from the Damascus University. The progress of environmental and social consideration was explained as follows:

1) EIA process

The First Progress Report was submitted to JICA on October 14. It clearly states work progress, future work and work schedule.

2) Consensus building with stakeholders

The first stakeholders' meeting was convened in April 2004.

Talk with residents of Deir Al Ashayer is in progress. DAWSSA expects that parties concerned will reach an agreement in the near future.

3) Coordination with the Lebanese side

DAWSSA sent letters three times to the vice minister of irrigation in order to urge the ministry to place the Project on the agenda of the Syrian-Lebanese Ministerial Committee on Water.

DAWSSA contacted the Lebanese side by itself. The expert of GTZ has started investigation of shared water.

(2) Tentative schedule

According to the First Progress Report, DAWSSA's tentative schedule on EIA process is as described below:

Task Number	Task	Date for Completion
1	Assembling information from the group teams which provide background information on the assessment of impacts	Week 4, Oct. 2004
2	Preparing a presentation to assess the impacts which provides background information on the nature of the project activities and the environmental conditions in the project sites	Week 2, Nov. 2004
3	Convening the EIA study team in a series of meetings for: a. Explaining the basis of impacts assessment including types of impacts and determination of their significance b. Presentation of background information for each environmental aspect c. Conducting a group survey of each impact in order to determine its significance d. Determination of major impacts and their level of	Week 4, Nov. 2004

	<p>significance</p> <p>e. Determination of mitigation measures for these impacts including alternatives</p> <p>f. Proposing monitoring plans to ensure the impacts are minimized</p>	
4	Convening a stakeholders' meeting to explain the major impacts, mitigation measures and monitoring plan	Week 1, Dec. 2004
5	Review of mitigation measures and monitoring plan based on input from stakeholders	Week 3, Dec. 2004
6	Preparation of draft EIA report	Week 4, Jan. 2005
7	Presentation of the summary of the draft report to stakeholders in order to gain their approval and address their concerns	Week 1, Feb. 2005
8	Revision and translation of final EIA report and submission to the environment agency for approval	Week 4, Feb. 2005
9	Submission of approved final report to JICA	Week 4, Mar. 2005

The Team requested to shorten the schedule as much as possible in accordance with decision-making process of the Japanese side.

(3) Confirmation of the prerequisite

Both sides reaffirmed the prerequisite for the implementation of the Project agreed by the previous Minutes of Discussions:

- 1) The fact that the water shortage in Damascus city is extremely severe and is desperately serious problem in social and economic aspects should be confirmed,
 - Water supply suspension was obliged severely during dry year.
 - The Team collects backup data such as record of cuts in water supply.
- 2) The countermeasures against water leakage and other water loss should be sufficiently undertaken,
 - The replacement of the old distribution pipelines was carried out with the cooperation of the Japanese Grant Aid.
 - Countermeasures against water leakage will be strengthened continuously by reinforcement of leakage detection capability and introduction of District Meter Area (DMA).
 - Rate of water leakage decreased from 34.7% in 1997 to 23% in 2003.
- 3) There should be positive prospect and solid implementation plan for future drastic solution such as inter-basin water transmission in order to minimize the deterioration of water balance in the Barada and Awaj basin,
 - The water transmission plans from coastal basin and Euphrates River are in progress.
 - Wastewater reuse for irrigation is in operation.

- 4) The social consensus for the implementation of the Project should be built through the EIA process. Especially the residents around the new water sources should agree to the groundwater development in the Project.
 - DAWSSA held a series of stakeholders' meetings.
 - Talk with residents in Deir Al Ashayer is continuing.
- 5) The EIA should be undertaken in compliance with related laws and regulations in Syria.
 - DAWSSA has organized the EIA Study Team with assistance of Mr. Mohamad Kayyal, Associate Professor of the Faculty of Civil Engineering at Damascus University.
 - DAWSSA will prepare EIA report and submit to General Commission for Environmental Affairs (GCEA) based on the EIA decree put in force in 1995.
- 6) The adequate monitoring system of environmental impact should be established,
 - DAWSSA is negotiating with the Ministry of Irrigation to utilize a part of its monitoring wells.
 - DAWSSA has own monitoring wells and maintains constant monitoring. Monitoring records are described in annual reports of DAWSSA.
- 7) There should be decision-making mechanism which can stop the operation of the new water sources when negative influence emerges more than initially envisioned.
 - DAWSSA has the operation criteria for existing well fields. The Study Team will revise it or submit recommendation for it, if necessary, considering application to the Project sites.

4. Requirements and conditions for future work

The Team requires well data obtained by pumping tests including groundwater table and yield for basic design work. Definite possibility of social agreement is also necessary for decision-making of the Japanese side.

Therefore, both sides agreed to the following conditions and time limits:

- 1) Yaboos: DAWSSA should report the results of pumping test for remaining wells by November 7 to the Team and the JICA Syria Office. The Team will proceed to basic design and cost estimation for wells reported by then.
- 2) Maadar II:
 - a) Condition 1: DAWSSA should report the results of pumping test for all the planned 8 wells by November 7 to the Team and the JICA Syria Office. Otherwise, Maadar II should be postponed.
 - b) Condition 2: If condition 1 is met, the Team will simulate the effect on the Lebanese side. If

certain amount of influence is predicted. DAWSSA should obtain consensus of the Lebanese Government through the official channel under the control of Ministry of Irrigation in writing by December 15. Otherwise, Maadar II should be postponed. Effect on the Lebanese side should be also confirmed by a group well pumping test.

3) Deir Al Ashayer:

- a) Condition 1: DAWSSA should report the results of pumping test for all the planned 6 wells by November 7 to the Team and the JICA Syria Office. Otherwise, Deir Al Ashayer should be postponed.
- b) Condition 2: If condition 1 is met, DAWSSA should obtain consensus of residents in Deir Al Ashayer in writing by the end of November. Otherwise, Deir Al Ashayer should be postponed.
- c) Condition 3: If condition 1 is met, the Team will simulate the effect on the Lebanese side. If certain amount of influence is predicted, DAWSSA should obtain consensus of the Lebanese Government through the official channel under control of Ministry of Irrigation in writing by December 15. Otherwise, Deir Al Ashayer should be postponed. Effect on the Lebanese side should be also confirmed by a group well pumping test.

As for the coordination with the Lebanese side, the Syrian side should at least notify the Lebanese side through the official channel, because all the project sites are located in the boarder area. In case certain influence is predicted in Maadar II and/or Deir Al Ashayer, the Syrian side should obtain consensus in writing in order to avoid future trouble. In Yaboos area, there is no habitant and water use in the Lebanese side, so that no effect is foreseen.

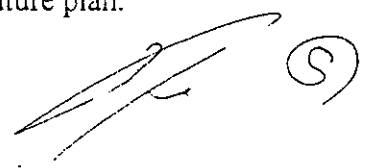
The work schedule for EIA should be shortened as much as possible.

If it happens that an area (or areas) should be postponed to the next fiscal year, the Basic Design Study will continue next fiscal year without renewed request.

5. Water transmission plan

DAWSSA has started consultation with the Ministry of Transport to deal with construction of water transmission pipelines along the highway to Beirut and railway crossing. The results should be informed to the Team as soon as possible.

DAWSSA has a future plan to develop Sergaya area and Maadar I area and to extend the three well fields requested in the Project. This will affect the size of pipelines of the Project, so that the Team will carefully examine the realizable possibility and relevance of the future plan.



6. Equipment plan and procurement plan

Both sides reaffirmed that the collection pipes less than 200mm diameter would be prepared by the Syrian side as agreed by the previous Minutes of Discussions signed on March 24.

Both side also agreed that diesel generators would be also prepared by the Syrian side. because they would be used only for standby.

7. Items requested by the Government of Syria

After discussions with the Team, the items described in Annex-3 were finally requested by the Syrian side. JICA will assess the appropriateness of the request and will recommend to the Government of Japan for approval.

8. Undertakings of the Syrian side

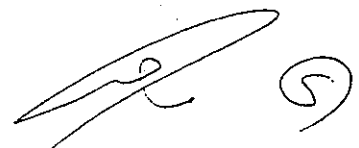
The Syrian side will take the necessary measures, as described in Annex-4, for smooth implementation of the Project, as a condition for the Japanese Grant Aid to be implemented.

9. Schedule of the Study

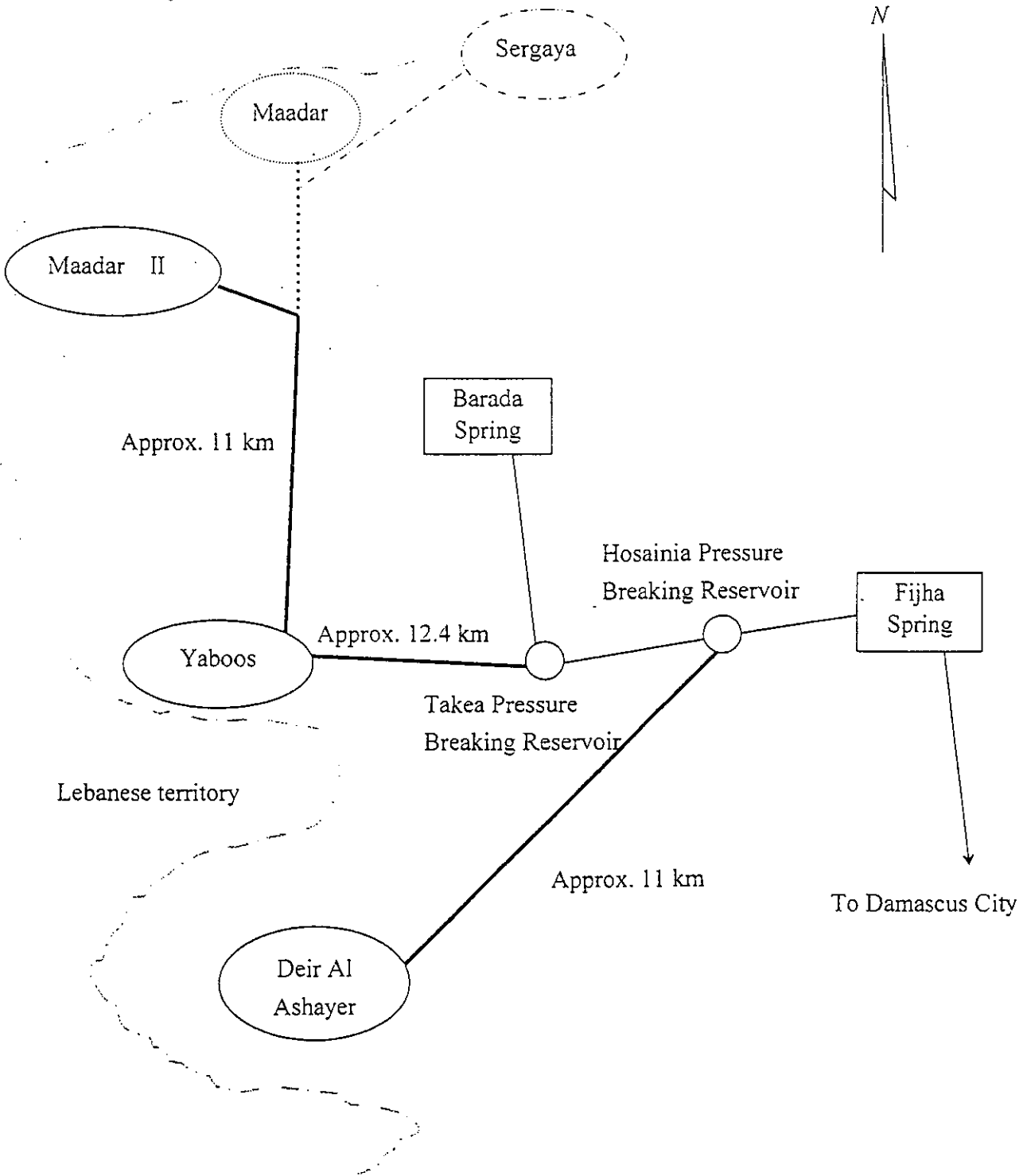
9-1. The consultants will proceed to further studies in Syria until October 22 and in November 2004.

9-2. JICA will prepare the draft report in English and dispatch a mission in order to explain its contents around January 2005.





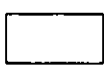
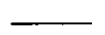


9-3. In case that the contents of the report is accepted in principle by the Government of Syria, JICA will complete the final report and send it to the Government of Syria by March 2005.



ANNEX-1 : Project Sites



Legend

- | | |
|---|--|
|  : Well field site for fast track portion |  : Proposed water transmission pipeline |
|  : Site excluded from the original request |  : Existing pressure breaking reservoir |
|  : Existing water source |  : Existing water transmission pipeline |
|  : Border between Syria and Lebanon |  : Site of future plan by DAWSSA |

ANNEX-2 : List of Wells Constructed by DAWSSA

	Well I.D. No.	Drilling complete	Pumping test complete	Depth (m)	Static water level (meter below the surface)	Specific yield (m ³ /hr/m)
Yaboos						
1	YAW 1	*	*	400	97.0	5.89
2	YAW 2	*	*	400	101.5	12.05
3	YAW 3	*	*	400	93.2	2.50
4	YAW 4			(250)	-	-
5	YAW 5	*	*	400	Under data analysis	Under data analysis
6	YAW 6	*	*	396.6	87.0	6.96
7	YAE 7	*	*	400	90.7	2.01
8	YAE 8			(190)	-	-
9	YAE 9	*	*	400	107.0	2.22
10	YAE 10	*	*	425	117.8	0.29
11	YAE 11	*	*	450	127.7	0.85
12	YAE 12			(140)	-	-
13	YAE 13			(70)	-	-
Maadar II						
1	MA1			(320)	-	-
2	MA2			(200)	-	-
3	MA3			(240)	-	-
4	MA4			(250)	-	-
5	MA5			(210)	-	-
6	MA6			(140)	-	-
7	MA7			(18)	-	-
8	MA8			(400)	-	-
Deir Al Ashayer						
1	DA1	*		285.4	-	-
2	DA2	*	*	277.8	18.1	3.05
3	DA3	*		273.7	-	-
4	DA4			(200)	-	-
5	DA5			(70)	-	-
6	DA6			(15)	-	-

Wells with I.D. No. starting with YAW are located in Yaboos West.

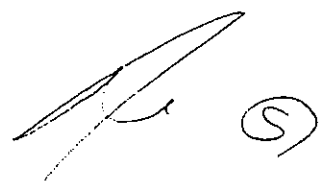
Wells with I.D. No. starting with YAE are located in Yaboos East.

Depth figure in parentheses shows drilling progress as of Oct. 15.

ANNEX-3 : Items Requested by the Syrian Side for the Fast Track Potion

Procurement of the following Equipment:

Yaboos and Maadar II scheme		
1) Submersible pump	Q = 50 m ³ /hr, H = 300 m	19 sets
2) Collection pipe		1 lot
3) Transmission pipeline	DN = 500 – 600 mm	25 km
Deir Al Ashayer scheme		
1) Submersible pump	Q = 50 m ³ /hr, H = 150 m	6 sets
2) Collection pipe		1 lot
3) Transmission pipeline	DN = 300 – 400 mm	11 km



ANNEX-4 : Undertakings of the Syrian Side

[Study and Planning Stage]

1. To build the consensus on the implementation of the Project among stakeholders, including residents living around the new water sources;
2. Coordination with the Lebanese side;
3. To complete the EIA procedures following the related laws and regulation in Syria;
4. To complete the well construction work for the Project;
5. To consult with related authorities to determine the routes of water transmission pipelines;
6. To establish the monitoring system;

[Procurement Stage (Cooperation by the Japanese Grant Aid)]

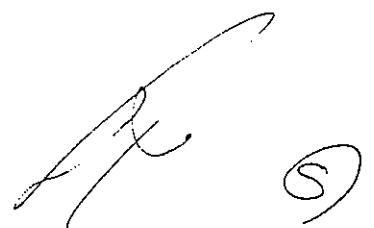
7. To ensure prompt unloading and customs clearance of the products purchased under the Japan's Grant Aid at ports of disembarkation in the Recipient Country;
8. To accord Japanese nationals whose services may be required in connection with the supply of the products and services under the verified contracts such facilities as may be necessary for their entry into Syria and stay therein for the performance of their work;
9. To bear commissions, namely advising commissions of an Authorization to Pay (A/P) and payment commissions, to the Japanese foreign exchange bank for the banking services based upon the Banking Arrangement (B/A);
10. To exempt Japanese nationals from customs duties, internal taxes and fiscal levies which may be imposed in Syria with respect to the supply of the products and services under the verified contracts;
11. To bear all the expenses, other than those covered by the Japan's Grant Aid, necessary for the Project;
12. To procure equipment which is due to be borne by the Syrian side;

[Construction Stage]

13. To obtain necessary permissions, licenses, and other authorization for implementing the Project, if necessary;
14. To secure a lot of land necessary for the Project;
15. To provide a proper access road to the Project site;
16. To provide facilities for distribution of electricity and other incidental facilities in and around the site;
17. To control traffic, secure security of pedestrians and passing cars, minimize negative effects for surrounding environment, protect other burial facilities such as electric cables and telephone lines, coordinate with related authorities;
18. To undertake installation and construction work using equipment and materials provided by the Japanese Grant Aid such as installation of equipment, construction of pipelines, construction of pressure breaking reservoirs and construction of incidental facilities;

[Operation and Monitoring Stage]

19. To ensure that the equipment and materials purchased under the Japan's Grant Aid be maintained and used properly and effectively for the Project;
20. To monitor the environmental impact appropriately;
21. To operated the new water sources based on the result of the monitoring (bare essential production within the designed permissible amount, appropriate measures in case of unexpected negative influence); and
22. To enhance comprehensive water resources management including improvement of the existing water distribution systems and the study of inter-basin water transmission.

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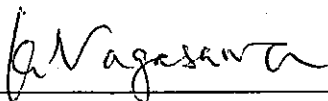
MINUTES OF DISCUSSIONS
ON THE BASIC DESIGN STUDY
ON THE PROJECT FOR DEVELOPMENT OF NEW WATER SOURCES
FOR DAMASCUS CITY
IN THE SYRIAN ARAB REPUBLIC
(EXPLANATION ON DRAFT REPORT (1))

In March and October 2004, the Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched the Basic Design Study Team on the Project for Development of New Water Sources for Damascus City (hereinafter referred to as "the Project") to Syrian Arab Republic (hereinafter referred to as "Syria"), and through discussion, field survey, and technical examination of the results in Japan, JICA prepared a draft report of the study.

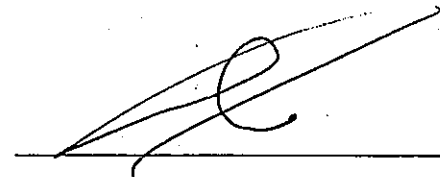
In order to explain and to consult with the Government of Syria on the components of the draft report, JICA sent to Syria the Draft Report Explanation Team (hereinafter referred to as "the Team"), which is headed by Mr. Kazuhide Nagasawa, Resident Representative, Syria Office, JICA, from January 15 to 24, 2005.

In the course of discussions, both parties confirmed the main items described on the attached sheets.

Damascus, January 19, 2005



Mr. Kazuhide Nagasawa
Leader
Draft Report Explanation Team
Japan International Cooperation Agency
Japan



Eng. Mwafak Khallouf
General Director
Damascus Water Supply and Sewerage
Authority (DAWSSA)
Syrian Arab Republic

ATTACHMENT

1. Components of the Draft Report

The Government of Syria agreed and accepted in principle the components of the draft report (1) explained by the Team.

2. Japan's Grant Aid scheme

The Syrian side understands the Japan's Grant Aid Scheme and the necessary measures to be taken by the Government of Syria as explained by the Team and described in Annex-4 and Annex-5 of the Minutes of Discussions signed by both parties on March 24, 2004.

3. Schedule of the Study

JICA will complete the final report in accordance with the confirmed item and send it to the Government of Syria by April, 2005.

4. Other relevant issues

4-1. Project components

The Team explained that the draft report (1) dealt with Yaboos area and the draft report (2) would be prepared for Maadar II area and Deir Al Ashayer area after further work to be conducted. Main components of the project for Yaboos area are shown in Annex-1.

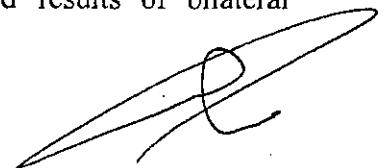
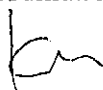
4-2. Draft detailed specification of the equipment

The Team handed one copy of the draft detailed specification of the equipment to Eng. Mwafak Khallouf, General Director of DAWSSA. Both sides agreed that this draft specification was confidential and should not be duplicated or released to any outside parties.

4-3. Environmental and social consideration

The Team explained the following major comments from JICA's Advisory Council of Environmental and Social Considerations Review, which consists of academic experts, NGOs, etc.:

- (1) JICA is requested to confirm results of EIA conducted by the Syrian side,
- (2) JICA is requested to make a decision based on the results of group pumping test,
- (3) It is necessary to gain approval from the Lebanese side at the Syrian-Lebanese Committee on water and JICA is requested to describe the process and results of bilateral coordination in the B/D report,



- (4) It is desirable to propose a monitoring plan in detail,
- (5) To estimate groundwater recharge ratio and recharge area is very difficult especially in limestone areas. The B/D report is requested to give a description of data, figure, basis of assumption, scientific reasoning, etc. in order to ensure traceability and repeatability of estimation,
- (6) Water quality analysis is requested to be conducted in more items such as arsenic (As), fluorine (F), selenium (Se), heavy metals (Fe, Mn, Cu, Pb, Zn, Hg, Cr, Cd) and organic compounds (COD or TOC),
- (7) Water quality of Yaboos area is contaminated with coliform bacteria. Mechanism of contamination should be described in the B/D report. Countermeasures and monitoring plan are also important,
- (8) An operation plan should be clearly stated to avoid excessive groundwater extraction,
- (9) The groundwater simulation model used in the draft report involves many assumptions. The B/D report is requested to mention those assumptions and limits of the model clearly and to emphasize importance of monitoring,
- (10) Because the operation of the Project is seasonal, the B/D report is requested to describe important points of operation and maintenance corresponding to this operation characteristic, and
- (11) Impact of water shortage should be described more in detail.

The Team will finalize the draft report in consideration of these comments. DAWSSA transferred these comments to the supervisor of EIA Study Team, Dr. Kayyal of Damascus University.

DAWSSA agreed to the necessity of countermeasures against water source contamination and promised to conduct additional water quality analysis.

Both sides confirmed the following progress and schedule of EIA process for Yaboos area:

Task Number	Task	Schedule
1	Stakeholders meeting (2 nd)	Dec. 28 – 29, 2004 (done)
2	Group pumping test	Jan. 16, 2005 – (started) (about 1 month duration)
3	Preparation of EIA report (1 st draft)	Jan. 19, 2005
4	Stakeholders meeting (3 rd)	1 st or 2 nd week of Feb., 2005
5	Submission of EIA report (Yaboos) to GCEA	Feb.20, 2005

K

6	Examination of EIA report (Yaboos) by GCEA	Feb. 20 – March 20, 2005
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DAWSSA explained achievement of environmental and social considerations as follows:

(1) EIA report

DAWSSA submitted a part of EIA report (1st draft) to the Team on January 17 and explained that the rest would be also submitted in a few days. The EIA report is prepared in English and DAWSSA will translate it into Arabic. DAWSSA explained that the EIA report would be finalized reflecting further check by DAWSSA, results of the ongoing group pumping test and comments from stakeholders, and submitted to GCEA (General Commission for Environmental Affair) by February 20 (same as the original schedule).

(2) Stakeholders meeting

DAWSSA provided the minutes of meeting of the 2nd stakeholders meeting held on December 28 and 29, 2004. No objection was raised to the Project in the meeting. Requests from the representative of local residents (Jdaidet Yaboos village) will be considered as follows:

1) Drinking water supply to the village

The Minister of Housing and Construction agreed to this request and Water Supply Authority for Rural Damascus will take necessary action.

2) Participation to the group pumping test

DAWSSA had sent an official invitation letter and already received a response letter.

3) Introduction of group irrigation by dripping

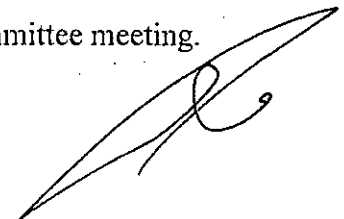
Ministry of Irrigation plans to conduct a pilot study near Barada Spring. In association with this, DAWSSA expressed its expectation for continuation of technical transfer by JICA to competent authorities in Syria.

The 3rd stakeholders meeting will be held in 1st or 2nd week of February as soon as the groundwater level stabilizes and the result of group pumping test is estimated.

(3) Official coordination with the Lebanese government

DAWSSA reported that an oral approval for the whole Project had been already obtained at the previous official committee meeting on water between Syrian government and Lebanese government. The Lebanese side is in process of nominating delegations to attend site visit and monitoring. The Syrian side will request written approval in the next committee meeting.

km



(4) Information disclosure

DAWSSA made minutes of meeting for each stakeholders meeting in Arabic and English. The EIA report is also prepared in English and Arabic. Both of them are open to public.

4-4. Water transmission plan

The Team explained methodology and design results of the water transmission pipeline, which had been determined taking into consideration future connection and expansion. DAWSSA understood them.

DAWSSA explained that there was no need to change the transmission route according to consultation and coordination with the Ministry of Transport and other line ministries.

4-5. Undertakings of the Syrian side

The Syrian side will take the necessary measures, as described in Annex-2, for smooth implementation of the Project, as a condition for the Japanese Grant Aid to be implemented.

The Team requested DAWSSA to keep contact and provide following information and documents via JICA Syria Office as soon as possible:

- (1) Result of the group pumping test in Yaboos area,
- (2) Minutes of meeting for the 3rd stakeholders meeting,
- (3) Final version of the EIA report, and
- (4) Result of EIA examination by GCEA.

4-6. Technical assistance

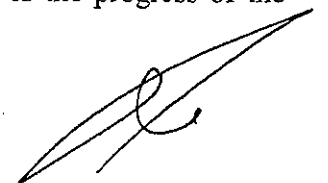
DAWSSA requested technical assistance (so-called Soft Component) and counterpart training in Japan in the following areas:

- (1) Installation and maintenance of a pressure reducing facility,
- (2) Installation of a submersible pump to a deep well, and
- (3) Hydrogeology to evaluate and monitor influence area and protection area around wells.

The Team recognized the necessity and promised to convey the request to JICA headquarters.

4-7. Work progress of well construction and EIA process for Maadar II area and Deir Al Ashayer area

DAWSSA has been constructing production wells in the three sites. Here is the progress of the production well construction as of January 17:



Area	Pumping test complete	Drilling complete	Under construction
Yaboos	12	12	1
Maadar II	3	3	5
Deir Al Ashayer	4	4	2

The location of the sites is shown in Annex-3. The well list is shown in Annex-4.

DAWSSA also explained the progress of EIA process as follows:

(1) Consensus building among stakeholders

DAWSSA, Ministry of Housing and Construction and Damascus Countryside Governorate held several discussions with residents (mainly farmers) of Deir Al Ashayer area and have obtained written approval to the Project from them. DAWSSA submitted a copy of letter from the Chairman of Dimas Town Council to the Damascus Countryside Governorate dated on December 2, 2004, which stated that they did not have objection to the groundwater exploiting in Deir Al Ashayer area on condition that drinking water would be supplied to Dimas and Deir Al Ashayer.

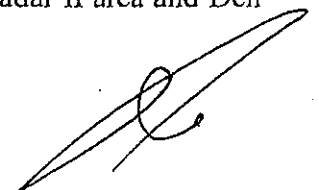
(2) Official coordination with the Lebanese government

DAWSSA is taking the procedure to obtain written approval from the Lebanese side for Maadar II area and Deir Al Ashayer area as well as Yaboos area.

DAWSSA explained a future schedule as follows:

Task Number	Task	Schedule
1	Well construction in Deir Al Ashayer area	By the middle of February, 2005
2	Group pumping test in Deir Al Ashayer area	From the middle of February, 2005 – (about 1 month duration)
3	Well construction in Maadar II area	By the middle of March, 2005
4	Group pumping test in Maadar II area	From the middle of March, 2005 – (about 1 month duration)
5	Stakeholders meeting for Maadar II area and Deir Al Ashayer area	April, 2005
6	Submission of EIA report (Maadar II and Deir Al Ashayer) to GCEA	May, 2005

The Team explained that JICA would conduct the 3rd field survey for Maadar II area and Deir Al Ashayer area under the following conditions in principle:

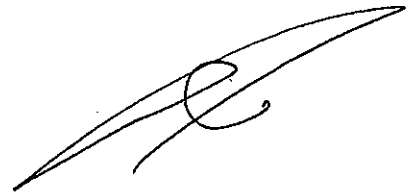
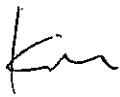



- (1) Construction of all the production wells is completed,
- (2) Group pumping tests are conducted,
- (3) The Lebanese side indicates acceptance of the Project based on recognition of the group pumping test results, and
- (4) Stakeholders including nearby local residents approved the implementation of the Project based on recognition of the group pumping test results.

The Team explained purposes of the 3rd field survey as follows:

- (1) To verify location and conditions of the wells,
- (2) To verify results of pumping tests and water quality analysis,
- (3) To conduct survey necessary for design of water collection pipelines, and
- (4) To discuss contents of the EIA report.

JICA will prepare a draft report for Maadar II area and Deir Al Ashayer area after approval of EIA by the Syrian government and then dispatch a draft report explanation team to Syria.



ANNEX-1 : Main components of the project for Yaboos area

Procurement of the following Equipment:

Yaboos scheme		
1) Submersible pump	Q = 0.83 m ³ /min	11 sets
2) Collection pipe	DN = 250 – 400 mm	1 lot
3) Transmission pipeline	DN = 600 mm	11.5 km
4) Fixed water level valve	600 mm, with strainer and sluice valve	2 units

ANNEX-2 : Undertakings of the Syrian Side

[Study and Planning Stage]

1. To build the consensus on the implementation of the Project among stakeholders, including residents living around the new water sources;
2. Coordination with the Lebanese side;
3. To complete the EIA procedures following the related laws and regulation in Syria;
4. To complete the well construction work for the Project;
5. To consult with related authorities to determine the routes of water transmission pipelines;
6. To establish the monitoring system;
7. To make detailed design of civil engineering facilities and electric facilities;

[Procurement Stage (Cooperation by the Japanese Grant Aid)]

8. To ensure prompt unloading and customs clearance of the products purchased under the Japan's Grant Aid at ports of disembarkation in the Recipient Country;
9. To accord Japanese nationals whose services may be required in connection with the supply of the products and services under the verified contracts such facilities as may be necessary for their entry into Syria and stay therein for the performance of their work;
10. To bear commissions, namely advising commissions of an Authorization to Pay (A/P) and payment commissions, to the Japanese foreign exchange bank for the banking services based upon the Banking Arrangement (B/A);
11. To exempt Japanese nationals from customs duties, internal taxes and fiscal levies which may be imposed in Syria with respect to the supply of the products and services under the verified contracts;
12. To bear all the expenses, other than those covered by the Japan's Grant Aid, necessary for the Project;
13. To procure equipment which is due to be borne by the Syrian side (collection pipes with diameter less than 200 mm and diesel generators);

[Construction Stage]

14. To obtain necessary permissions, licenses, other authorization and budget for implementing the Project, if necessary;
15. To secure a lot of land necessary for facility construction in the Project;
16. To provide facilities for distribution of electricity and other incidental facilities in and around the site;
17. To control traffic, secure security of pedestrians and passing cars, minimize negative effects for surrounding environment, protect other burial facilities such as electric cables and telephone lines, coordinate with related authorities;
18. To undertake installation and construction work using equipment and materials provided by the Japanese Grant Aid such as installation of equipment, construction of pipelines,

construction of pressure breaking reservoirs and construction of incidental facilities;

19. To secure high visibility of the Project;

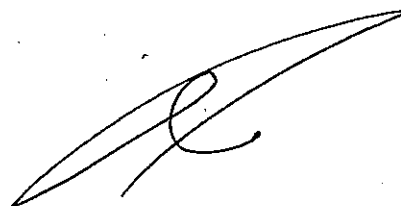
[Operation and Monitoring Stage]

20. To ensure that the equipment and materials purchased under the Japan's Grant Aid be maintained and used properly and effectively for the Project with necessary allocation of personnel and budget;

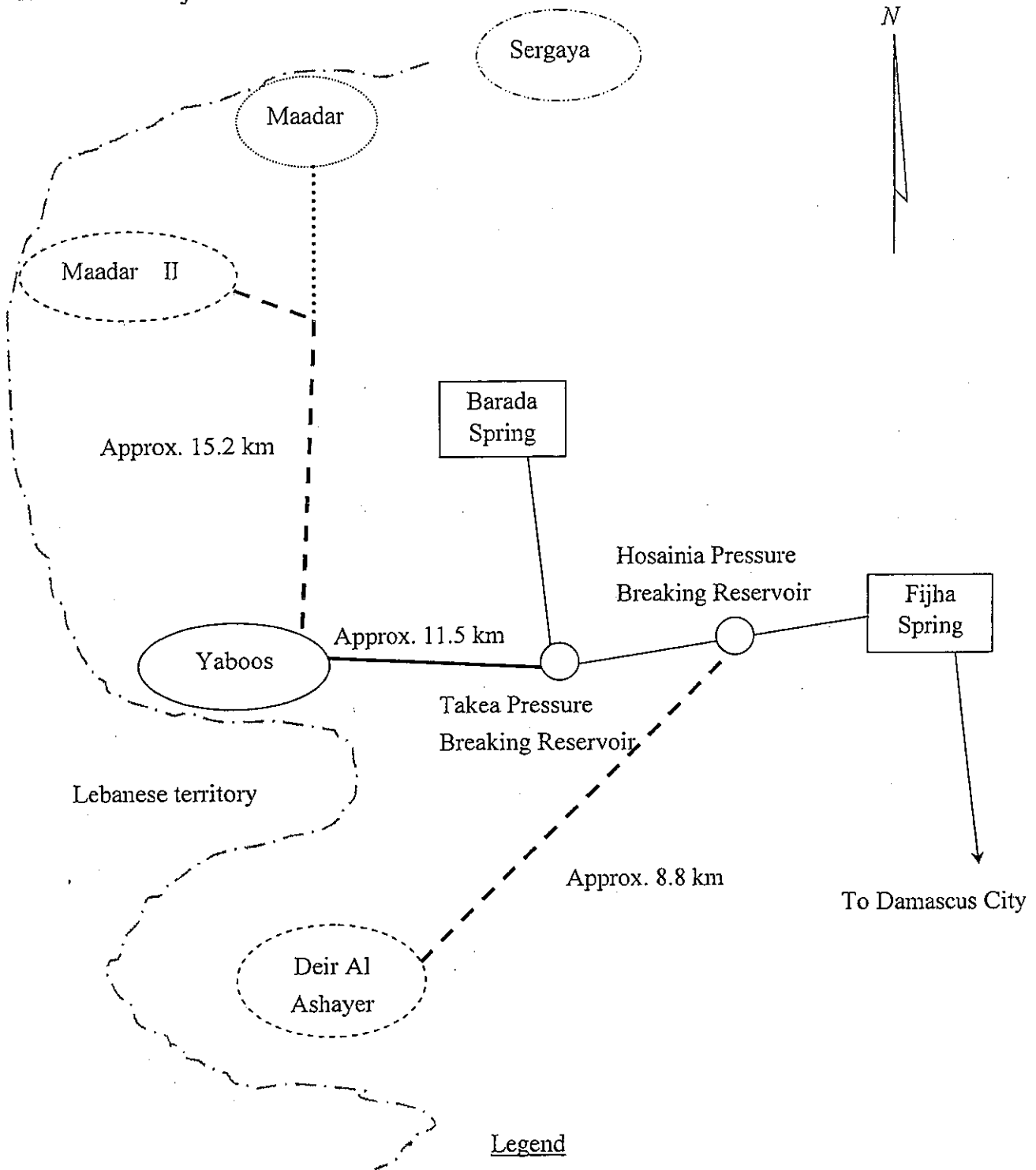
21. To monitor the environmental impact appropriately;

22. To operated the new water sources based on the result of the monitoring (bare essential production within the designed permissible amount, appropriate measures in case of unexpected negative influence); and

23. To enhance comprehensive water resources management including improvement of the existing water distribution systems and the study of inter-basin water transmission.



ANNEX-3 : Project Sites



Legend

- : Well field site (1st stage)
- : Well field site (2nd stage)
- : Site excluded from the original request
- : Existing water source
- . - : Border between Syria and Lebanon
- : Water transmission pipeline (1st stage)
- - - : Water transmission pipeline (2nd stage)
- : Existing pressure breaking reservoir
- : Existing water transmission pipeline
- : Site of future plan by DAWSSA

for

[Signature]

ANNEX-4 : List of Wells Constructed by DAWSSA

	Well I.D. No.	Drilling complete	Pumping test complete	Depth (m)	Static water level (meter below the surface)	Specific yield (m ³ /hr/m)
Yaboos						
1	YA 1	*	*	400	97.0	5.83
2	YA 2	*	*	400	101.5	12.06
3	YA 3	*	*	400	93.25	2.55
4	YA 4	*	*	400	111.95	1.91
5	YA 5	*	*	400	99.3	4.19
6	YA 6	*	*	396.6	87.0	7.04
7	YA 7	*	*	400	90.7	1.9
8	YA 8	*	*	400	106.85	0.95
9	YA 9	*	*	400	107.0	2.16
10	YA 10	*	*	425	117.8	0.27
11	YA 11	*	*	450	127.7	0.87
12	YA 12			(357)	-	-
13	YA 13	*	*	400	94.10	0.85
Maadar II						
1	MA1			(400)	-	-
2	MA2			(480)	-	-
3	MA3			(345)	-	-
4	MA4			(400)	-	-
5	MA5	*	*	400	-	-
6	MA6	*	*	500	19.63	-
7	MA7			(280)	-	-
8	MA8	*	*	500	200.25	1.28
Deir Al Ashayer						
1	DA1	*	*	290	3.43	3.14
2	DA2	*	*	283	18.35	3.3
3	DA3	*	*	279	6.59	6.65
4	DA4	*	*	295	9.84	5.06
5	DA5			(200)	-	-
6	DA6			(250)	-	-

Depth figure in parentheses shows drilling progress as of Jan. 17.

(a)

Appendix-5 References collected

(1) References related to EIA

- The Seven Water Basins of Syria: Environmental Action Plans
World Bank/UNDP, April 1998
Environmental Resources Management (ERM),
8 Cavendish Square, London W1M 0ER
General Environmental Impact Assessment Guideline including Draft EIA Decree
Establishment of an Environmental Assessment (EIA) Unit
World Bank, European Investment Bank, March 1995
DHV Consultants BV, Amersfoort, The Netherlands in association with
Alfa Group, Damascus, Syrian Arab Republic
Industrial Pollution Abatement Guideline
Wastewater Treatment Plants
Establishment of an Environmental Assessment (EIA) Unit
World Bank, European Investment Bank, May 1995
DHV Consultants BV, Amersfoort, The Netherlands in association with
Alfa Group, Damascus, Syrian Arab Republic
STUDIES AND DESIGN OF WORKS CONCERNING REHABILITATION AND
EXPANSION OF THE WATER SUPPLY SYSTEM OF DAMASCUS CITY AND
ITS SURROUNDINGS (DRAFT), ENVIRONMENTAL REPORT, DAWSSA,
March 2004
LAHMEYER INTERNATIONAL in association with
AAC (Kuwait) and AWMc (United Kingdom)
National Environmental Action Plan for the Syrian Arab Republic
Ministry of State for Environmental Affairs, Syrian Arab Republic
UNDP, The World Bank, with the assistance of ERM
PROJECT OF SUPPLYING PART OF THE WATER DEMAND OF DAMASCUS
CITY FROM THE SYRIAN COASTAL AREA WATER SUPPLY,
ENVIRONMENTAL IMPACT ASSESSMENT, PHASE II
DAWSSA, July 2003
IBG, DHV
Law No.50
Republic President, Pursuant to the constitution provisions, June 2002

(2) Maps

- Topo-map (covering all study area) 1:50,000. x 1 sheet
Topo-map (covering all study area) 1:25,000. x 4 sheets
Digital map (covering Dimas area) 1:5,000. x 1 sheet
GEOLOGICAL MAP OF SYRIA (covering Zabadani to Yafour) 1:50,000.

Sheet I-37-VII-3a,c

USSR, 1962

A Part of Geological Map of Syria (covering all study areas) 1:250,000.

(unknown)

Carte Geologique de la partie Nord du massif de l'Anti-Leban Bassin versant de la Source Figeih

ETUDE HYDROLOGIQUE ET HYDROGEOLOGIQUE DE LA SOURCE FIGEH

GRENOBIT, France, R II 442-101, (unknown)

1 :200,000.

Digital map of Damascus (by CD-R)

General plan of Highway 8 sheet

(3) Miscellaneous Data/Information on Hydrogeology

Results of Pumping Test (by MOI)

Well Log of Monitoring wells (by MOI)

A Part of Haramon Project Report

Groundwater Hydrograph of Monitoring Wells (WRIC)

Information on Wadi Marwa Well Field

Groundwater Hydrograph of production wells (DAWSSA)

Results of Water Quality Analysis (DAWSSA)

(4) Data/References on Water Supply of Damascus City

Water Production Data (2002) by DAWSSA

Studies and Design of Works Concerning Rehabilitation and Expansion of the Water Supply System of Damascus City and its Surroundings (Project primary report Vol. 1/3 and 2.3)

Project of Supplying Part of the Water Demand of Damascus City and its Countryside from the Syrian Coastal Area Water Supply, Evaluation of Water Demand (Phase I), February 2003

Appendix-6. Other Relevant Data

6-1. Hydraulic Calculations on Collection Pipes

Table 6-1 Hydraulic Calculation of Collection Pipeline

Figure 6-1 Yaboos Collection Pipeline

6-2. Hydraulic Calculation on Transmission Pipelines

Table 6-2-1. Hydraulic Calculation of Maadar/Yaboos Line (19 wells)

Figure 6-2-1. Profile of Maadar/Yaboos Line (19 wells)

Table 6-2-2. Hydraulic Calculation of Maadar/Yaboos Line (32 wells)

Figure 6-2-2. Profile of Maadar/Yaboos Line (32 wells)

6-3. Estimation of Total Submersible Pump Head

6-4. Construction Cost borne by the Syrian Side

6-5. Results of Baseline Survey

6-6. Results of Water Quality Test and Water Quality Syrian Standard

6-7. Results of Group Well Pumping Test

Figure 6-7-1. Location Map of Group Well Pumping Test

Figure 6-7-2. Results of Group Well Pumping Test

Figure 6-7-3. Results of Group Well Pumping Test (Private Well)

Table 6-7-1. Results of Group Well Pumping Test

Table 6-1 Hydraulic Calculation of Collection Pipeline (Yaboos)

Line No.	Junction	Distance (m)	Unit Flow (l/s)	Discharge (m ³ /s)	Elevation (E.L. m)	Diameter (mm)	Velocity (m/s)	Loss (m)	D.W.L (E.L. m)	Head (m)	Pump Head (m)	備考
West Side												
1	Y-1 - J-1	67.0	13.9	0.0139	1,280.6	150	0.786	0.45	1,311.7	31.1		
2	Y-2 - J-1	85.0	13.9	0.0139	1,285.3	150	0.786	0.57	1,311.9	26.6		
3	J-1 - J-2	21.0		0.0278	1,278.4	200	0.885	0.13	1,311.3	32.9		
4	Y-3 - J-2	5.0	13.9	0.0139	1,277.7	150	0.786	0.03	1,311.2	33.5		
5	J-2 - J-3	26.0		0.0417	1,278.3	200	1.327	0.33	1,311.2	32.9		
6	Y-4 - J-4	16.0	13.9	0.0139	1,308.6	150	0.786	0.11	1,312.0	3.4		
7	J-4 - J-3	183.0		0.0278	1,292.6	200	0.885	1.09	1,311.9	19.3		Future connection (1 Well)
8	J-3 - J-5	211.0		0.0694	1,277.3	300	0.983	0.95	1,310.8	33.5		
9	Y-12 - J-5	41.0	13.9	0.0139	1,276.9	150	0.786	0.28	1,310.2	33.3		
10	J-5 - J-7	315.0		0.0833	1,276.1	300	1.180	1.99	1,309.9	33.8		
11	Y-5 - J-6	147.0	13.9	0.0139	1,282.1	150	0.786	0.99	1,309.4	27.3		
12	Y-13 - J-6	11.0	13.9	0.0139	1,275.4	150	0.786	0.07	1,308.5	33.1		
13	J-6 - J-7	86.0		0.0278	1,275.5	200	0.885	0.51	1,308.4	32.9		
14	J-7 - J-8	61.0		0.1111	1,269.5	350	1.155	0.31	1,307.9	38.4		
15	Y-6 - J-8	107.0	13.9	0.0139	1,268.5	150	0.786	0.72	1,308.3	39.8		
16	J-8 - J-9	239.0		0.1250	1,268.1	350	1.300	1.51	1,307.6	39.5		
East Side												
17	Y-11 - J-10	91.0	13.9	0.0139	1,308.0	150	0.786	0.61	1,309.6	1.6		
18	Y-10 - J-10	17.0	13.9	0.0139	1,299.4	150	0.786	0.11	1,309.2	9.8		
19	J-10 - J-11	74.0		0.0278	1,296.6	200	0.885	0.44	1,309.0	12.4		
20	J-11 - J-12	17.0		0.0417	1,289.4	200	1.327	0.22	1,308.6	19.2		Future connection (3 Wells)
21	Y-9 - J-12	7.0	13.9	0.0139	1,287.2	150	0.786	0.05	1,308.4	21.2		
22	J-12 - J-13	114.0		0.0556	1,287.7	250	1.132	0.83	1,308.4	20.7		
23	Y-8 - J-13	9.0	13.9	0.0139	1,281.2	150	0.786	0.06	1,307.6	26.4		
24	J-13 - J-14	136.0		0.0694	1,280.6	250	1.415	1.49	1,307.6	27.0		
25	Y-7 - J-14	21.0	13.9	0.0139	1,272.1	150	0.786	0.14	1,306.2	34.1		
26	J-14 - J-9	40.0		0.0833	1,271.1	250	1.699	0.62	1,306.1	35.0		
27	J-9 - RT	7.0		0.2083	1,269.7	400	1.659	0.06	1,306.1	36.4		
	RT				1,269.5				1,306.0	36.5		
Total												
		2,154.0										

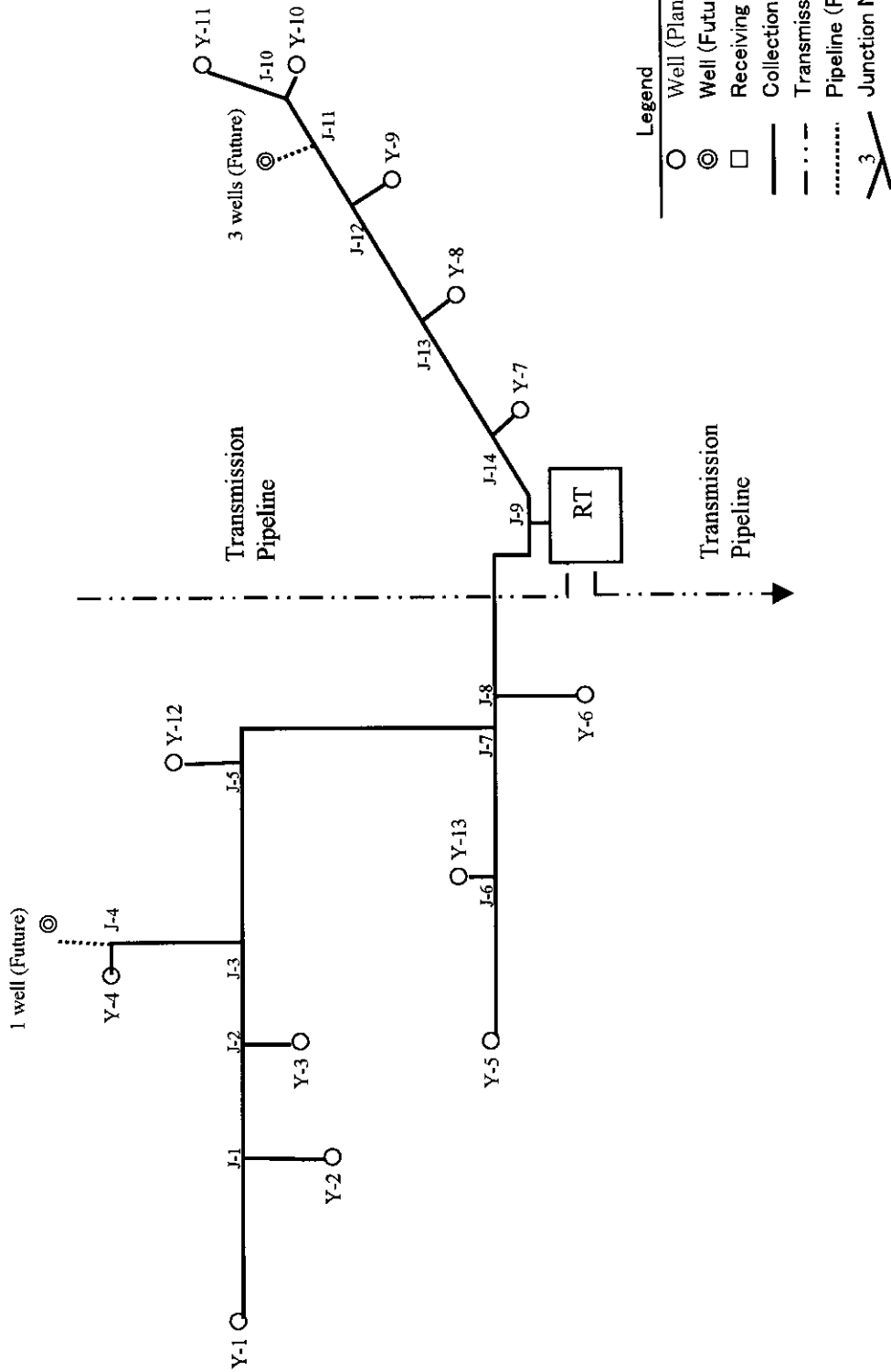


Figure 6-1 Yaboos Collection Pipeline

Table 6-2-1 Hydraulic Calculation of Maadar/Yaboos Line (Number of Wells: 19)

Station	Location	Distance per points m	Distance beginning ① m	Distance beginning ② m	G.L. EL m	Diameter mm	Covering m	Center of Pipe EL m	Discharge m ³ /sec	Velocity m/sec	Hydraulic Gradient m/1000m	Head loss m	Dynamic head EL m	Dynamic W. P. m	Static head EL m	Static W. P. m	Remarks
0	RT No.1	0.00	0.00	0.00	1,190.00	350	1.0	1188.83	0.097	1.011	3.97356	0.00	1190.0	1.2	1193.0	4.2	7 wells
-50		750.24	750.24	750.24	1,117.45	350	1.0	1116.28	0.097	1.011	3.97356	2.98	1187.0	70.7	1193.0	76.7	
-41		345.49	1,095.73	1,095.73	1,090.88	350	1.0	1089.71	0.097	1.011	3.97356	1.37	1185.6	95.9	1193.0	103.3	
-32	Lowest point	538.87	1,634.60	1,634.60	1,050.53	350	1.0	1049.36	0.097	1.011	3.97356	2.14	1183.5	134.1	1193.0	143.6	
-21	Booster Station	1,115.06	2,749.66	2,749.66	1,170.20	350	1.0	1169.03	0.097	1.011	3.97356	4.43	1179.1	10.0	1193.0	24.0	
-21	Booster Station	611.29	2,234.05	2,749.66	1,170.20	350	1.0	1169.03	0.097	1.011	3.97356	2.43	1372.9	203.8	1361.0	192.0	
-15		509.02	1,622.76	3,360.95	1,244.81	350	1.0	1243.64	0.097	1.011	3.97356	2.02	1370.4	126.8	1361.0	117.4	
-10		510.06	1,113.74	3,869.97	1,292.19	350	1.0	1291.02	0.097	1.011	3.97356	2.03	1368.4	77.4	1361.0	70.0	
-5		603.68	603.68	4,380.03	1,334.49	350	1.0	1333.32	0.097	1.011	3.97356	2.40	1366.4	33.1	1361.0	27.7	
1	RT No.2	0.00	0.00	4,983.71	1,360.85	350	1.0	1359.68	0.097	1.011	3.97356	0.00	1364.0	4.3	1361.0	1.3	
1	RT No.2	0.00	0.00	4,983.71	1,360.85	350	1.0	1359.68	0.111	1.155	5.08704	0.00	1361.0	1.3	1364.0	4.3	1 well
6		500.80	500.80	5,484.51	1,325.60	350	1.0	1324.43	0.111	1.155	5.08704	2.55	1358.5	34.0	1364.0	39.6	
12	Lowest point	599.88	1,100.68	6,084.39	1,315.30	350	1.0	1314.13	0.111	1.155	5.08704	3.05	1355.4	41.3	1364.0	49.9	
20		799.93	1,900.61	6,884.32	1,318.06	350	1.0	1316.89	0.111	1.155	5.08704	4.07	1351.3	34.4	1364.0	47.1	
28+50m	Connction	850.54	2,751.15	7,734.86	1,328.29	350	1.0	1327.12	0.111	1.155	5.08704	4.33	1347.0	19.9	1364.0	36.9	Maadar
"	"	0.00	2,751.15	7,734.86	1,328.29	500	1.0	1327.04	0.111	0.566	0.89556	0.00	1347.0	20.0	1364.0	37.0	
32	Highest point	349.93	3,101.08	8,084.79	1,330.48	500	1.0	1329.23	0.111	0.566	0.89556	0.31	1346.7	17.5	1364.0	34.8	
40		799.97	3,901.05	8,884.76	1,320.74	500	1.0	1319.49	0.111	0.566	0.89556	0.72	1346.0	26.5	1364.0	44.5	
50		999.93	4,900.98	9,884.69	1,303.40	500	1.0	1302.15	0.111	0.566	0.89556	0.90	1345.1	42.9	1364.0	61.8	
60		999.97	5,900.95	10,884.66	1,297.93	500	1.0	1296.68	0.111	0.566	0.89556	0.90	1344.2	47.5	1364.0	67.3	
70		1,000.36	6,901.31	11,885.02	1,290.71	500	1.0	1289.46	0.111	0.566	0.89556	0.90	1343.3	53.8	1364.0	74.5	
83	Highway	1,300.30	8,201.61	13,185.32	1,290.29	500	1.2	1288.84	0.111	0.566	0.89556	1.16	1342.1	53.3	1364.0	75.2	
90		700.17	8,901.78	13,885.49	1,286.07	500	1.2	1284.62	0.111	0.566	0.89556	0.63	1341.5	56.9	1364.0	79.4	
103	Yaboos WS	1,300.04	10,201.82	15,185.53	1,269.73	500	1.2	1268.28	0.111	0.566	0.89556	1.16	1340.3	72.1	1364.0	95.7	
"	PBR No.1	0.00	10,201.82	15,185.53	1,269.73	600	1.2	1268.23	0.264	0.934	1.82582	0.00	1269.0	0.8	1272.0	3.8	11 wells
110		714.52	10,916.34	15,900.05	1,263.55	600	1.2	1262.05	0.264	0.934	1.82582	1.30	1267.7	5.6	1272.0	10.0	
120		1,000.56	11,916.90	16,900.61	1,247.53	600	1.2	1246.03	0.264	0.934	1.82582	1.83	1265.9	19.8	1272.0	26.0	
130		1,002.00	12,918.90	17,902.61	1,229.62	600	1.2	1228.12	0.264	0.934	1.82582	1.83	1264.0	35.9	1272.0	43.9	
140		1,003.18	13,922.08	18,905.79	1,200.35	600	1.2	1198.85	0.264	0.934	1.82582	1.83	1262.2	63.4	1272.0	73.2	
L16	PBR No.2	1,209.38	15,131.46	20,115.17	1,173.09	600	1.2	1171.59	0.264	0.934	1.82582	2.21	1260.0	88.4	1272.0	100.4	
"	PBR No.2	0.00	15,131.46	20,115.17	1,173.09	600	1.2	1171.59	0.264	0.934	1.82582	0.00	1174.0	2.4	1177.0	5.4	
164	Highway	1,228.64	16,360.10	21,343.81	1,152.26	600	1.2	1150.76	0.264	0.934	1.82582	2.24	1171.8	21.0	1177.0	26.2	
178	Zarzar lake	1,401.49	17,761.59	22,745.30	1,144.66	600	1.0	1143.36	0.264	0.934	1.82582	2.56	1169.2	25.8	1177.0	33.6	
186	Lowest point	799.43	18,561.02	23,544.73	1,132.36	600	1.0	1131.06	0.264	0.934	1.82582	1.46	1167.7	36.7	1177.0	45.9	
191	highest point	499.68	19,060.70	24,044.41	1,152.16	600	1.0	1150.86	0.264	0.934	1.82582	0.91	1166.8	16.0	1177.0	26.1	
193		200.05	19,260.75	24,244.46	1,144.98	600	1.0	1143.68	0.264	0.934	1.82582	0.37	1166.5	22.8	1177.0	33.3	
197	concrete bridge	399.35	19,660.10	24,643.81	1,112.16	600	1.0	1110.86	0.264	0.934	1.82582	0.73	1165.7	54.9	1177.0	66.1	
211	Main road	1,395.13	21,055.23	26,038.94	1,092.61	600	1.0	1091.31	0.264	0.934	1.82582	2.55	1163.2	71.9	1177.0	85.7	
216	Crossing railway	499.58	21,554.81	26,538.52	1,088.56	600	1.0	1087.26	0.264	0.934	1.82582	0.91	1162.3	75.0	1177.0	89.7	
G	Existing PBR	144.91	21,699.72	26,683.43	1,091.58	600	1.0	1090.28	0.264	0.934	1.82582	0.26	1162.0	71.7	1177.0	86.7	

Figure 6-2-1 Profile for Maadar/Yaboos - Takea (Well number = 19)

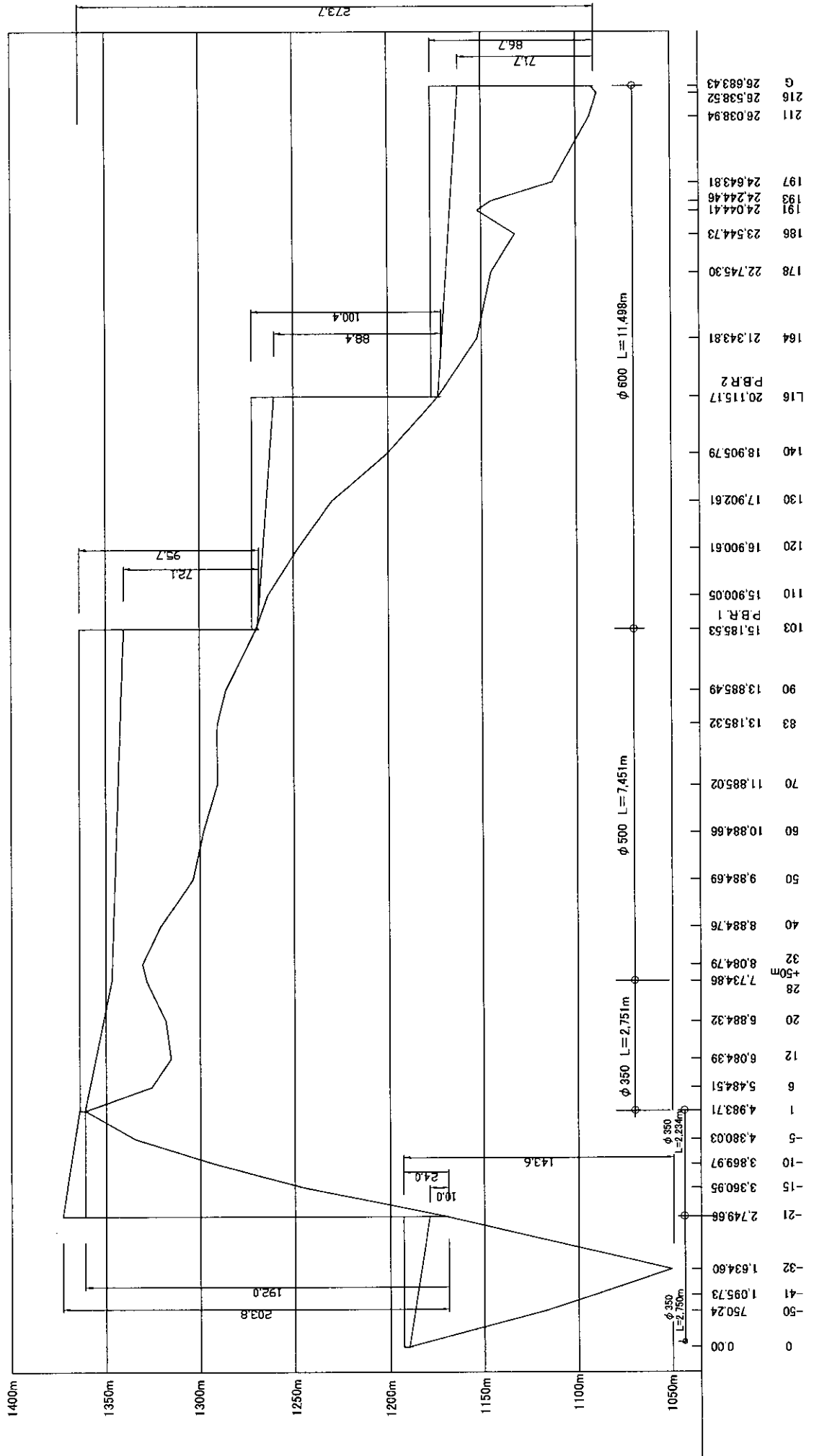
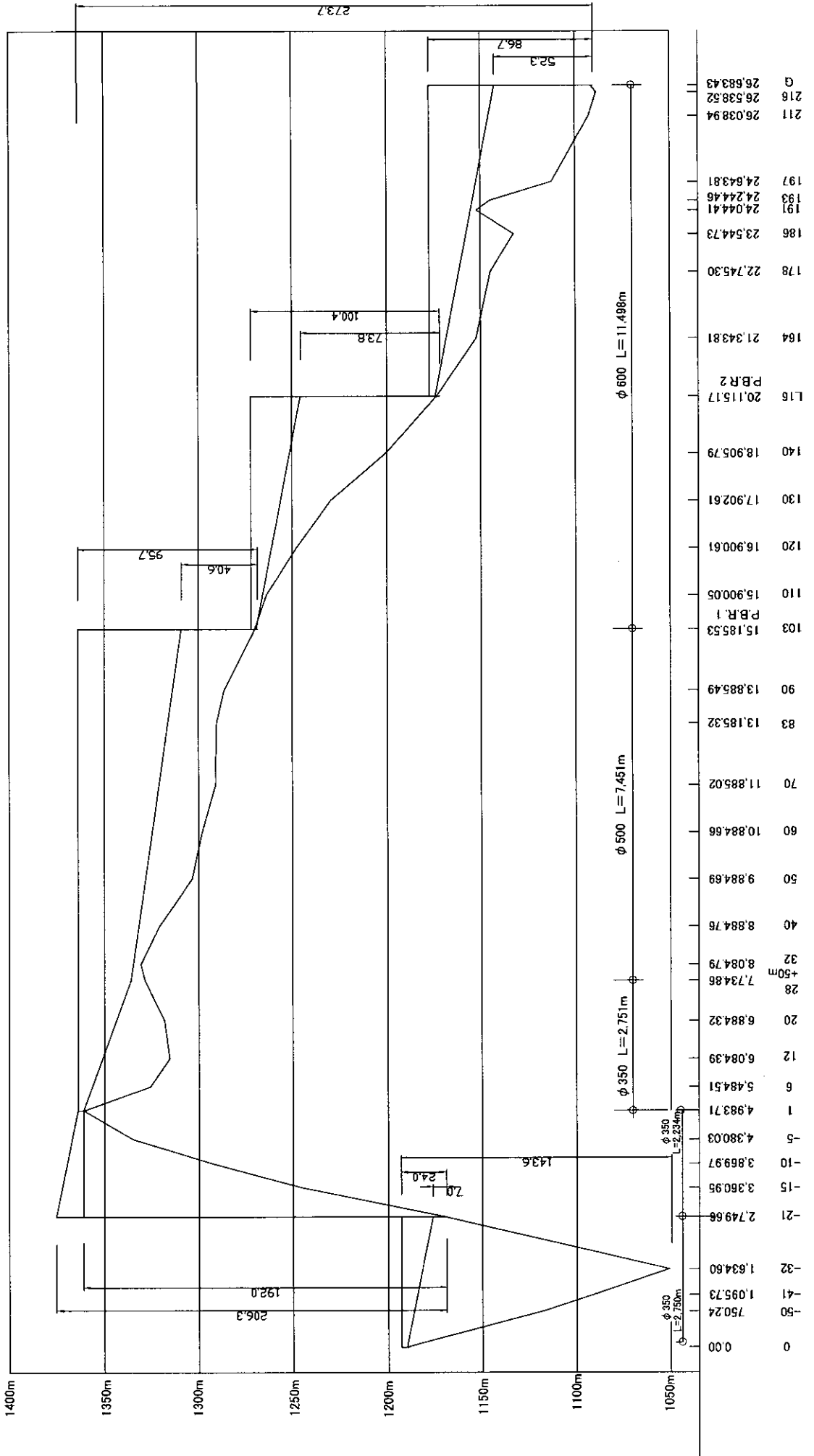


Table 6-2-2 Hydraulic Calculation of Maadar/Yaboos Line (Number of Wells: 32)

Station	Location	Distance per points m	Distance beginning ① m	Distance beginning ② m	G.L. EL m	Diameter mm	Covering m	Center of Pipe EL EL m	Discharge m ³ /sec	Velocity m/sec	Hydraulic Gradient m/1000m	Head loss m	Dynamic head EL m	Dynamic W.P. m	Static head EL m	Static W.P. m	Remarks
0	RT No.1	0.00	0.00	0.00	1,190.00	350	1.0	1188.83	0.111	1.155	5.08704	0.00	1190.0	1.2	1193.0	4.2	8 wells
-50		750.24	750.24	750.24	1,117.45	350	1.0	1116.28	0.111	1.155	5.08704	3.82	1186.2	69.9	1193.0	76.7	
-41		345.49	1,095.73	1,095.73	1,090.88	350	1.0	1089.71	0.111	1.155	5.08704	1.76	1184.4	94.7	1193.0	103.3	
-32	Lowest point	538.87	1,634.60	1,634.60	1,050.53	350	1.0	1049.36	0.111	1.155	5.08704	2.74	1181.7	132.3	1193.0	143.6	
-21	Booster Station	1,115.06	2,749.66	2,749.66	1,170.20	350	1.0	1169.03	0.111	1.155	5.08704	5.67	1176.0	7.0	1193.0	24.0	
-21	Booster Station	611.29	2,234.05	2,749.66	1,170.20	350	1.0	1169.03	0.111	1.155	5.08704	3.11	1375.4	206.3	1361.0	192.0	
-15		509.02	1,622.76	3,360.95	1,244.81	350	1.0	1243.64	0.111	1.155	5.08704	2.59	1372.3	128.6	1361.0	117.4	
-10		510.06	1,113.74	3,869.97	1,292.19	350	1.0	1291.02	0.111	1.155	5.08704	2.59	1369.7	78.6	1361.0	70.0	
-5		603.68	603.68	4,380.03	1,334.49	350	1.0	1333.32	0.111	1.155	5.08704	3.07	1367.1	33.8	1361.0	27.7	
1	RT No.2	0.00	0.00	4,983.71	1,360.85	350	1.0	1359.68	0.111	1.155	5.08704	0.00	1364.0	4.3	1361.0	1.3	
1	RT No.2	0.00	0.00	4,983.71	1,360.85	350	1.0	1359.68	0.153	1.589	9.16907	0.00	1361.0	1.3	1364.0	4.3	3 wells
6		500.80	500.80	5,484.51	1,325.60	350	1.0	1324.43	0.153	1.589	9.16907	4.59	1356.4	32.0	1364.0	39.6	
12	Lowest point	599.88	1,100.68	6,084.39	1,315.30	350	1.0	1314.13	0.153	1.589	9.16907	5.50	1350.9	36.8	1364.0	49.9	
20		799.93	1,900.61	6,884.32	1,318.06	350	1.0	1316.89	0.153	1.589	9.16907	7.33	1343.6	26.7	1364.0	47.1	
28+50m	Connection	850.54	2,751.15	7,734.86	1,328.29	350	1.0	1327.12	0.153	1.589	9.16907	7.80	1335.8	8.7	1364.0	36.9	
//		0.00	2,751.15	7,734.86	1,328.29	500	1.0	1327.04	0.236	1.203	3.61166	0.00	1335.8	8.7	1364.0	37.0	6 wells
32	Highest point	349.93	3,101.08	8,084.79	1,330.48	500	1.0	1329.23	0.236	1.203	3.61166	1.26	1334.5	5.3	1364.0	34.8	
40		799.97	3,901.05	8,884.76	1,320.74	500	1.0	1319.49	0.236	1.203	3.61166	2.89	1331.6	12.1	1364.0	44.5	
50		999.93	4,900.98	9,884.69	1,303.40	500	1.0	1302.15	0.236	1.203	3.61166	3.61	1328.0	25.9	1364.0	61.8	
60		999.97	5,900.95	10,884.66	1,297.93	500	1.0	1296.68	0.236	1.203	3.61166	3.61	1324.4	27.7	1364.0	67.3	
70		1,000.36	6,901.31	11,885.02	1,290.71	500	1.0	1289.46	0.236	1.203	3.61166	3.61	1320.8	31.3	1364.0	74.5	
83	Highway	1,300.30	8,201.61	13,185.32	1,290.29	500	1.2	1288.84	0.236	1.203	3.61166	4.70	1316.1	27.2	1364.0	75.2	
90		700.17	8,901.78	13,885.49	1,286.07	500	1.2	1284.62	0.236	1.203	3.61166	2.53	1313.6	28.9	1364.0	79.4	
103	Yaboos WS	1,300.04	10,201.82	15,185.53	1,269.73	500	1.2	1268.28	0.236	1.203	3.61166	4.70	1308.9	40.6	1364.0	95.7	
//	PBR No.1	0.00	10,201.82	15,185.53	1,269.73	600	1.2	1268.23	0.444	1.573	4.78951	0.00	1269.0	0.8	1272.0	3.8	15 wells
110		714.52	10,916.34	15,900.05	1,263.55	600	1.2	1262.05	0.444	1.573	4.78951	3.42	1265.6	3.5	1272.0	10.0	
120		1,000.56	11,916.90	16,900.61	1,247.53	600	1.2	1246.03	0.444	1.573	4.78951	4.79	1260.8	14.8	1272.0	26.0	
130		1,002.00	12,918.90	17,902.61	1,229.62	600	1.2	1228.12	0.444	1.573	4.78951	4.80	1256.0	17.9	1272.0	43.9	
140		1,003.18	13,922.08	18,905.79	1,200.35	600	1.2	1198.85	0.444	1.573	4.78951	4.80	1251.2	52.3	1272.0	73.2	
L16	PBR No.2	1,209.38	15,131.46	20,115.17	1,173.09	600	1.2	1171.59	0.444	1.573	4.78951	5.79	1245.4	73.8	1272.0	100.4	
//	PBR No.2	0.00	15,131.46	20,115.17	1,173.09	600	1.2	1171.59	0.444	1.573	4.78951	0.00	1174.0	2.4	1177.0	5.4	
164	Highway	1,228.64	16,360.10	21,343.81	1,152.26	600	1.2	1150.76	0.444	1.573	4.78951	5.88	1168.1	17.4	1177.0	26.2	
178	Zarzar lake	1,401.49	17,761.59	22,745.30	1,144.66	600	1.0	1143.36	0.444	1.573	4.78951	6.71	1161.4	18.0	1177.0	33.6	
186	Lowest point	799.43	18,561.02	23,544.73	1,132.36	600	1.0	1131.06	0.444	1.573	4.78951	3.83	1157.6	26.5	1177.0	45.9	
191	highest point	499.68	19,060.70	24,044.41	1,152.16	600	1.0	1150.86	0.444	1.573	4.78951	2.39	1155.2	4.3	1177.0	26.1	
193		200.05	19,260.75	24,244.46	1,144.98	600	1.0	1143.68	0.444	1.573	4.78951	0.96	1154.2	10.5	1177.0	33.3	
197	concrete bridge	399.35	19,660.10	24,643.81	1,112.16	600	1.0	1110.86	0.444	1.573	4.78951	1.91	1152.3	41.5	1177.0	66.1	
211	Main road	1,395.13	21,055.23	26,038.94	1,092.61	600	1.0	1091.31	0.444	1.573	4.78951	6.68	1145.6	54.3	1177.0	85.7	
216	Crossing railway	499.58	21,554.81	26,538.52	1,088.56	600	1.0	1087.26	0.444	1.573	4.78951	2.39	1143.2	56.0	1177.0	89.7	
G	Existing PBR	144.91	21,699.72	26,683.43	1,091.58	600	1.0	1090.28	0.444	1.573	4.78951	0.69	1142.5	52.3	1177.0	86.7	

Figure 6-2-2 Profile for Maadar/Yaboos - Takea (Well number = 32)



Appendix 6-3 Estimation of Total Submersible Pump Head

Well No.	Discharge (m ³ /min)	Ground Level	Static Water Level GL (m)	Drawdown	Dynamic Water Level GL (m)	Pipeline Loss (m)	Actual Head (m)	Riser Pipe Dia. (mm)	Velocity (m/s)	C	f	Riser Pipe Length (m)	No. of Riser Pipe (No.)	Total Length (m)	Riser Pipe Loss (m)	Total Head (m)	Rating Head (m)	Motor Output (kW)	Distance (m)	Cable Size (mm ²)	Cable Length (m)	
YA1	0.83	1280.62	97.0	20.0	117.0	31.1	148.1	100	1.77	110	0.0302	6.00	20	120	5.78	154	160	37	130	38	260	
YA2	0.83	1285.32	101.5	16.0	117.5	26.6	144.1	100	1.77	110	0.0302	6.00	20	120	5.78	150	160	37	130	38	260	
YA3	0.83	1277.69	93.2	33.0	126.2	33.5	159.7	100	1.77	110	0.0302	6.00	22	132	6.36	167	170	45	142	38	284	
YA4	0.83	1308.59	111.6	34.0	145.6	3.4	149.0	100	1.77	110	0.0302	6.00	25	150	7.23	157	160	37	160	38	320	
YA5	0.83	1282.13	99.3	23.0	122.3	27.3	149.6	100	1.77	110	0.0302	6.00	21	126	6.07	156	160	37	136	38	272	
YA6	0.83	1268.49	87.0	16.0	103.0	39.8	142.8	100	1.77	110	0.0302	6.00	18	108	5.20	149	160	37	118	38	236	
YA7	0.83	1272.07	90.7	35.0	125.7	34.1	159.8	100	1.77	110	0.0302	6.00	22	132	6.36	167	170	45	142	38	284	
YA8	0.83	1281.20	100.0	19.0	119.0	26.4	145.4	100	1.77	110	0.0302	6.00	21	126	6.07	152	160	37	136	38	272	
YA9	0.83	1287.19	107.0	32.0	139.0	21.2	160.2	100	1.77	110	0.0302	6.00	24	144	6.94	168	170	45	154	38	308	
YA10	0.83	1299.33	117.8	78.0	195.8	9.8	205.6	100	1.77	110	0.0302	6.00	33	198	9.54	216	220	55	208	60	416	
YA11	0.83	1307.99	127.7	73.0	200.7	1.6	202.3	100	1.77	110	0.0302	6.00	34	204	9.83	213	220	55	214	60	428	
													260									

Standard Pump Specification			
Discharge (m ³ /H)	Total Head (m)	Motor Output (kW)	Cable Size (mm ²)
50.00	0	66	5.5
50.00	66.1	15	8.0
50.00	82.1	82	
50.00	97.1	18.5	
50.00	97.1	97	
50.00	133.1	22	22
50.00	133.1	30	38
50.00	163.1	37	38
50.00	163.1	198	38
50.00	198.1	45	60
50.00	198.1	242	

Appendix 6-4 Construction Cost borne by the Syrian Side (Phase 1)

Unit: Syrian pound

Item	Dimension	Unit	Q'ty	Rate	Cost	Remarks
1.						
a) Well House Construction		m ²	11	66,000	726,000	
	Sub-total				726,000	
b) Pipe Laying Works for	DIP φ400mm	m	7	800	5,600	
Collection Pipelines	DIP φ350mm	m	300	700	210,000	
	DIP φ300mm	m	526	600	315,600	
	DIP φ250mm	m	290	500	145,000	
	DIP φ200mm	m	407	400	162,800	
	DIP φ150mm	m	624	300	187,200	
	Sub-total		2,154		1,026,200	
c) Construction of No.3 RT	Concrete works	m ³	332	7,500	2,490,000	
	Sub-total				2,490,000	
d) Pipe Laying Works for	DIP φ600mm	m	11,497	1,200	13,796,400	
Transmission Pipelines	Sub-total				13,796,400	
e) Construction of No.2 PBR	Concrete works	m ³	242	7,500	1,812,300	
& Related pipe Laying	DIP φ600mm	m	8.5	1,200	10,200	
	Sub-total				1,822,500	
f) Construction of No.3 PBR	Concrete works	m ³	107	7,500	804,450	
& Related pipe Laying	DIP φ600mm	m	45	1,200	54,000	
	Sub-total				858,450	
g) Generator House	Concrete works	sets	2	2,000,000	4,000,000	
	Sub-total				4,000,000	
Total					24,719,550	
h) Other works					4,943,910	20% of Tatal
i) Construction cost					29,663,460	
j) Administration and Contingency					14,831,730	50% of Construction cost
Ground total					44,495,190	
2. Electric Facility						
Generator		set	2	5,100,000	10,200,000	
Panels		sets	11	150,000	1,650,000	
Transformer		set	2	4,560,000	9,120,000	
Total					20,970,000	
3. Land acquisition		m ²	840	100	84,000	
4. Monitoring						
Well drilling		sets	1	1,500,000	1,500,000	
Monitoring Devices		sets	3	140,000	420,000	Including Transportation
Total					1,920,000	

Appendix 6-5. Results of Baseline Survey

1. Purpose of the Survey

The survey aims to analyze present social conditions and water supply situations in the service areas covered by Damascus City Water Supply and Sewerage Authority (DAWSSA) and will be of some help to formulate indicator for studying evaluation of this Project.

2. Survey Area and Number of Sample

This survey was conducted as the same method as “the Study on the Development of Water Supply System for the Damascus City” in 1997 by JICA. The survey areas were divided into 5 groups, that is 3 groups based on the household income of the formal water supply area in Damascus City, 1 group at the informal water supply area in Damascus City and the last group at villages of the service areas at outskirts of Damascus City.

DAWSSA supplies water to approximately 350,000 households on paper at present and that is excluded the informal areas in Damascus City. It is recommendable that samples of the survey is 3,500 households as being picked up on 1% of all supplied household. However, it is very difficult to survey such numbers within 1 month. Finally, 500 households, around 0.1% of all supplied household, are selected as our survey samples referring to 600 samples at JICA Study. 500 samples were classified to 5 class groups based on the monthly income and service areas. Each class group has 100 samples approximately, as shown in the table below.

Table-1 Survey Class and Sample Number

Class	Supply Area	Income per Month	Number	Remarks
1	Formal area in Damascus City	25,000SP ~	105 samples	
2		10,000 ~ 25,000SP	105 samples	
3		~ 10,000SP	105 samples	
4	Informal area in Damascus City		105 samples	
5	Villages		80 samples	10 households per village
Total			500 samples	

3. Method and Duration

The survey was carried out by the interview method of five interviewing groups (two interviewers per group) according to the questionnaires from March 27 to April 12, 2004.

4. Survey Result

The survey results are as follows.

(1) Distance from main road

Most people were living along the main road. Distance from the main road of Class group 1 ~ 3 is within 0.5km and one of Class 4 ~ 5 is within 2.0km.

(2) Electricity and communication condition

Average electricity cut per month is 4.2 times.

The number of phones is 1 set per household and one of mobile phone, recently it is very popular, is 0.6 set per household.

Table-2 Electricity and Communication Condition

Item	Unit	Class					Average
		1	2	3	4	5	
Electricity cut per month	Set	0.39	2.41	3.10	10.23	5.08	4.20
Phone per household	Set	1.36	0.98	0.83	0.57	1.20	0.98
Mobile per household	Set	1.68	0.56	0.33	0.10	0.45	0.63

(3) Family Structure

As shown in Table-3, average number of household is 5.53 persons against 6.0 persons at the JICA Study.

Tsble-3 Family Structure

Item	Unit	Class					Average
		1	2	3	4	5	
Number per household	Person	3.96	6.15	5.91	5.62	6.13	5.53
Rate of infants and students	Person	38.2	40.1	38.5	46.4	35.3	39.9
Rate attending university & university degree	Person	43.3	22.9	8.1	5.6	9.2	18.3

(4) Occupation

There are few farmers in Damascus City. Rate of agriculture is only 9% even in the villages outside Damascus City.

Table-4 Occupation

Item	Unit	Class				
		1	2	3	4	5
Agricultural	%	0	1.9	0	0	8.6

(5) Expenses

Average income in Class 3 (low income class in Damascus City) and Class 4 (informal areas in Damascus City) seems 5,000 SP per month and one in Class 5 (villages) seems 9,000 SP. As shown in Table-6, it is a big difference of balance between income and expenditure in Class 1 and 3. One reason is that maximum income of Class 1 is assumed 100,000 SP, but it is not clear the reason of Class 3. On the other hand, average income is lower than the expenditure. The reason is also average income is estimated based on the mean of range. Engel's coefficient in Class 2 is a bigger rate than other classes. It seems the rate of infants and students in household is affected in Engel's coefficient.

Table-5 Monthly Income

Monthly Income	Unit	Class				
		1	2	3	4	5
1,000 ~ 3,000 SP	%	0.0	0.0	2.86	2.86	2.50
3,000 ~ 5,000 SP	%	0.0	0.0	51.43	54.29	32.50
5,000 ~ 10,000 SP	%	0.0	0.0	45.71	40.95	36.25
10,000 ~ 25,000 SP	%	0.0	100.0	0.0	1.90	28.75
25,000 ~ 50,000 SP	%	38.10	0.0	0.0	0.0	0.0
50,000 ~	%	61.90	0.0	0.0	0.0	0.0
Average	1000SP	76.19	17.50	5.54	5.30	9.10

表-6 Monthly Expenditure

Monthly Income	Unit	Class				
		1	2	3	4	5
Food		20,981	11,508	4,366	3,949	5,964
Medical		4,512	1,322	963	852	936
Transport		9,458	2,179	823	822	1,024
Education		17,867	1,221	598	386	787
Electricity		3,264	964	482	258	561
Water		444	247	239	0	280
Others		14,073	904	529	331	829
Total		70,599	18,345	8,000	6,598	10,381
インゲル係数		29.7	62.7	54.6	59.9	57.5

(6) Medical Health

Table-7 shows the main diseases and water born diseases, such as, water born infections, skin diseases, lachrymal, etc..

Table-7 Medical Health

Item		Unit	Class				
			1	2	3	4	5
Clinic visit		Times	2.1	1.9	1.7	2.6	1.6
Main diseases	Nervous system	Family	5	3	6	2	-
	Asthma	Family	2	6	-	-	1
	Heart diseases	Family	15	9	7	3	6
	Diabetes	Family	17	5	11	10	8
	High blood pressure	Family	29	16	19	16	5
	Water born infections	Family	11	14	19	31	14
	Eyes infections	Family	1	3	2	-	-
	Skin diseases	Family	1	8	4	24	-
	Kidney sand	Family	3	14	10	6	3
	Lachrymal	Family	-	2	1	30	-

(7) Water Supply Condition

Water supply condition in the service areas is as follows.

Table-8-1 Water Sources

Item	Unit	Class					Average
		1	2	3	4	5	
Private tap	%	100.0	100.0	96.19	3.81	93.75	78.00
Public tap	%	0.0	0.0	0.95	0.0	1.25	0.40
Well	%	0.0	0.0	2.86	14.29	5.00	4.40
Others	%	0.0	0.0	0.0	81.90	0.0	17.20

Table-8-2 Water Supply Conditions

Item		Unit	Class					Average
			1	2	3	4	5	
Rainy season	Good	%	100.0	93.33	87.62	29.52	92.50	80.00
	Normal	%	0.0	6.67	9.52	8.57	6.25	6.20
	Bad	%	0.0	0.0	2.86	61.90	1.25	13.80
	Supply time	/day	23.8	22.3	21.3	15.2	21.4	20.8
	Supply day	/week	7.0	6.9	6.8	4.94	6.9	6.5
Dry season	Good	%	96.19	88.57	77.14	29.52	87.50	75.20
	Normal	%	3.81	10.48	18.10	8.57	10.00	10.20
	Bad	%	0.0	0.95	4.76	61.90	2.50	14.60
	Supply time	/day	23.5	20.3	18.9	13.9	20.5	19.4
	Supply day	/week	7.0	6.6	6.5	4.3	6.8	6.2
Satisfaction	Good	%	79.05	54.29	50.48	4.76	52.50	48.00
	Normal	%	2.86	20.95	7.62	2.86	25.0	11.20
	Bad	%	18.10	24.76	41.90	92.38	22.5	40.80
Case of bad (× : over 50%) (: below 50%)	Quality		×	×	×	×	×	
	Quantity					×		
	Pressure					×		
	Fee					×		
	Stability					×		

Table-8-3 Water Fee

Item		Unit	Class					Average
			1	2	3	4	5	
Satisfaction	Expensive	%	5.71	32.38	50.48	82.86	43.75	43.00
	Normal	%	92.38	66.67	48.57	17.14	55.00	56.00
	Cheep	%	1.90	0.95	0.95	0.0	1.25	1.00
Monthly water charge		SP	444	247	238	0	280	240
Monthly water consumption		m ³ /hr	87.45	40.48	48.59	22.23	52.87	50.21
Monthly water demand		m ³ /hr	88.72	48.75	50.59	44.95	92.65	63.76

Table-8-4 New Public Water Supply Facility

Item		Unit	Class					Average
			1	2	3	4	5	
Necessity of expansion		%	31.43	58.10	60.00	97.14	58.75	61.20
Necessity of expansion		%	57.58	24.59	7.94	58.82	12.77	33.32
Willing to Pay		SP	416	321	150	238	300	284

Appendix 6-6 Results of Water Quality Test and Water Quality Syrian Standard

		Yaboos				Syrian Standard
Item	Unit	M37	No.7	M40	Ave.	
A. In-situ test						
Temp.	°C	15.8	16.0	16.1	16.0	—
EC.	μ S/cm	37.5	35.8	36.2	36.5	—
pH		7.46	7.76	7.71	7.6	—
B. Laboratory Test						
for potable water						
1 Turbidity	NTU	3.5	2.5	4	3.3	5
2 Colors	Deg.	n	n	n	n	15
3 Taste	TT	n	n	n	n	—
4 Odor	TON	n	n	n	n	—
5 Total Hard	mg/lit	21	24	22	22.3	500
6 T.D.S	ppm	235	260	235	243.3	1,000
7 Residue Cl	ppm	0	0	0	0.0	—
8 pH		7.7	7.5	7.7	7.6	6.5 - 8.5
chemical analysis						
9 Ca	mg/lit	72	80	80	77.3	—
10 Mg	mg/lit	7	10	5	7.3	—
11 Na	mg/lit	5	4	4	4.3	200
12 K	mg/lit	0.5	0.5	0.5	0.5	—
13 HCO3	mg/lit	232	268	224	241.3	—
14 CO3	mg/lit	0	0	0	0.0	—
15 SO4	mg/lit	16	14	18	16.0	—
16 Cl	mg/lit	8	8	6	7.3	250
17 NO3	mg/lit	7	6	7	6.7	40
18 NO2	mg/lit	0	0	0	0.0	0.01
19 NH4	mg/lit	0	0	0	0.0	0.05
heavy metal						
20 Zn	mg/lit	n	n	n	n	3
21 Fe	mg/lit	n	n	n	n	0.3
22 Cu	mg/lit	n	n	n	n	—
23 Mn	mg/lit	n	n	n	n	—
hygiene item						
24 Coliform	pcs/100ml	100	200	500	266.7	100
25 Bacteria	pcs/100ml	2000	500	6000	2833.3	100

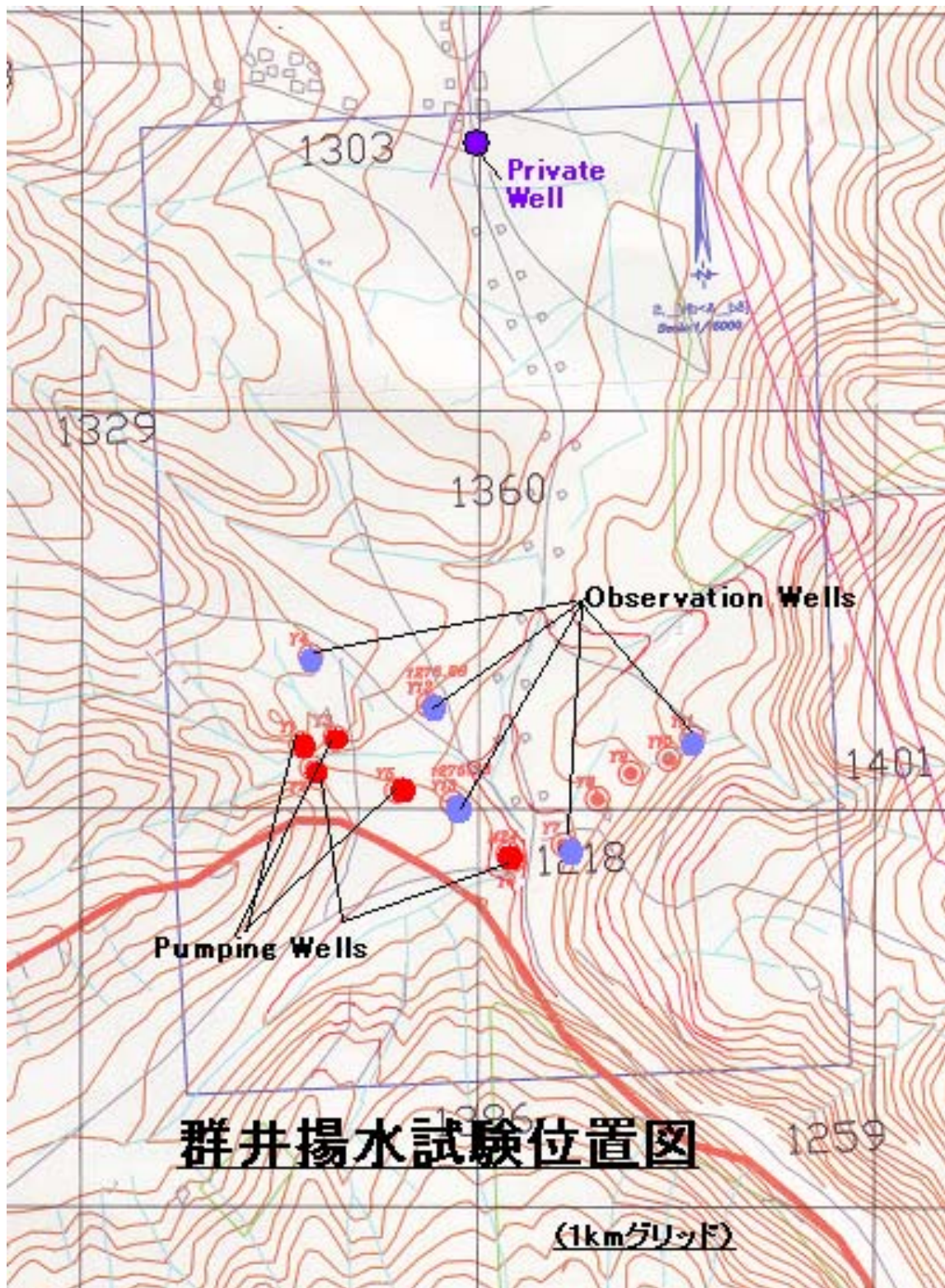


Figure 6-7-1 Location Map of Group Well Pumping Test

group pumping test
Jdaidet Yaboos

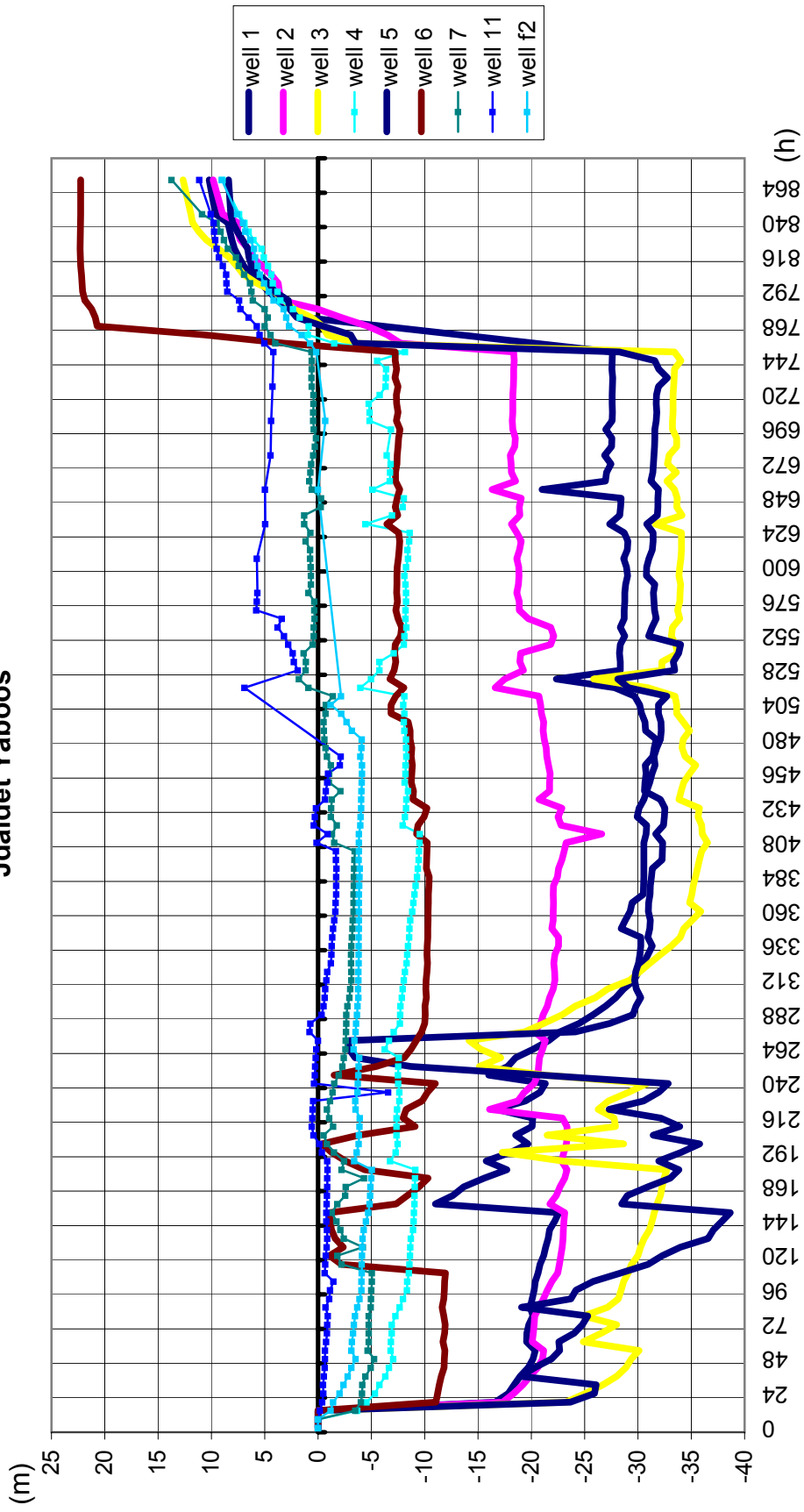


Figure 6-7-2 Results of Group Well Pumping Test

Figure 6-7-3 Result of Group Well Pumping Test (Private well)

