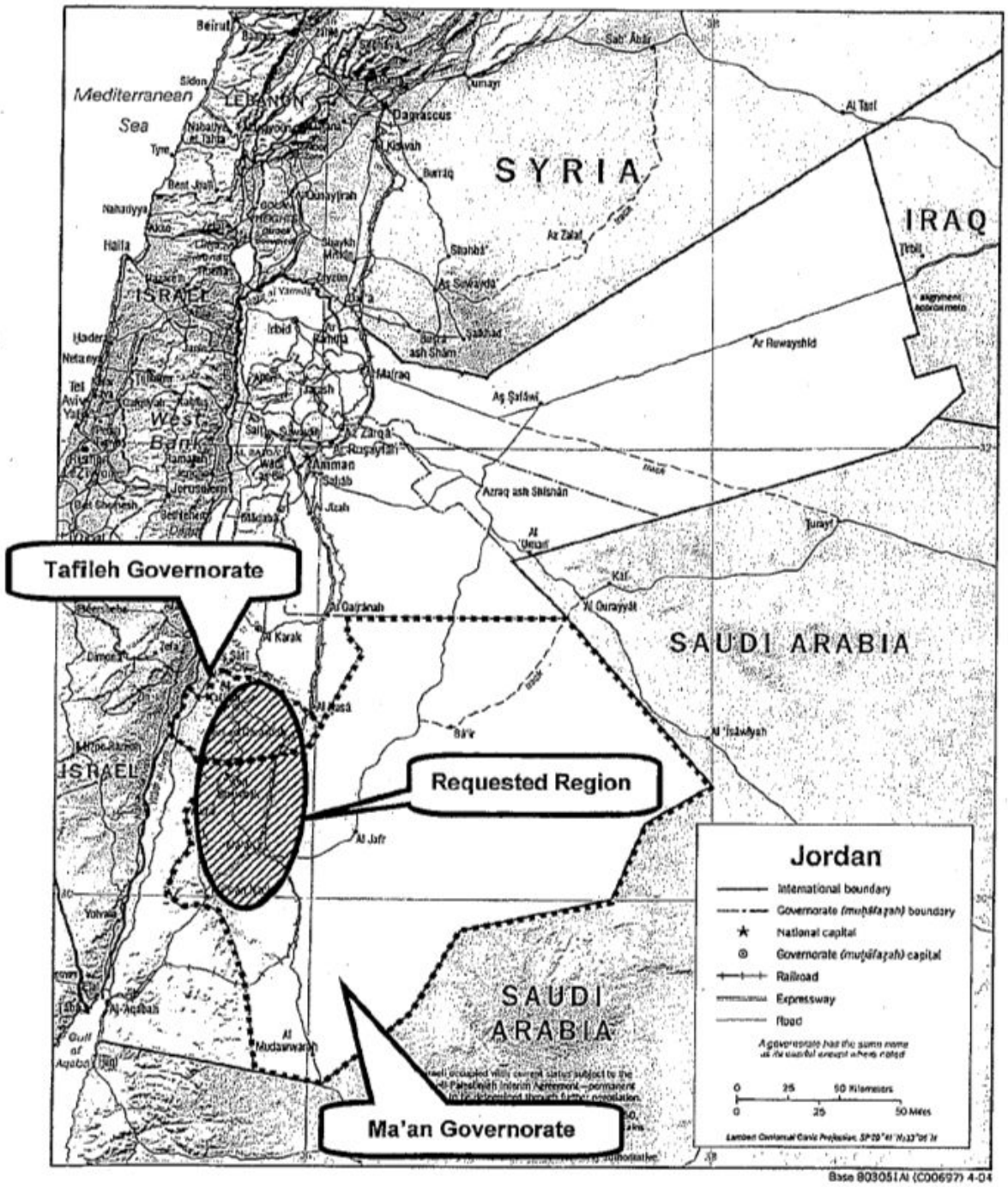
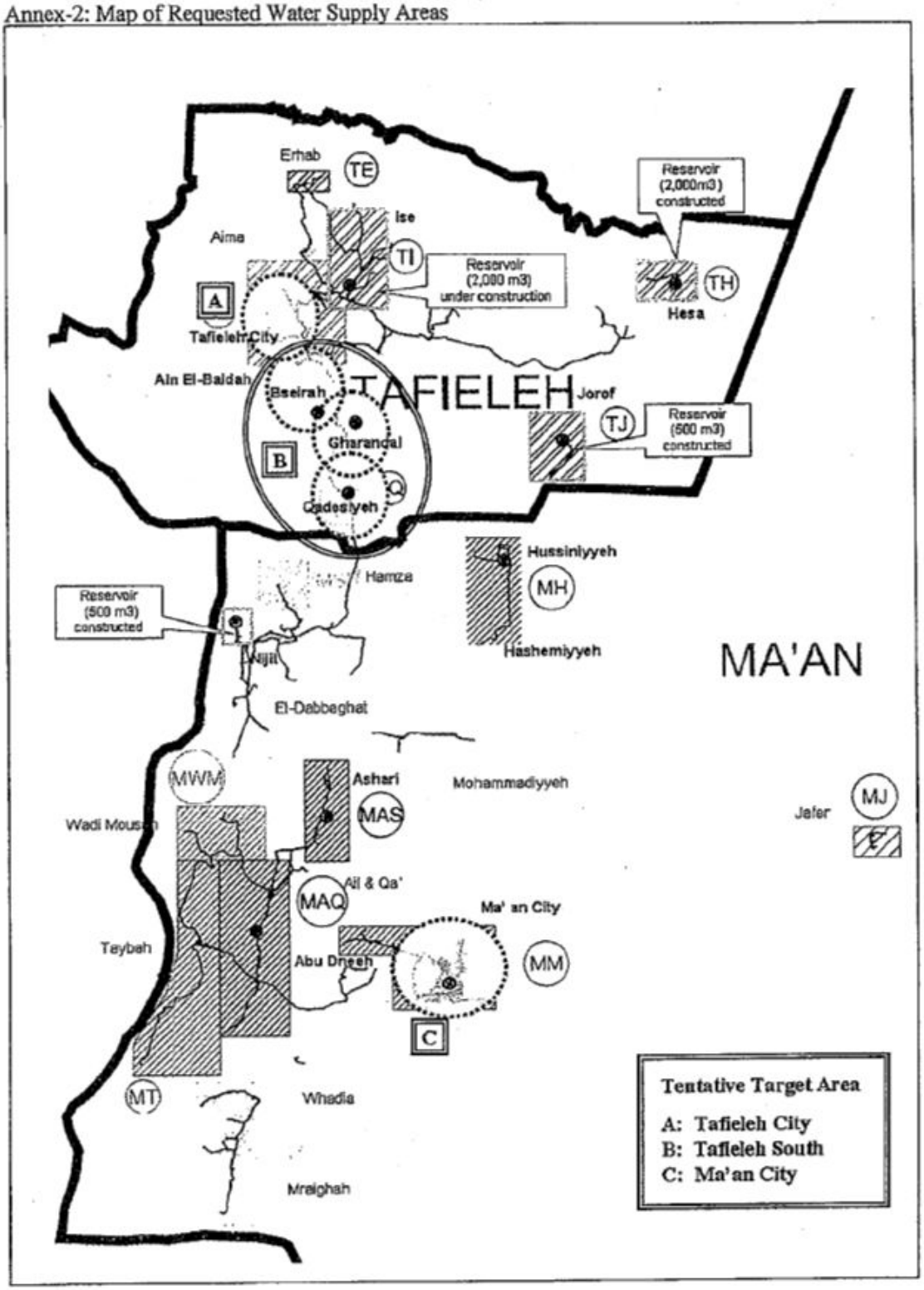
Annex-1: Project Sites Map (Tafileh and Ma'an Governorates)



Annex-2: Map of Requested Water Supply Areas



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Annex-3: Organization Chart of WAJ

Annex-4: Items Requested by the Jordanian Side

Tentative Target Area	Items		Responsibility
Tafieleh Governorate (1) Tafieleh City (2) Tafieleh South - El-Baidha - Bseira - Gharandal - Qhadesiyeh	Reservoir		Japan
	Pipe	25 mm	Jordan
		32 mm	Jordan
		63 mm	Japan
		100 mm	Japan
		150 mm	Japan
		200 mm	Japan
		300 mm	Japan
	Pump Station		Japan
	Flow Meter		Japan
	Pressure Reducing Facility		Japan
Ma'an Governorate (3) Ma'an City –	Pipe	25 mm	Jordan
		32 mm	Jordan
		63 mm	Jordan
		100 mm	Japan
		150 mm	Japan
		200 mm	Japan
		300 mm	Japan
	Flow Meter		Japan

Annex-5: JAPAN'S GRANT AID SCHEME

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

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

1. Grant Aid Procedures (Attachment 1)

The Japanese Grant Aid is supplied through following procedures:

- Preparatory Survey
  - The Survey conducted by JICA
- Appraisal &Approval
  - -Appraisal by the GOJ and JICA, and Approval by the Japanese Cabinet
- Authority for Determining Implementation
  - -The Notes exchanged between the GOJ and a recipient country
- Grant Agreement (hereinafter referred to as "the G/A")
  - -Agreement concluded between JICA and a recipient country
- Implementation
  - -Implementation of the Project on the basis of the G/A

2. Preparatory Survey

(1) Contents of the Survey

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

- Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of relevant agencies of the recipient country necessary for the implementation of the Project.
- Evaluation of the appropriateness of the Project to be implemented under the Grant Aid Scheme from a technical, financial, social and economic point of view.

- Confirmation of items agreed between both parties concerning the basic concept of the Project.
- Preparation of a outline design of the Project.
- Estimation of costs of the Project.

The contents of the original request by the recipient country are not necessarily approved in their initial form as the contents of the Grant Aid project. The Outline Design of the Project is confirmed based on the guidelines of the Japan's Grant Aid scheme.

JICA requests the Government of the recipient country to take whatever measures necessary to achieve its self-reliance in the implementation of the Project. Such measures must be guaranteed even though they may fall outside of the jurisdiction of the organization of the recipient country which actually implements the Project. Therefore, the implementation of the Project is confirmed by all relevant organizations of the recipient country based on the Minutes of Discussions.

(2) Selection of Consultants

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

(3) Result of the Survey

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

3. Japan's Grant Aid Scheme

(1) The E/N and the G/A

After the Project is approved by the Cabinet of Japan, the Exchange of Notes(hereinafter referred to as "the E/N") will be singed between the GOJ and the Government of the recipient country to make a pledge for assistance, which is followed by the conclusion of the G/A between JICA and the Government of the recipient country to define the necessary articles to implement the Project, such as payment conditions, responsibilities of the Government of the recipient country, and procurement conditions.

(2) Selection of Consultants

In order to maintain technical consistency, the consulting firm(s) which conducted the Survey will be recommended by JICA to the recipient country to continue to work on the Project's

implementation after the E/N and G/A.

(3) Eligible source country

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

(4) Necessity of "Verification"

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

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

In the implementation of the Grant Aid Project, the recipient country is required to undertake such necessary measures as Attachment 1.

(6) "Proper Use"

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

(7) "Export and Re-export"

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

(8) Banking Arrangements (B/A)

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

b) The payments will be made when payment requests are presented by the Bank to JICA under

an Authorization to Pay (A/P) issued by the Government of the recipient country or its designated authority.

(9) Authorization to Pay (A/P)

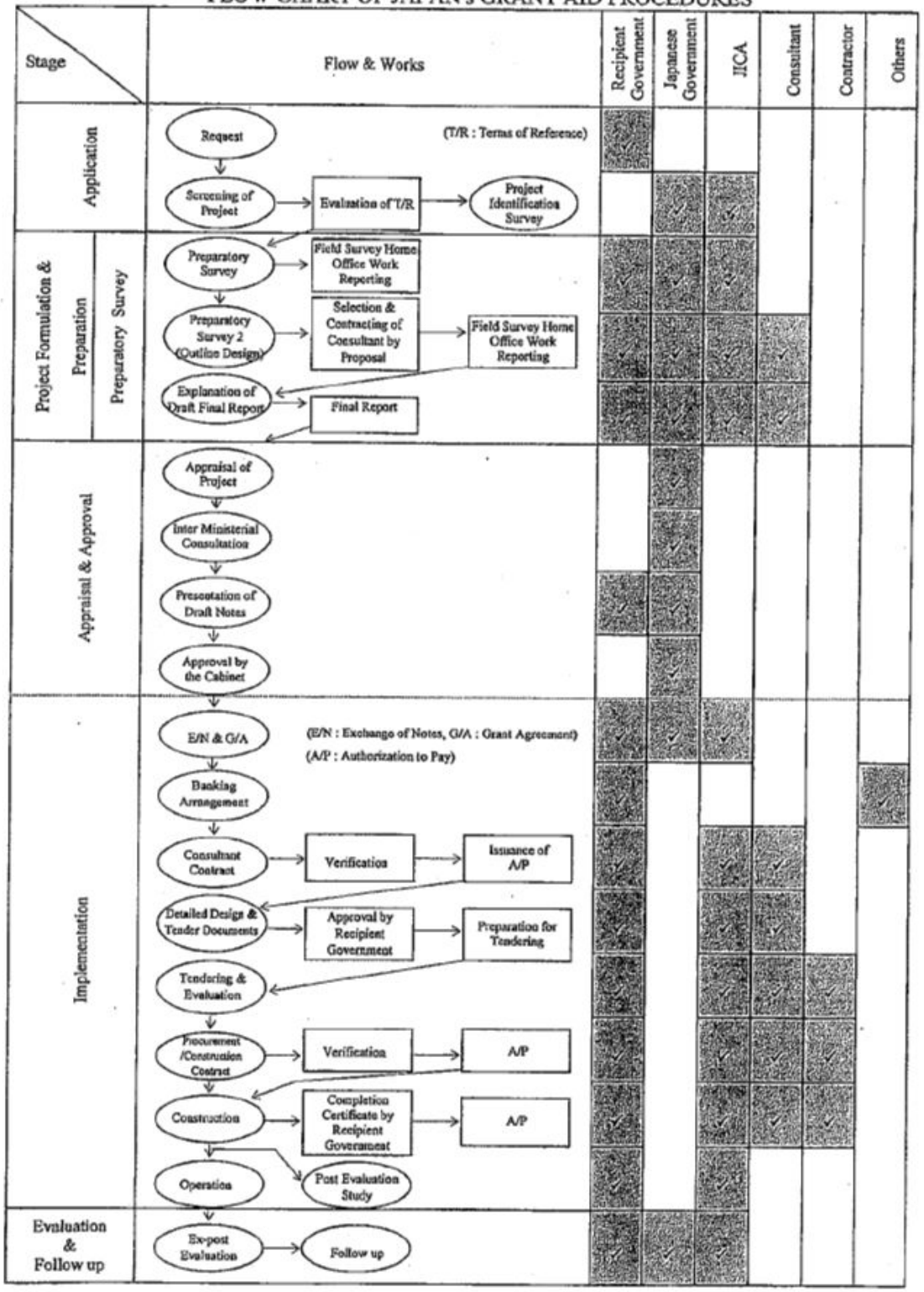
The Government of the recipient country should bear an advising commission of an Authorization to Pay and payment commissions paid to the Bank.

(10) Social and Environmental Considerations

A recipient country must carefully consider social and environmental impacts by the Project and must comply with the environmental regulations of the recipient country and JICA socio-environmental guidelines.

Attachment 1 for Annex-5

FLOW CHART OF JAPAN's GRANT AID PROCEDURES

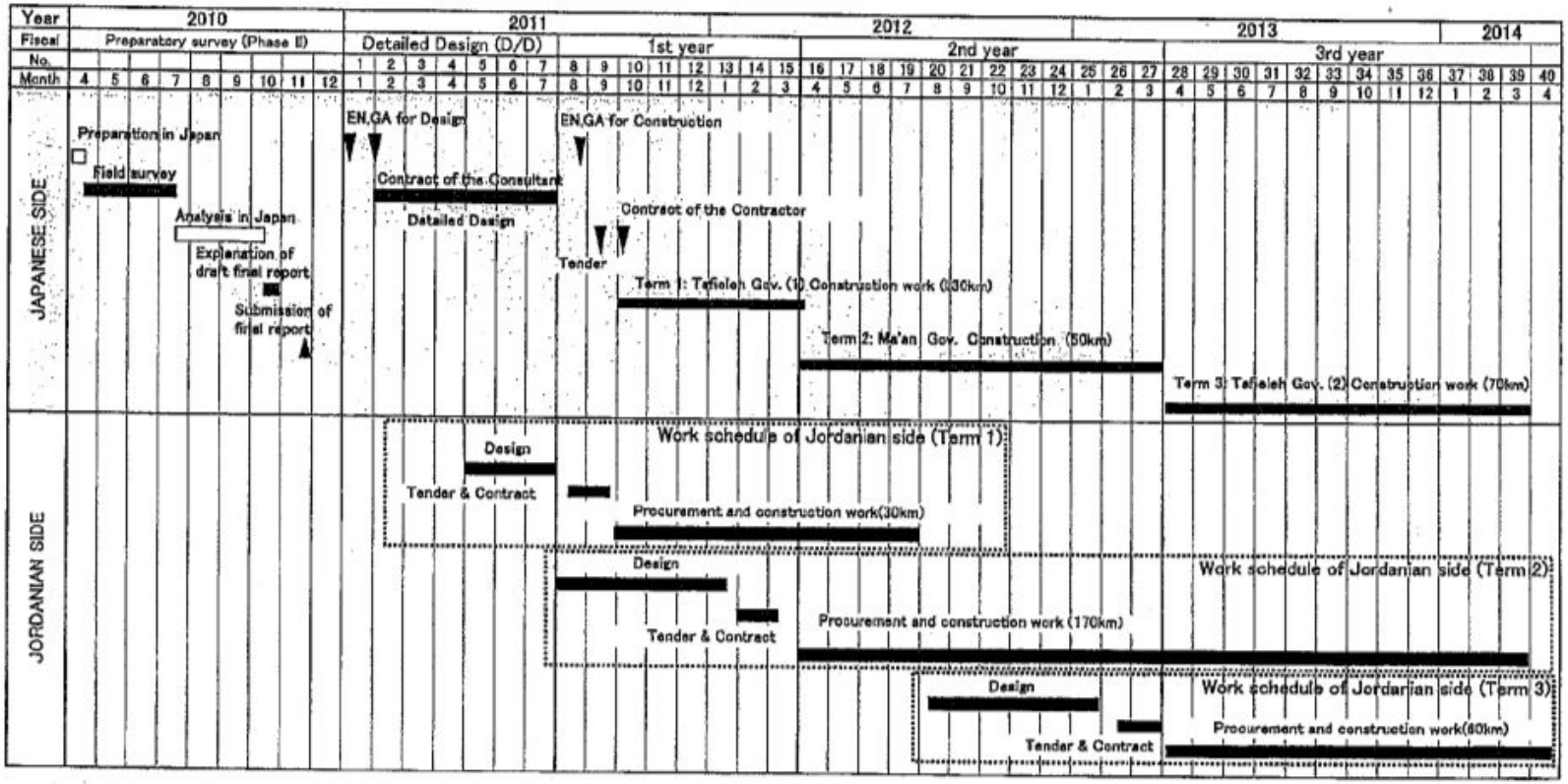


Annex-6: Major Undertakings to be taken by Each Government

No.	Items	To be covered by Grant Aid	To be covered by Recipient Side
1	To secure lots of land necessary for the implementation of the Project and to clear the sites		●
2	To construct the following facilities		
	1) The building	●	
	2) The gates and fences in and around the site		●
	3) The parking lot	●	
	4) The road within the site	●	
	5) The road outside the site		●
3	To provide facilities for distribution of electricity, water supply and drainage and other incidental facilities necessary for the implementation of the Project outside the sites		
	1) Electricity		
	a. The distributing power line to the site		●
	b. The drop wiring and internal wiring within the site	●	
	c. The main circuit breaker and transformer	●	
	2) Water Supply		
	a. The city water distribution main to the site		●
	b. The supply system within the site (receiving and elevated tanks)	●	
	3) Drainage		
	a. The city drainage main (for storm sewer and others to the site)		●
	b. The drainage system (for toilet sewer, common waste, storm drainage and others) within the site	●	
	4) Gas Supply		
	a. The city gas main to the site		●
	b. The gas supply system within the site	●	
	5) Telephone System		
	a. The telephone trunk line to the main distribution frame/panel (MDF) of the building		●
	b. The MDF and the extension after the frame/panel	●	
	6) Furniture and Equipment		
	a. General furniture		●
	b. Project equipment	●	
4	To ensure prompt unloading and customs clearance of the products at ports of disembarkation in the recipient country and to assist internal transportation of the products		
	1) Marine (Air) transportation of the Products from Japan to the recipient country	●	
	2) Tax exemption and custom clearance of the Products at the port of disembarkation		●
	3) Internal transportation from the port of disembarkation to the project site	●	
5	To ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the purchase of the products and the services be exempted		●
6	To accord Japanese nationals whose services may be required in connection with the supply of the products and the services such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work		●
7	To ensure that the Facilities and the products be maintained and used properly and effectively for the implementation of the Project		●
8	To bear all the expenses, other than those covered by the Grant, necessary for the implementation of the Project		●
9	To bear the following commissions paid to the Japanese bank for banking services based upon the B/A		
	1) Advising commission of A/P		●
	2) Payment commission		●
10	To give due environmental and social consideration in the implementation of the Project.		●

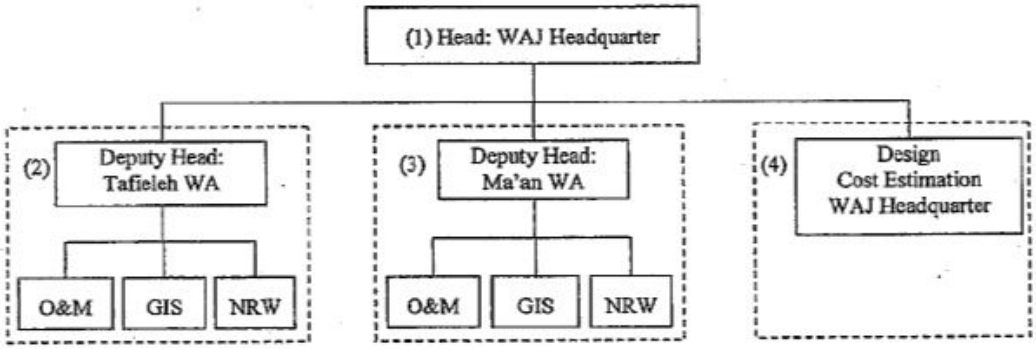
(B/A : Banking Arrangement, A/P : Authorization to pay)

Annex-7: Tentative Schedule of Measures to be taken by Both Sides*



* The schedule is drafted under the condition that the Government of Japan will approve the implementation of the Project

Annex-8: Structure of Counterpart Team



(1) WAJ Headquarter

Head: WAJ Headquarter : Mr. Waleed Sukkar

(2) Tafieleh Govenorate

Deputy Head: Tafieleh WA : Mr. Adnan Khaiat, Director of Tafieleh
O&M and NRW : Mr. Mustafa AL Zananeen, O&M and NRW Director
GIS : Mr. Muhamed Hawamdeh, Data Entry and GIS Expert
Mr. Muhamed Zanoon, Data Entry and GIS Expert

(3) Ma'an Governorate

Deputy Head: Ma'an WA : Mr. Akram Al Zananeen, Director of Ma'an
O&M and NRW : Mr. Samer Maaita, O&M and NRW director
GIS : Ms. Abla Muhamed Elaian, GIS Expert

(4) Design, Cost Estimation, WAJ Headquarter

Ms. Reham Bani-Han, Head of Study and Feasibility Study Division
Ms. Haneen Qublan, Engineer
Ms. Asma Wahadneh, Engineer

MINUTES OF DISCUSSIONS
ON
THE PREPARATORY SURVEY (PHASE II)
ON
THE PROJECT FOR REHABILITATION AND IMPROVEMENT
OF WATER FACILITIES
IN TAFIELEH GOVERNORATE
IN THE HASHEMITE KINGDOM OF JORDAN
(EXPLANATION ON DRAFT OUTLINE DESIGN REPORT)

In April 2010, the Japan International Cooperation Agency (hereinafter referred to as "JICA") conducted the Preparatory Survey (Phase II) for the Outline Design on the Project for Rehabilitation and Expansion of the Water Facilities in Southern Governorates of Tafieleh and Ma'an to Jordan and through discussion, field survey and technical examination of the results in Japan, JICA prepared a draft outline design report (hereinafter referred to as "the Draft Report").

In order to explain and to consult with the Government of Jordan on the components of the Draft Report, JICA sent to Jordan the Draft Report Explanation Team (hereinafter referred to as "the Team"), which is headed by Mr. Fumihiko Okiura, Director, Water Resources Management Division I, Water Resources and Disaster Management Group, Global Environment Department, JICA, and is scheduled to stay in the country from October 24th to 28th, 2010.

The Team held discussions with the officials concerned of the Government of Jordan. In the course of discussions, both sides confirmed the main items described in the attached sheets.

Amman, 28 October, 2010

Mr. Fumihiko Okiura
Leader,
Draft Report Explanation Team
Japan International Cooperation Agency
Japan

Eng. Munir Oweis
Secretary General,
Water Authority of Jordan (WAJ)
Ministry of Water and Irrigation
The Hashemite Kingdom of Jordan

ATTACHMENT

1. Component of the Draft Report

The Jordanian side agreed and accepted in principle the components of the Draft Report explained by the Team. The components of the Project are shown in **Annex-1**.

2. Japan's Grant Aid Scheme

The Jordanian side understands the Japan's Grant Aid Scheme and the necessary measures to be taken by the Government of Jordan as explained by the Team and described in Annex-5 and Annex-6 of the Minutes of Discussions signed by both sides on 14 April, 2010.

3. Schedule of the Study

JICA will complete the final report in accordance with the confirmed item and send it to the Government of Jordan by January 2011.

4. Other Relevant Issues

The following issues were discussed and confirmed by both sides.

4-1) Project Title

The Jordanian side agreed to modify the Project Title as "the Project for Rehabilitation and Improvement of the Water Facilities in Tafieleh Governorate" (hereinafter referred to as "the Project") proposed by the Team according to the final components of the Project.

4-2) Components of the Project

The Jordanian side agreed the components of the Project described in **Annex-1** and **Annex-2**.

4-3) Project Cost Estimate

The Team explained to the Jordanian side the Project Cost Estimate as described in **Annex-3**. It is provisional estimate and would be further examined by the Government of Japan for the approval of the Grant. The Jordanian side understood that the Project Cost Estimate is not final and subject to be modified. Both sides agreed that the Project Cost Estimate should never be duplicated or released to any outside parties until signing of all the contract(s) for the Project.

4-4) Undertakings and Obligations of Jordanian Side

1) In case the Project would be approved by the Government of Japan, Jordanian side would execute the obligations with the progress of the construction and procurement in additional to major undertakings described in **Annex-4**.

2) The Jordanian side agreed and committed to allocate enough budgets and implement necessary works as described in **Annex-5**.

4-5) "Soft Component" of the Project

1) The Project would implement the technology transfer and capacity building on distribution management as a portion of Soft Component, so that the Jordanian side would be able to monitor and manage water flow and pressure in the overall water supply system effectively.

2) The Jordanian side agreed and committed to assign the responsible personnel in charge of the distribution management in WAJ Tafieleh Governorate as counterpart for technical assistance, and to promote continuous efforts to reduce non revenue water.

3) USAID will conduct training on GIS data management and hydraulic modeling for existing systems from February 2011 under Water / Wastewater Infrastructure Project, including Tafieleh Governorate. Both sides confirmed that the Soft Component will be conducted for effective management of water distribution and non revenue water reduction utilizing the new distribution system constructed by the Project, based on the skills and knowledge acquired through the USAID project.

4-6) Overlapping with other projects

Both sides confirmed that the Project would not be overlapped with any other project supported by other donor agencies, NGOs, and Jordanian official organizations.

4-7) Environmental Impact Assessment (EIA)

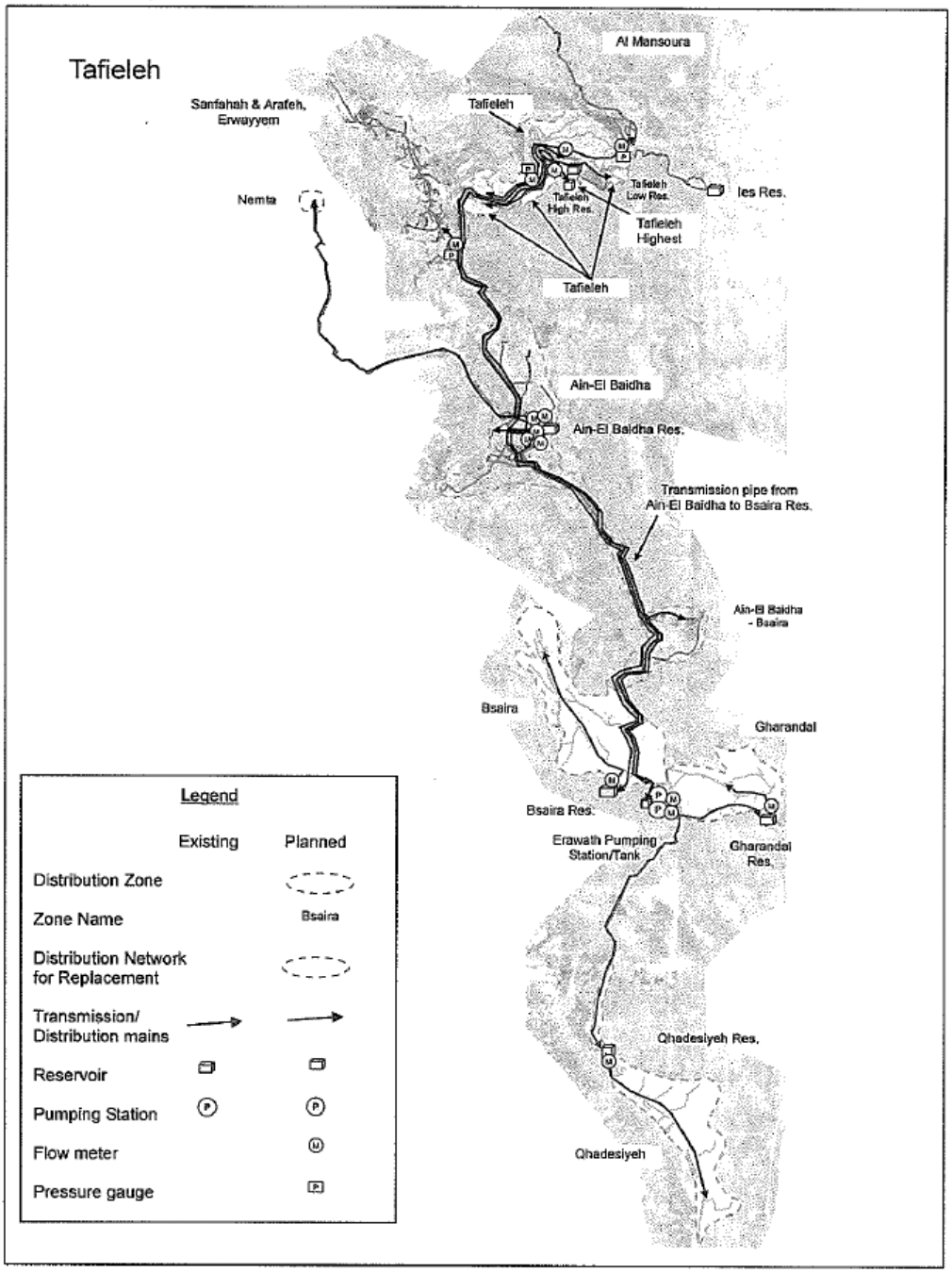
Both sides confirmed that the Jordanian side will check the necessity of EIA to related authorities based on the Project components explained by the Team. In case the EIA is required, the Jordanian side will conduct and complete it before March 2011.

Annex-1	The Components of Project
Annex-2	Project Location Map
Annex-3	Project Cost Estimate
Annex-4	Major Undertakings to be taken by Each Government
Annex-5	Tentative Schedule of Measures to be taken by Both Sides

Annex-1: The Components of Project

Facilities	Specification/capacity/quantity	
Reservoir	Bsaira	RC structure, rectangular shape, capacity: 1,200m^3 L 19.4m x W 18.8m x H 5.45m
	Gharandal	RC structure, rectangular shape, capacity: 600m^3 L 13.4m x W 12.8m x H 5.95m
Erawath Pumping Station (PS)	Rehabilitation for transmission pump for planned Gharandal reservoir	Renewal of existing pump equipment Q: 0.95m^3/min. x Head: 225m x 2 sets Horizontal shaft single suction multi-stages centrifugal pump Electrical works and instrumentation
	Expansion for transmission pump for existing Qhadesiyeh reservoir	Construction of a pump house for expansion pumping station Q: 1.5 m^3/min. x Head: 380m x 2 sets Horizontal shaft single suction multi-stages centrifugal pump Electrical works and instrumentation Air breathing valve for anti-water hammer : 3 sets (on the pipe between pumping station to existing Qhadesiyeh reservoir) Altitude valve in existing Qhadesiyeh reservoir
Transmission pipeline	Erawath PS—Planned Gharandal reservoir	DIP 150 mm x 3,540m
	Bsaira Junction – Bsaira reservoir	DIP 200 mm x 460m
	Bsaira entrance – Bsaira Junction	DIP 250 mm x 2,270m
	Ain-El Baidha reservoir – Bsaira entrance	DIP 300 mm x 7,950m
	Total	14,220 m
Distribution pipeline	Tafieleh city (14,060m)	DIP 100mm x 6,230m DIP 150mm x 3,020m DIP 200mm x 2,510m DIP 250mm x 2,210m DIP 300 mm x 90m Pressure reducing valve: 4 places
	Bsaira (7,180 m)	DIP 100mm x 3,300m DIP 150mm x 490m DIP 200mm x 2,930m DIP 250mm x 460m Pressure reducing valve: 7 places
	Gharandal (3,780 m)	DIP 100mm x 2,460m DIP 150mm x 320m DIP 200 mm x 1,000m Pressure reducing valve: 5 places
	Qhadesiyeh (5,350 m)	DIP 100mm x 2,250m DIP 150mm x 1,780m DIP 200 mm x 1,320m Pressure reducing valve: 6 places
	Total	30,370 m
Distribution monitoring system	Tafieleh city and Tafieleh south area	Central monitoring system: 1 set Flow meter: 15 sets Pressure meter: 3 sets
Procurement of pipe materials	Tafieleh city, Bsaira, Gharandal, Qhadesiyeh	HDPE 63mm x 50,100m

Annex-2: Project Location Map



Annex-3: Project Cost Estimate (Confidential)

(1) Japanese side cost obligation

This Part is closed due to the confidentiality.

(2) Jordanian side cost obligation

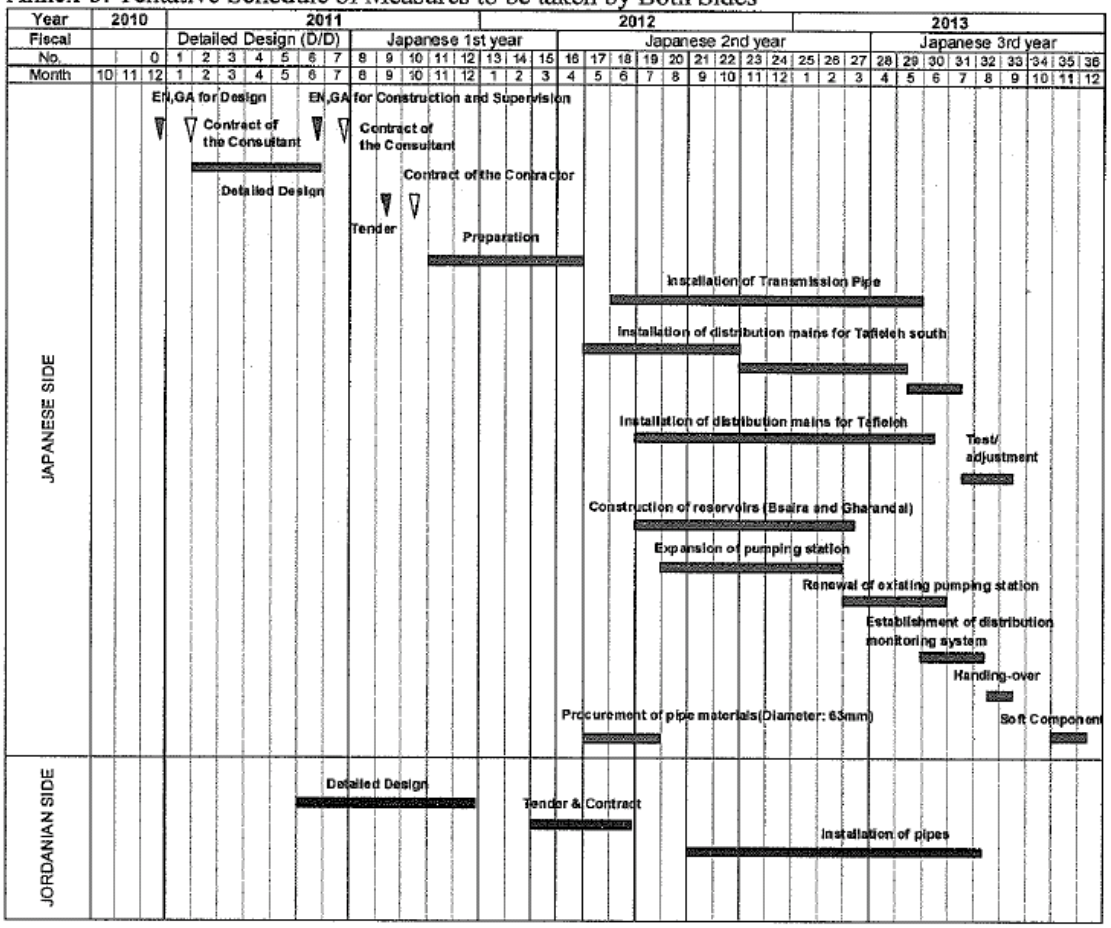
Items	Project cost (thousand JD)	Remarks
1. Construction of distribution reservoirs		
1) Land acquisition and creation and leveling of land	32.7	Governmental land
2) Supply of primary power of required capacity for the reservoirs	-	It is supplied by electric power company.
3) Land acquisition for access road to the site and construction	51.6	Cost for land acquisition is not included.
4) Road pavement in the site of reservoirs, setting of light, construction of fences, gates and planting along the site boundary of reservoirs	49.3	
5) Construction of reservoir drain pipe from the boundary of reservoirs to the nearby existing discharge place	53.4	
6) Provision of necessary water and chemicals (chlorine) for trial operation of the facilities constructed	3.6	
2. Renewing and expansion of a pumping station		
1) Provision of land for expansion of pumping station, and creation and leveling of land	-	Leveling by WAJ labor
2) Supply of primary power of required capacity for the pumping station and installation of a transformer with a transformer panel or replacement of existing ones	-	It is assumed to use WAJ reserve equipment.
3. Installation work of transmission and distribution pipelines		
1) Installation work of distribution pipelines (diameter: 63mm) procured by Japanese side	2,405	
2) Installation work of house connection (20 mm and 25 mm)	4,829	
3) Provision of necessary water and chemicals (chlorine) for trial operation of the facilities constructed	4.1	
4. Installation of distribution monitoring system	0	
1) Supply of primary power of required capacity for the monitoring system	-	It is supplied by electric power company
Total	7,429	

Annex-4: Major Undertakings to be taken by Both Sides

Construction/Procurement & Installation	Japan	Jordan
1. Installation work of distribution reservoir		
(1) To acquire the land for reservoirs construction sites and reclaim and level the land before the start of construction work by Japanese side		●
(2) To construct distribution reservoirs	●	
(3) To supply primary power of required capacity		●
(4) To acquire land for access road of reservoirs in Gharandal and Bsaira before August 2011		●
(5) To construct access road to reservoirs in Gharandal and Bsaira before the start of construction work by Japanese side		●
(6) To construct road paving, lighting, vegetation, fencing, gates, etc., within the site		●
(7) To lay drain pipe from the site to discharge place (Japanese side will lay it within the site boundary.)		●
2. Renewing and expansion of pumping station		
(1) To renew existing pump equipment	●	
(2) To provide, reclaim, level the land for expansion pumping station in the site of existing pumping station		●
(3) To construct expansion pumping station	●	
(4) To supply primary power of required capacity and install a transformer with a transformer panel or replacement of existing ones.		●
3. Installation work of transmission and distribution pipeline		
(1) To install transmission pipelines	●	
(2) To install distribution pipelines (Diameter: more or equal than 100 mm)	●	
(3) To procure pipe materials (Diameter: 63 mm)	●	
(4) To design pipelines to be installed by Jordanian side		●
(5) To install distribution pipelines to be procured by Japanese side (Diameter: 63 mm)		●
(6) To install house connections and water meters		●
(7) To coordinate for required approvals and permissions to implement construction works, procedure for traffic control during construction period in the road		●
(8) To cooperate in piping work, such as coordination in water cut off, communication for water cut, presence at site in piping works when required, etc.		●
4. Installation work of distribution monitoring system		
(1) To secure the land for installation of equipment		●
(2) Installation work of monitoring system for distribution flow and pressure	●	
(3) To supply primary power of required capacity		●
5. Soft component		
(1) To provide required equipments for implementation of soft-component and training room		●
(2) Implementation of soft-component (technology transfer and capacity building)	●	
6. Common items for construction works		
(1) To provide temporary stock yards for construction materials and machineries and lands for temporary works		●
(2) To take all necessary measures to secure disposal sites for excavation debris and drains for wastewater from construction works		●
(3) To provide necessary water and chemicals (chlorine) for trial operation of the facilities constructed		●
7. Other Items		
(1) To coordinate for required approvals and permissions from relevant authorities to implement detailed design studies and construction works		●
(2) To cooperate in consultation with residents living near the construction sites and to coordinate procedures for traffic control in works with relevant authorities		●
(3) To carry out necessary procedures for issue of A/P required for payments to Japanese Consultants and Contractor and to bear the commissions for advising and payment to a bank in Japan for banking services based upon the Banking Arrangement		●
(4) To ensure prompt unloading and customs clearance of the goods for the project at the port of disembarkation in Jordan		●
(5) To accord Japanese nations whose services may be required in connection with the supply of products and services under the verified contract such facilities as may be necessary for their entry into Jordan and stay there for the performance of their works.		●
(6) To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies may		●

	be imposed in Jordan with respect to the supply of the products and services under the verified contract. And to take necessary measures for such tax exemption.		
(7)	To use, operate and maintain properly the facilities and equipment constructed or procured under the Japan's Grant Aid program.		•
(8)	To bear all the expenses, other than to be borne by the grant Aid, necessary for construction of the facilities		•

Annex-5: Tentative Schedule of Measures to be taken by Both Sides



ヨルダン国

南部地域給水改善計画準備調査

（その２）

ソフトコンポーネント計画書

2010 年 10 月

株式会社東京設計事務所

ヨルダン国南部地域給水改善計画準備調査（その２）
ソフトコンポーネント計画書

目　　次

表　目　次

別紙１：　ソフトコンポーネントに係る概算事業費の詳細

1. ソフトコンポーネントを計画する背景

無償資金協力「ヨルダン国南部地域給水改善計画」は、ヨルダン国（以下、「ヨ」国）南部地域タフィーラ県を対象として送配水システムの再構築(配水池の建設及び配水管網更新及び配水区の設定、減圧施設の設置、配水モニタリングシステムの設置、ポンプ送水の適正化）を行い、無収水量を低減し、増加した使用水量を公平に分配し、対象地域の給水状況を改善することを目的として実施される。

1) 現状

「ヨ」国南部地域の水道事業体は井戸を水源とした配水池からの自然流下配水及びポンプ圧送による給水を行っているが、高い無収水率、基幹水道システムの能力不足等の問題により、給水時間は制限され、一日一人水消費量（有収水量）は低い水準にとどまっている（タフィーラ県：84 リットル、マアン県：113 リットル)。無収水率はタフィーラ県約 47%、マアン県約 61%と全国平均の 43.9%(2008 年）より高い値を示しており、約半分が老朽化した配水管や高い配水圧に起因する漏水、残りはメータの不感知や不法接続と推定されている。タフィーラ県、マアン県における配水管の大部分は布設後平均約 22 年～39 年を経過した亜鉛メッキ鋼管や黒鋼管である。亜鉛メッキ鋼管は高水圧、腐食に弱く漏水の原因となっており、また、内面タール塗装黒鋼管は劣化による水質悪化が問題視されている。

また、タフィーラ県は起伏の大きい高原地帯（標高約 1,000m ～1,600m）に位置するが、給水圧を適正に保つための減圧施設や配水区が設置されていない。その結果、標高の低い地域は高水圧に標高の高い地域は低水圧になり、漏水や出水不良の原因になっている。更に、配水池の不備や老朽化した不適切な能力のポンプにより適切な水量を給水できず、タフィーラ県南部のブセイラ、ガランダール、カデシヤ等では給水が週 4 日～6 日制限され、住民の生活に大きな影響を及ぼしている。

2) ソフトコンポーネントの必要性

本プロジェクトによりタフィーラ県対象地域の送配水施設及び配水区が整備され、送配水システムが改善される。しかし、配水データの管理と活用、配水管網情報の定期的な更新、適切な配水管網の維持管理等が持続的に実施されなければ、本プロジェクトの実施効果は最大限に発揮されない。一方、現在の WAJ タフィーラ支所職員の知識、技術水準はこれらの活動を適切に実施するためには未だ不十分であり、本ソフトコンポーネントにより、技術支援を行い、配水管理及び無収水管理に係る能力を強化する必要がある。

また、本ソフトコンポーネントは「ヨ」国で実施されている技術協力プロジェクト「無収水対策能力向上プロジェクト」(2005 年～2008 年) 及び「無収水対策能力向上プロジェクトフェーズ 2」(2009 年～2011 年）の成果を活用する計画である。技術協力プロジェクトは WAJ の無収水対策に係る組織体制整備及び能力向上 (漏水探査、水道メータ設置、配水ネットワークの管理等) を支援している。本ソフトコンポーネントを通して漏水箇所・修理箇所、出水不良苦情箇所の GIS データベース化、配水モニタリングシステムの適切な運用、データの管理・分析に係る技術移転及び能力強化を行うことで、WAJ タフィーラ支所は技術協力プロジェクトにより習得した配水ネットワーク管理技術をパイロット区画から水道システム全体に応用することができる。

2. ソフトコンポーネントの目標

WAJ タフィーラ支所職員の配水管理及び無収水管理に係る能力が向上する。

3. ソフトコンポーネントの成果

ソフトコンポーネントによる成果及び主な活動は以下のとおりである。

【成果 1】配水管網の状況が GIS マップにより把握される。

- 管網データの更新
- 維持管理データ（漏水苦情・漏水修理箇所、出水不良箇所、メータ交換箇所、不法接続箇所等）の GIS 視覚化

【成果 2】送配水配システムの水理状況が把握される。

- 送配水データの分析・活用
- 管網モデル構築とシュミュレーション

【成果 3】送配水データが配水管理・無収水管理に活用される。

- 配水管理へのデータの活用
- 無収水管理へのデータの活用

4. 成果達成度の確認方法

表 1 の方法によりソフトコンポーネントの成果達成度を確認する。WAJ タフィーラ支所の職員 3 名を対象として技術支援を行い、3 中 2 名が下記指標を全て満たすことを目標とする。

表 1　ソフトコンポーネント成果の確認方法

プログラム	成果の確認方法	成果達成度の指標
研修前のレベル	研修前のレベルを小テストにより把握する	なし
配水管網マッピング	マッピング手法小テスト 管網データ集計・図表化・解釈レポート提出	70 点以上 70 点以上
配水データ管理	配水データ集計・図表化・解釈レポート提出	70 点以上
配水管網解析	EPANET 2 ケーススタディレポート提出	70 点以上
総合配水管理	配水管理・運用計画レポートの提出	70 点以上

5. ソフトコンポーネントの活動（投入計画）

詳細活動内容を表 2 に示す。

表 2　ソフトコンポーネントの詳細活動内容

番号	活動
1)	準備
①	国内準備
①-1	技術移転計画書作成
①-2	テスト作成・質問票作成・研修用テキスト(案) 準備
②	実施準備・導入技術説明会
②-1	研修室設立・C/P 打合せ・実施準備・説明会準備
②-2	研修生の選定（研修前テスト・アンケート・評価・選定）
②-3	実施説明会
2)	配水管網データ GIS 管理
①	管網データ更新
①-1	管網マッピング入力データの解説・入力方法
①-2	管網データ更新入力（OJT)
①-3	管網の集計・図表化・分析
②	維持管理データの GIS 視覚化
②-1	維持管理データ入力フォーマットの作成
②-2	維持管理データ入力（OJT)
②-3	維持管理データの分析・活用
3)	送配水データ管理
①	送配水データの分析・活用
①-1	送配水データの収集（OJT)
①-2	送配水データの分析（OJT)と活用
②	管網モデル構築とシミュレーション
②-1	送配水管網シミュレーション手法（EPANET2）
②-2	新配水区モデルの構築
②-3	新配水区の管網解析（水圧、水量、流向）と結果分析
4)	送配水管理
①	送配水管理へのデータの活用
②	無収水管理へのデータの活用
5)	総合報告
①	総合セミナー（タフィーラ市）
①-1	総合セミナー準備
①-2	総合セミナー
②	報告書作成・マニュアル整備
②-1	ソフトコンポーネント評価
②-2	総合報告書作成・提出

6. ソフトコンポーネントの実施リソースの調達方法

本ソフトコンポーネントは、配水管理技術者（邦人コンサルタント）を延べ 1.47 ヶ月間派遣し、直接支援型で実施する。ソフトコンポーネントを実施する技術者の必要要件は以下のとおりとする。

1) 管網水理学を理解している

2) マッピング GIS ソフト及び管網解析ソフトを使用できる

3) 送配水運用計画を立案できる

4) 「ヨ」国側技術者に対する研修をマネジメントする能力がある

本技術者は、水理学、GIS 及び管網解析ソフトの幅広い知識、送配水運用計画の策定に係る経験に加えて「ヨ」国技術者と意思疎通を行うための語学力、開発途上国における送配水システムの維持管理上の問題点を理解していることが求められる。

なお、管網水理学、GIS 及び管網解析ソフトに関する技術者を「ヨ」国及び第三国から調達することは可能であるが、それらの技術を総合的に理解し、研修を実施することができる技術者の調達は困難である。従って、必要要件を満たし、「ヨ」国の送配水システムの状況を理解している本邦コンサルタントが適当である。

要員配置計画の詳細を表 3 に示す。

表 3　ソフトコンポーネントの要員配置計画

要員分野	人数	所属	内容
配水管理	1	本邦	本邦の配水管理技術を現地の状況及び研修員の技術水準に応用し以下の事項を実施する。 ・ 研修テキストの作成、研修の実施 ・ テスト、レポート宿題の作成・評価 ・ 各種フォーマットの整備 ・ セミナーの実施 ・ データの収集・編集・モデル化 ・ 評価

7.　ソフトコンポーネントの実施工程

本プロジェクトの施設建設工事は 22.5 ヶ月で実施される。本ソフトコンポーネントを実施するために建設される配水池、配水管網等で測定される配水量及び水圧のデータが必要となる。従って、本ソフトコンポーネントは施設完成後に行う。ソフトコンポーネントの期間は約 1.5 ヶ月、必要人日は以下のとおりである。実施計画を図 1、詳細活動計画を図 2 に示す。

・ 実働日数：39 日（国内準備 5 日、現地 34 日）
・ 換算月数：国内準備期間：0.17MM、派遣期間：1.47MM（44 日）

表 4　実施計画

番号	活動	国内	現地 第 1 ヶ月目	現地 第 2 ヶ月目
1)	準備			
①	国内準備	▬		
②	実施準備・導入技術説明会		▬	
2)	配水管網データ GIS 管理			
①	管網データ更新		▬▬	
②	維持管理データの GIS 視覚化		▬	
3)	送配水データ管理			
①	送配水データの分析・活用		▬	
②	管網モデル構築とｼﾐｭﾚｰｼｮﾝ		▬	
4)	送配水管理			
①	送配水管理へのデータの活用			▬
②	無収水管理へのデータの活用			▬
5)	総合報告			
①	総合セミナー			▬
②	報告書作成・マニュアル整備			▬

表 5　詳細活動計画

大項目	番号	活動	月順	共通	タフィーラ	国内	1ヶ月目	2ヶ月目	備考
			日順			1 2 3 4 5	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60	
1）準備									
	1）	準備							
	①	国内準備							
	D-1	技術移転計画書作成		1					
	D-2	テスト作成・質問票作成・研修用テキスト(案)準備		4					
		渡航		2					
	②	実施準備・導入技術説明会							
	②-1	研修室設立・C/P打合せ・実施準備・説明会準備		2					
	②-2	研修生の選定（研修前テスト・アンケート・評価・選定）			1				アンケート票、小テスト
	②-3	実施説明会							技術移転計画書
			小計	9	1				
2）配水管網データGIS管理									
	2）	配水管網データGIS管理							
	①	管網データ更新							
	①-1	管網マッピング入力データの解説・入力方法			1				IWトレーニングマニュアル
	①-2	管網データ更新入力（OJT）			2				ArcGIS
	①-3	管網の集計・図表化・分析			2				ArcGIS
	②	維持管理データのGIS視覚化							ArcGIS
	②-1	維持管理データ入力フォーマットの作成			1				ArcGIS
	②-2	維持管理データ入力（OJT）			2				ArcGIS
	②-3	維持管理データの分析・活用			2				ArcGIS
			小計		10				
3）送配水データ管理									
	3）	送配水データ管理							
	①	送配水データの分析・活用							ArcGIS
	①-1	送配水データの収集（OJT）			1				ArcGIS
	①-2	送配水データの分析（OJT）と活用			2				ArcGIS
	②	管網モデル構築とシミュレーション							
	②-1	送配水管網シミュレーション手法（EPANET2）			2				EPANET2
	②-2	新配水区モデルの構築			1				EPANET2
	②-3	新配水区の管網解析（水圧、水量、流向）と結果分析			2				EPANET2
			小計		8				
4）送配水管理									
	4）	送配水管理							
	①	送配水管理へのデータの活用			2				EPANET2、ArcGIS
	②	無収水管理へのデータの活用			2				EPANET3、ArcGIS
			小計		4				
5）総合報告									
	5）	総合報告							
	①	総合セミナー							
	①-1	総合セミナー準備		2					
	①-2	総合セミナー		1					
	②	報告書作成・マニュアル整備							
	②-1	ソフトコンポーネント評価		1					
	②-2	総合報告書作成・提出		1					総合完了報告書
			小計	5					
帰国									
		帰国		2					
		計		16	23				

8. ソフトコンポーネントの成果品

以下の報告書及び成果品を作成・提出する。

報告書・成果品	内容	時期
技術移転計画書（英文）	ソフトコンポーネントの内容、達成目標、詳細スケジュール、実施方法等	開始時
完了報告書（英文） （和文要約）	技術移転内容、能力向上結果、研修評価、技術移転マニュアル、写真、GIS、管網データを含む総合報告書	完了時
管網データ	GIS 管網マッピングデーター式	完了時
管網解析モデル	EPANET2 管網解析モデル	完了時
配水データ	入力済み配水データ	完了時
マニュアル類	マッピングマニュアル、管網解析マニュアル、配水データ入力・管理マニュアル	完了時
その他	指導記録、出力物、研修テキスト	完了時

9. ソフトコンポーネントの概算事業費

ソフトコンポーネントの概算事業費は 4,861 千円である。内訳は直接経費（現地庸人を含む）1,952 千円、直接人件費 1,276 千円、間接費 1,633 千円である。経費詳細を別紙 1 に示す。

10. 相手国実施機関の責務

1） 実施可能性

WAJ 本庁責任者は、本ソフトコンポーネントにより対象地域の送配水システムがより効果的に活用され、効率的な無収水管理及び配水管理が可能になることを理解し、参加・協力の意志を示している。また、WAJ が所有している既存の機材で実施可能であり、新に機材を調達する必要はないため、本ソフトコンポーネントの実施可能性は高いと判断される。なお、本ソフトコンポーネントに使用する機材は以下のとおりである。

- コンピューター3 台及び基本ソフトウエア、その他備品一式
- プロッターとプリンター（WAJ 所有機材）
- マッピング GIS ソフト ArcView（WAJ 所有機材）

2） 阻害要因及び対策

本ソフトコンポーネントによる効果、持続性を高めるため、研修員の人選が適切に行われる必要がある。以下を必要用件として、WAJ タフィーラ支所及び本邦コンサルタントが慎重に人選を行う。

- 配水管理の業務経験
- GIS ソフトの使用経験
- コンピューターの基本的な操作方法の習得
- 基本ソフト（MS-Excel 及び MS-Word）の操作方法の習得
- 十分な研修時間の確保（1 日 3 時間程度）
- 本研修に関する高い関心、意欲

また、タフィーラ支所には研修室がないため、支所内に研修場所を確保する必要がある。

別紙 1

ソフトコンポーネントに係る概算事業費の詳細

現地貨　1JD=130.07 円（OD 換算レート）

区分			日本円	現地貨(JD)	円換算	備考
直接人件費	（日本人：配水管理技術者）					日本人専門家の格付けは３号相当
	国内	0.17 人月	132,260		132,260	
	現地	1.47 人月	1,143,660		1,143,660	
	小計		1,275,920		1,275,920	
直接経費	現地傭人	1.40 人月		735.00	95,601	通訳（ｱﾗﾋﾞｱ語－英語）
	日当		203,850		203,850	
	宿泊		515,040		515,040	
	航空賃		855,375		855,375	
	車輌費			2,150.57	279,724	
	報告書作成費		2,500		2,500	
	小計		1,576,765	2,885.57	1,952,090	
間接経費	諸経費		1,148,328		1,148,328	直人費×90%
	技術経費		484,850		484,850	(直人費+諸経費)×20%
	小計		1,633,178	0.00	1,633,178	
合計					4,861,188	