

EXECUTIVE SUMMARY

0. PREFACE

The Disi-Mudawarra to Amman Water Conveyance System Environmental and Social Assessment (ESA) Report was written by Consolidated Consultants in June 2004. In 2007, Dar Al Handasah Consultants were commissioned by GAMA to Enerji A.S to undertake a review of the Project ESA to determine:

- If the changes to the project design since 2004 were sufficient to invalidate all or part of the ESA
- If there had been any changes to the National legal and policy framework since 2004 that would necessitate revision of all or part of the ESA.

As a result of that Review an Addendum (Version 1.0) to the ESA was prepared, and approved by MOE.

Subsequently a second Addendum has been prepared. This has four areas of specific focus:

- Ecology studies
- Archaeological studies
- Public Consultation
- Compensation for asset loss, loss of income, livelihood and nuisance.

This document has been prepared to summarise the findings of the Original ESA of 2004, ESA Addendum 1 of January 2008 and ESA Addendum 2 of March 2008 and therefore supersedes the original Executive Summary produced in June 2004.

1. **PROJECT OBJECTIVE AND DESCRIPTION**

Rapid population increase in the main cities of Amman, Zarqa and Irbid has placed unprecedented demands on Jordan's water resources. Total demand is approaching one billion cubic meters per year, which is close to Jordan's available renewable and economically developable water resources.

The Disi-Mudawarra to Amman Water Conveyance project is proposed to convey some 100 MCM/yr of water over the 325 kms from the proposed Disi wellfield to Greater Amman. This should serve to protect the Northern upland aquifers that currently supply Amman from over abstraction and preserve them as a standby water source.

Disi is a fossil aquifer extending from the southern edge of the Dead Sea in Jordan to Tabuk in northwest Saudi Arabia. Significant exploitation of the Jordanian part of the aquifer started in 1980 and at present it provides 16.5 MCM to Aqaba city for domestic purposes and 75 MCM for agricultural production.

Extensive hydro-geological studies carried out by the MWI indicate that 100-120 MCM/year can be drawn from the Disi aquifer. The water will be abstracted from the Dubaydib well field in the Disi-Mudawarra area. A total of 55 wells (46 operating and 9 stand-by) will be constructed to produce an average flow rate of 100 MCM/year.

The pipeline will run for some 110 kms across open land and some 215 kms within the alignments of public highways, Figure 1. The water will be received at two reservoirs, at Dabouk and Abu Alanda in western and eastern Amman respectively.

This project will be executed on a Build, Operate, Transfer (BOT) basis by a special purpose vehicle (Project Company, PC) set-up by GAMA Enerji A.S. The PC will own and operate the project for a period of 25 years after which the ownership of the project will revert to the Government of Jordan.

The Conveyor is designed to have a project life of 50 years and in future years may be used to convey water from major sea water desalination plants on the Red Sea to Amman.

The principal benefits forecast to accrue from the Project are as follows:

- Improving the quality of the supplied water to Amman;
- Relieving the over-abstracted aquifers by reducing pumping to their safe yield and allowing natural recharge to take place;
- Providing a reliable supply to Amman which enhances the implementation of the rationing program for distribution of water;
- Improving environmental health conditions especially in areas which are getting water less than what is required by any health standards;
- Providing an emergency supply to communities along the route.

A summary of the major elements of the project is provided in Table 1.



Figure 1 **Project Components and Layout**

Table 1 Summary of Key Project Elements

Components	Details
Well Field Facilities	Number of Wells
Dubaydib Well Field	55 production wells (46 wells for production and the remaining are standby wells) to produce a maximum flow of 100 MCM/year. At a depth of about 600m
Conveyance Facilities	Characteristics of Pipe
Main Conveyance Pipeline	1,600 mm steel pipeline with epoxy lining
Dabuk Branch	57" steel pipeline. A connection will be made from this pipe to the reservoir.
Abu Alanda Branch	51" steel pipeline. This will replace or twin with the existing 600 mm steel pipe from National Park Pump Stations (NPPS) to Abu Alanda.
Wellfield collector tank and pumping station	10,000m ³ capacity tank north of wellfield. Receives flow into tank consisting of 2 compartments. 5 pump sets to lift water regulating tank (1 acts as standby pump)
Regulating tank	At elevation of 1085m north of collector tank. 12,000m ³ capacity in a 2 compartment tank.
Break pressure tanks	1 BPT located along the route: Tank 1 97km north of regulating tank, elevation 965m Tank 10,000m ³ capacity. Flow control stations north of each to reduce residual pressure.
Madaba pumping station and control centre	Forebay tank located here to pump flow to the reservoirs at Dabuk and Abu Alanda. Flow control station upstream of tank. 2 groups of pumps here to lift water to the termini points. 60MCM/yr to Dabuk and 40MCM/yr to Abu Alanda. Site to include electricity supply infrastructure, and control room.
Turnouts	Five turnouts provided at Maan, Tafila, Karak, Madaba and Muntazah
Disinfection facilities	Fixed stations located downstream of wellfield pump station, regulating tanks, BPT, Madaba PS and Abu Alanda reservoir. Mobile units provided at turnouts and 7 stations at the wellfield.
Reservoirs	Characteristics of Reservoirs
Dabuk Reservoir	250,000 m ³ concrete reservoir that is already in operation.
Abu Alanda Reservoir	150,000 m ³ concrete reservoir.

2. LEGAL AND INSTITUTIONAL ASPECTS

The Project Environmental and Social Assessment (ESA) has been prepared to comply with the applicable policy, legal and administrative procedures of the Hashemite Kingdom of Jordan.

2.1 HK JORDAN EIA REQUIREMENTS

The primary legislation now in operation in Jordan is the 2003 Environmental Protection Law No.1 (EPL), and the subsequent Environmental Impact Assessment Regulations (37) of 2005 which were implemented after the completion of the 2004 ESA Study.

The 2003 EPL created the Ministry of Environment (MoE) as the body with responsibility for environmental affairs in Jordan.

The 2005 Environmental Impact Assessment Regulations sets out the issues that should be considered in the EIA, and the range of projects that are to be subject to regulation. It also outlines the information that should be provided in the Environmental Impact Statement (EIS), to be submitted to the Directorate of Licensing and Guidance at the Ministry of Environment (MoE).

Figure 2 summarizes the EIA process now adopted.

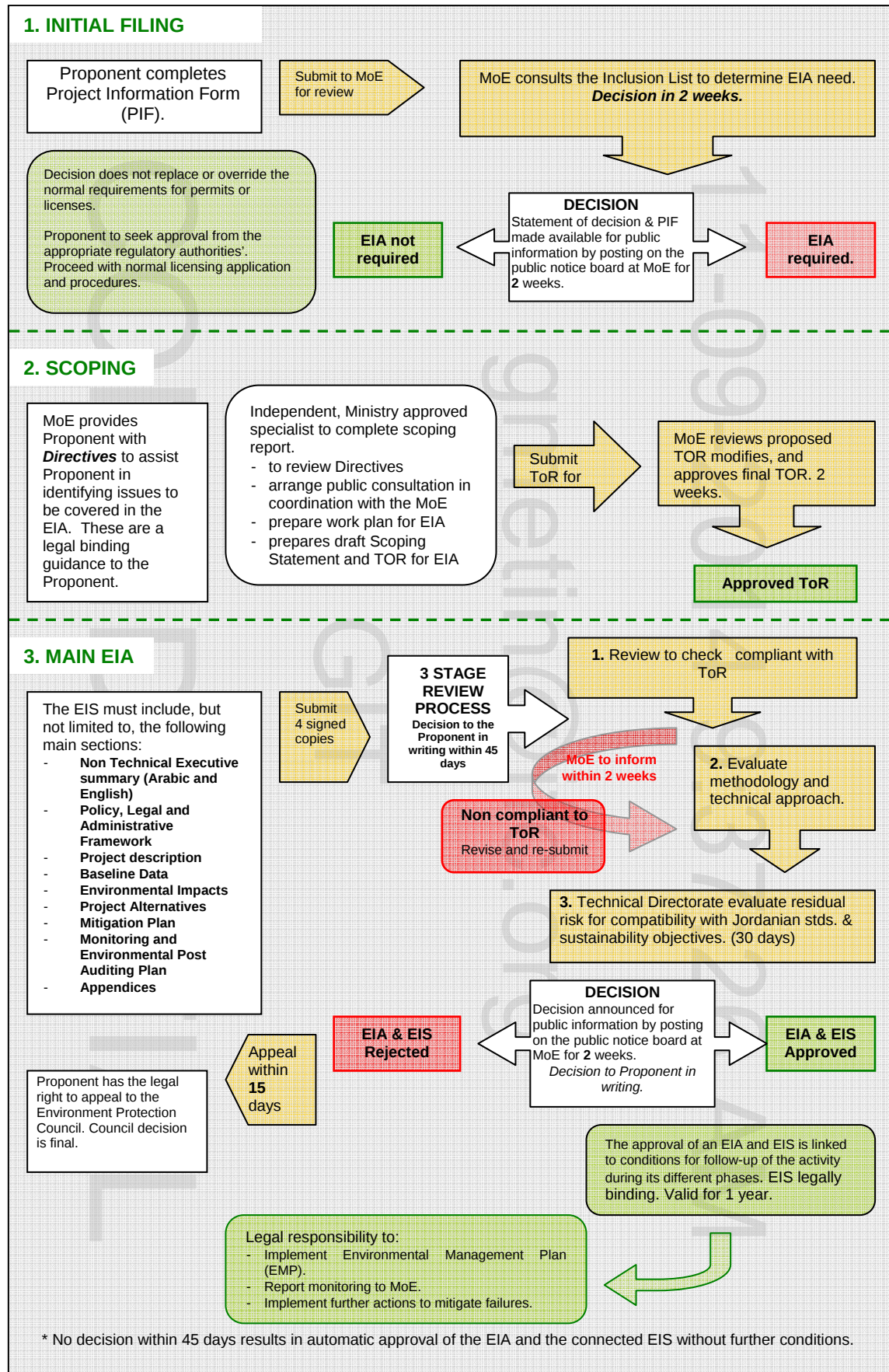


Figure 2 National EIA Process

ASEZA have the authority to apply environmental regulations within the ASEZA area. This includes the right to require EIA studies be undertaken and the right to review Project EIA reports. Although the Disi Project may have indirect impacts on Aqaba, the entire project infrastructure lies outside the ASEZA area and therefore ASEZA are not required to provide approvals.

2.2 OTHER APPLICABLE POLICIES

The original ESA Report was prepared in compliance with World Bank Guidelines, as a Category A project. It is anticipated that international financing agencies will assess the project against current internationally accepted standards, which may include the 2007 International Finance Corporation's Performance Standards on Social and Environmental Sustainability and the Third Edition of the World Health Organizations's Guidelines for Drinking Water Standards.

3. ANALYSIS OF ALTERNATIVES

3.1 ALTERNATIVE RESOURCES

Jordanian water resources, and their development, have been the subject of extensive study since the 1970s.

The 2004 ESA reproduced a simple summary Table of the forecast water supply and demand for the period 1998 – 2020 that illustrates the distribution of water consumption by 'Sector' and the expected deficit in supply. This highlights the scale of the water deficit problem facing Jordan.

Year	Water Demand (MCM /yr)			Water Supply (MCM /yr)			Deficit
	Municipal	Industrial	Agric.	Municipal	Industrial	Agric.	
1998	297	45	922	236	38	561	429
2000	321	54	922	239	37	541	480
2005	382	80	981	281	76	729	357
2010	435	102	1002	380	93	742	324
2015	520	134	992	463	112	700	371
2020	615	168	963	517	130	662	437

Source MWI, 2003.

The following Table presents the water resource development programme specified in the JICA 2001 Updated Investment Programme. This shows the relative decline in the significance of renewable groundwater and the relative importance of the Disi Project in providing freshwater. Excluding, TSE re-use as unsuitable for domestic consumption only 50 MCM /yr will be added to the supply including a forecast 65MCM/yr contribution from Disi.

	Existing	2001-5	to 2020	Increment 2005 – 2020
Surface (MCM/yr)	303	424	446	22
Renewable Groundwater	420	368	275	-93
Brackish Desal.	0	20	76	56
TSE Reuse	64	112	246	134
Fossil Freshwater (Disi)	70	65	130	65
Other water(1)	33	60	60	0
Total	890	1049	1233	184

(1) So called Peace water from Storage on Jordan Valley and side wadis

A synopsis of the present consensus would be as follows:

- In the absence of a major shift in water consumption patterns in which large quantities of water are shifted from agricultural production to Municipal and other consumption Jordan, and Amman in particular, will continue to face major water shortages. The degree to which a shift of resource consumption of the

scale required can be achieved in the present socio, economic and political climate is perhaps the most significant area of divergence in thinking. However, for the present and immediate future no such shift is planned.

- Virtually all of Jordan's significant renewable surface and groundwater resources have now been brought into production. In the Amman area, the major sources, the upland aquifers, are in danger of being over exploited and are in need of significant protection. The Azraq aquifers, while now at least partly protected, have already been badly damaged with resulting serious degradation of the Azraq wetland.
- In the near future, additional water will have to come from major infrastructure projects such as Red Sea desalination plants and even potentially from projects such as the Red Sea Dead Sea Canal or, from the remaining major undeveloped source, the fossil Disi Aquifer.
- Although the Disi project will provide significant amounts of water to Greater Amman it alone will not be sufficient to overcome the gap between forecast water demand and available supply. Therefore, it will need to be complemented with actions to mobilize additional water resources, including non-traditional sources and to address demand management, especially among other sectors.

In summary, under a 'No Action' Scenario the available supplies for the growing population of Greater Amman will further deteriorate and could over the medium term become critical with the possibility of rationing during the summer months.

The application of policy based demand management strategies at the scale required to have a marked effect on supplies to Amman is unrealistic over the short and medium despite recent major efforts by the authorities.

In these circumstances, it can be seen that there is an immediate need for provision of a major new source through capital investment. At this time the Disi aquifer is the preferred option of the Government. In this regard it should be noted that the proposed project will be constructed to have an extended lifespan and will be available to convey desalinated water from Aqaba to Amman in the future if need be.

3.2 DEVELOPMENT OF THE WELL FIELD

Two alternative sites were originally identified for the development of the well field; namely the Dubaydib site (adopted) located in the unconfined Rum aquifer, and the Batn El-Ghoul site located in the confined Rum aquifer.

The water in Batn El-Ghoul contains higher Fe and Mn concentrations (more than 5 mg/l), which would need treatment to remove these concentrations. The other constraint with abstraction from the Batn El-Ghoul well field is the expected water quality deterioration in the aquifer due to the downward leakage from the Khreim Group (containing highly saline water) as abstraction proceeds.

3.3 ALIGNMENT OF THE PIPELINE

The proposed pipeline alignment was developed in response to two principal criteria:

- Minimise the need for land acquisition.
- Optimise the design to limit pipe sizes and pumping requirements.

The resulting design has the pipeline running within Public Highway rights of way north of Hesa township and through developed areas.

Substantial refinements to the selected alignment may be anticipated during the detailed design phase but these are not expected to require additional land acquisition. However, they may include crossings of main highways and other substantial shifts within the ROWs.

Less significant site specific changes may also be expected. As an example, the alignment has been modified at Abu Alanda, to avoid direct impacts to the cultural heritage site, the Cave of Seven Sleepers, and the surrounding area.

4. **SIGNIFICANT SOCIAL AND ENVIRONMENTAL IMPACTS**

Positive impacts will be generated by the supply of potable water to Amman.

Adverse impacts will be generated mostly as a result of construction activities and will be temporary and local in nature.

4.1 **PROJECT SPECIFIC IMPACTS**

4.1.1 **Construction Impacts**

Between Hesa and the proposed storage termini the alignment utilises public highway rights of way and project impacts are quite diverse.

Seven categories of impact are defined.

Compensation

With the exception of one remaining plot (for the Madaba Interchange pumping station) land acquisition has been completed for the Project.

Compensation issues therefore relate to five cases.

1. Removal of (**illegal**)¹ assets within Road Rights of Way. It is evident from reconnaissance surveys² that some homes and businesses (and associated assets) are located partially within the road rights of way and may be adversely affected by the Project.

2. Annual Crops

Some other areas on the margins of the ROW have been used for small scale agricultural production.

3. Potential loss of earnings resulting from temporary loss of access. Inevitably, the construction of the proposed pipeline along road ROWs will have the effect of isolating properties and businesses from their existing point of access. In this instance two basic cases can be defined:

- Temporary, total or partial loss of access to the facility.
- Temporary loss of car parking areas and forecourts.

These impacts have the potential to cause a loss of trade and thus income.

4. Nuisance from loss of access. As with businesses, residential units and other structures, including community facilities, may have their access restricted for an extended period. This will have nuisance impacts and in the case of social infrastructure could reduce the level of service provision available to communities.

5. Contractor negligence (i.e unplanned actions) resulting in loss of or damage to assets with or without secondary impacts of loss of earnings.

¹ In most instances it is assumed here that any asset remaining within Road ROWs is illegal. However, it is possible that there are various forms of informal or unregistered title, including the custom of construction within the right-of-way, usufruct rights (permanent or temporary use), and others that may be 'legal'

² It is also understood that some government buildings are within the right of way.

Nuisance Effects

Nuisance effects will arise mainly from noise and dust generation but may also be manifest in other ways including, disruption in water and power supplies.

Main affected areas include:

- The Residential surrounding the proposed new Abu Alanda reservoir,
- Mixed residential neighbourhoods and “service/commercial” establishments areas along the alignment between Abu Alanda reservoir and Amman-Madaba Bridge.
- the establishments located between Amman-Madaba Bridge and Aljiza area within the project corridor and the Qatraneh area.
- From Al Jiza to Airport bridge
- From Airport bridge to Dabuk reservoir.
- Populated are between Qatraneh cross road to Al Jiza.
- From Al Jiza to Airport bridge
- From Airport bridge to Dabuk reservoir.
- From Madaba interchange to Abu Alanda reservoir.
- Between Jurf Al Darwish to the Qatraneh cross road.

Effects associated with the actual preparation of the pipeline trench and pipe laying will be short term and in these cases affected properties may expect to suffer nuisance effects for 6-8 weeks only.

However, properties in proximity to unsurfaced construction access roads may suffer nuisance over a considerably longer period. Similarly, any receivers in proximity to fixed project sites, camps and yards, processing plants would be subject to significant nuisance over an extended period.

Waste Management

The construction phase will result in the generation of solid liquid waste. Sources will include:

- Work force domestic waste; expected to be between 9-18 m³/capita/year liquid waste 0.5 kg/capita/day solid waste from project offices, camps and storage locations.
- Routine maintenance and servicing of vehicles and construction machines as well as from the different construction activities.
- Waste construction materials

In all such cases discharge or dumping of the waste at unapproved sites will have strong adverse effects.

In addition hydrotesting³ of the pipeline will be undertaken prior to commissioning. This could include the discharge of large quantities of ‘tainted’ wastewater.

Public Health and Safety

Project construction activities will pose a threat to public health and safety, especially along the urban route branches to Abu Alanda and Dabuk, and in the populated parts of the central section (between Hesa town and the Madaba interchange). These threats will also extend to the workforce.

Principal areas of concern include:

- Vehicular-pedestrian conflicts along all project affected road rights of way.

³ Process of using water under pressure to test the integrity of pipelines and vessels

- Deep excavations close to residential areas especially in Abu-Alanda, Dabuk and Qatraneh areas. These will pose a particular hazard to vehicle drivers and pedestrians at night time.
- Potential collision risk as a result of the movement and operation of heavy equipment within the construction sites and along the project corridor.
- General operation of heavy plant and equipment in close proximity to residential areas.

Access and Traffic

Access roads will be required to serve construction activities along the project corridor and permanent access roads will be required to serve the new infrastructure. Potential adverse impacts from such roads include:

- Changes in local geomorphology and the natural landscape, especially in the northern and middle sections of the corridor;
- Damage to natural habitats and destruction of natural vegetation, especially in the northern and middle sections of the corridor;
- Increased accessibility to sensitive sites (habitats and cultural resources);
- Soil compaction and erosion; and

The final alignment within the Public Highway ROW has not been fixed, however, in all cases, extensive disruption to traffic flow will occur. The scale and extent of the disruptions at specific locations will be a function of the actual position of the alignment with respect to road carriageways.

Archaeological and Cultural Heritage Impacts

Two known, significant, cultural sites were found to be affected by the project; the area of Cave of Seven Sleepers and the Mausoleum.

For the Cave and the surrounding area, MWI have accepted an alignment as distant from the site as practicable within the available ROW. The Mausoleum site is fenced but will require specific additional protection from the EMP.

In addition, given the high density of archaeological and cultural heritage sites in Jordan, the project will use "chance find" procedures should unknown or unrecorded archaeological sites be located during the course of excavations.

In such an event the well established practices of DAJ will be applied to ensure compliance with Jordanian Antiquities Law No. (12) of 1976 and the Regulations of Archaeological Excavation and Surveys.

Off Site Impacts

At this time the number and type of facilities that will need to be developed, or existing facilities utilised, to meet Project needs is unknown. Facilities that could be required may include:

- Borrow Pits
- Aggregate crushing and batching plants
- Asphalt Plant
- Construction camps and lay down areas
- Other materials storage and maintenance areas
- Water sources – Wells.

Clearly, each of this type of facility will generate its own impacts which will be more or less significant given the physical and socio-economic context within which it is placed. Nevertheless these sources of impact are identified as having the potential to be the most damaging of all Project Impacts.

Impacts in the remote areas between Hesa and the wellfield are expected to be relatively benign. There are six reasons for this:

- There are no communities in proximity to project work sites.
- Project activities are considered unlikely to have an adverse effect on existing traditional communities lifestyles or livelihood.
- There are few known significant resources, natural, biological or cultural that may be adversely affected.
- At the micro level, there are very few constraints to the location of the alignment. Therefore, in the event that significant resources are identified during the detailed design stage they may be protected by local shifts in the alignment.
- Project activities will be confined to a narrow, well defined corridor.
- Construction activities are not complex and with the exception of chlorine (for use during commissioning) do not require extensive use of hazardous materials or processes.

Notwithstanding the above, the following potentially significant impacts are identified:

- Possible damage to vulnerable desert habitats from uncontrolled vehicular movements
- Disturbance effects on breeding and migratory birds

Impacts in the vicinity of the well field are largely confined to potential impacts on the ecology of the area. The ecology study concluded that the well field area contains the least disturbed habitats affected by the Project and includes areas of potential significant conservation value. The major concern relates to the location of elements of the well field within a designated important bird area (IBA).

However, following discussions with RSCN, the agency responsible for IBAs in Jordan, a no objection to development in the well field area was obtained under the specific conditions listed below:

- Construction should minimise the effects of well construction on natural habitats
- Avoid Construction during crucial periods and in important habitats, especially those for breeding raptors and others (March – May)
- Proper disposal of waste materials during drilling and extraction and removal from site of all excess materials and debris
- All pits are to be filled
- Construction should take place outside of key periods; breeding, nesting and roosting.
- If any planting is proposed only native species should be used.
- All workers should be aware of the importance of the area and of the effects of harmful activities which should be banned.

4.1.2 Operational Impacts

The 2004 ESA defines only the effects on Biological resources as potentially significant. Specifically, the disturbance to breeding and migratory bird species and other wildlife, increased human interference and access to wildlife areas and the fragmentation desert habitats that are already under stress.

Moderate impacts were also defined in respect of impacts to groundwater resources and impacts on agricultural activity.

During the operational phase of the project impacts to the Disi aquifer as a result of abstraction from Batn El-Ghoul well field include the potential deterioration in water quality due to the downward leakage from the Khreim Group (containing highly saline water) as abstraction proceeds. To prevent such a process from occurring, a limited volume of water is to be abstracted from this well field keeping the water level of Rum aquifer higher than the confining layer of the Khreim Group. The other inevitable impact is a depletion of the resource over time.

5. ENVIRONMENTAL MANAGEMENT PLAN

The Project EMP has been prepared in response to the findings of the original ESA, the adoption of a BOT approach to project implementation, and to meet the specific needs of international financing agencies.

The proposed EMP has four components:

1. Mitigation Plan: This comprises three elements. A Design Review, a Compensation Plan and a Construction Management Plan;
2. Monitoring Plan; for all project phases.
3. Communications Strategy
4. Implementation Plan (IP) for all project phases. In addition to addressing project implementation and reporting arrangements, the IP links all major EMP activities to project schedules and milestones

In addition, the EMP requires that the eventual operator of the Project must have in place a comprehensive EMS. It is expected that this will ensure that the issues defined in this ESA and this Addendum will be adequately addressed. Therefore, the emphasis in this EMP is on the management of impacts that may arise from the pre-construction and construction Phase of the Project.

5.1 MITIGATION PLAN

The proposed hierarchy of mitigation measures is set out below.

Mitigation Hierarchy	Rationale	When in ESA process	Impact management tool or measure
<i>Avoid impact (eliminate)</i>	<i>Early identification of impacts and subsequent adjustment of design and timing where possible to avoid sensitive environments.</i>	<i>Design Review Detailed Design Stage</i>	<i>The first tier of impact mitigation for the Disi conveyance scheme has been carried out by alignment readjustments to avoid sensitive habitats, cultural sites, and non-government land.</i>
<i>Remedy or offset impact</i>	<i>When significant effects remain that cannot be prevented or reduced, they are offset by remedial or compensatory action.</i>	<i>Compensation Plan Detailed Design Stage</i>	<i>Financial compensation for lost assets Compensation payments for financial loss/loss of land. Creation of compensation habitat and/or enhancement of habitat. Relocation of assets i.e. trees, archaeological features, monuments, public art.</i>

<i>Reduce impact severity</i>	<i>If adverse effects cannot be prevented, steps taken to reduce them through such methods as minimisation of cause of impact at source, abatement on site and abatement at receptor</i>	<i>Construction Management Construction</i>	<i>Measures to reduce impacts include:</i> <i>Use of abatement equipment at construction sites.</i> <i>Provision of abatement equipment to receptors.</i> <i>Use of alternative construction process.</i> <i>Operational controls</i> <i>Measures implemented and monitored through a Construction Environment Management Plan (CEMP).</i>
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Design Review

The proposed Design Review has two objectives:

- (i) To eliminate or minimise potential adverse social and environmental impacts by subjecting the proposed final conveyor alignment to a multi disciplinary review.
- (ii) To demonstrate that full coordination has been undertaken with the relevant utility authorities and with other ongoing and committed projects. This should serve to minimise adverse effects on local communities.

To provide evidence of the completion of a Design Review, the EMP requires that a Design Review Report is included in the final design documentation.

Compensation Plan (CP)

Compensation requirements for the Project are outlined in the proposed Entitlement Matrix in Table 2 and the EMP specifies the process required to establish and implement a CP.

The preparation and implementation of the proposed CP will require completion of the following tasks at least 15 days prior to the handing over of the ROW to the contractor.

- *Confirmation of Entitlements Matrix*
- *Compensation Inventory*
- *Notification*
- *Valuation and Negotiation*
- *Appeal Process*
- *Completion*
- *Monitoring*

In addition, it is possible that a number of PAPs will be from vulnerable groups, that may be subject to pressure or harassment to sign over their rights or relinquish their entitlement. Therefore the CP contains specific provision for dealing with the entitlements of vulnerable groups.

Construction Environmental Management Plan (CEMP)

The objective of CEMP is to ensure that all contractors performing work on the DP do so in accordance with regulatory requirements and that in doing so they:

- Formulate comprehensive work instructions to be adopted by contract personnel for the protection of the quality of the environment,
- Take action to eliminate or minimize risks of harm to local ecosystems,
- Assure the protection of the environment based on sustainable development principles,

The CEMP is the mechanism by which it is proposed potential construction impacts will be managed. At this time it is envisaged that the CEMP will comprise a Compliance Framework document supported by separate guidance notes as follows:

Guideline CEMG-01	General Guidelines
Guideline CEMG-02	Waste Management
Guideline CEMG-03	Hazardous Materials Management
Guideline CEMG-04	Construction Camps
Guideline CEMG-05	Access Management Plan
Guideline CEMG-06	Borrow Sites
Guideline CEMG-07	Ecology and Wildlife Management
Guideline CEMG-08	Cultural Heritage

In each case the CEMG guidelines will be designed to meet the requirements of both the relevant National Environmental Standards and the requirements of international finance agencies.

In addition, specific contract provisions will be required to mandate formal adoption by all 'Project Contractors' of a Community Relations, Security, Health, Environment, and Safety Plan or equivalent.

The CEMP requires that the EPCC makes reasonable efforts to conform to the specified CEMGs.

Persistent non-compliance with the requirements of the CEMGs shall incur negative performance points (NPPs) that will reflect the contractor's poor performance in meeting their environmental obligations.

Negative points will be used in assessing a company's environmental performance and the need or otherwise for the implementation of penalties. The Negative Performance Point scale shall be based on the nature and severity of the non-compliance events, and will be specified with respect to pre-defined inspection checklists made available to the EPCC.

The compliance status of the EPCC will be determined in quarterly reports prepared following site inspections using the pre-prepared checklists.

The CEMP will be prepared by PC and certified as compliant with the requirements of this EMP by PC.

Table 2 Entitlements Matrix

Adverse Project Induced Effect	Compensation need	Status	National Legislative Framework	Compensation Responsibility
Land Acquisition				
Land acquisition for project construction	Reasonable compensation payment for land acquired	MWI advise that major acquisitions already completed and compensation paid. Only outstanding acquisition is for Madaba pump station site.	Land Acquisition Law (LAL)	MWI and Department of Lands
Other Compensation – Legal Assets and Activities				
Destruction of assets. May include businesses, walls, trees, forecourts, utilities infrastructure.	Payments to replace lost assets at market value.	MWI advise that compensation has been paid as per requirements of LAL	Land Acquisition Law	MWI and Department of Lands
Damage or loss of crop or part of crop by temporary use of land by contractor	Payment for lost income	No actual case defined at this time. Proximity of agricultural lands to Project alignment is such that some crops may be lost To be addressed on case by case basis during construction These impacts can be easily excluded by good Contractor Management	LAL requires payment of equitable compensation Use of Civil Law (Articles 256-287). Or Directly negotiated settlement	MWI
Temporary loss of access and nuisance values resulting from planned construction activities.	Possible compensation for nuisance values or impacts on business activities	Not addressed	Use of Civil Law (Articles 256-287) Compensation requirements not explicitly set out.	No legal basis for allocating payment. As a planned project activity MWI to negotiate and pay compensation
Loss of business or income from dislocation caused by planned project activities.	Owner Payment for lost income Employee Compensation for income lost as result of loss of employment or reduced wages/salary.	Not addressed	Use of Civil Law (Articles 256-287) Compensation requirements not explicitly set out.	No legal basis for allocating payment. As a planned project activity MWI to negotiate and pay compensation
Other Compensation – Assets and Activities Within Highway Rights of Way Required by Project				
Destruction of assets. May include businesses, walls, trees, forecourts, utilities infrastructure.	Replacement of lost asset	Not addressed	None	As a planned project activity MWI to negotiate and pay compensation
Temporary loss of access to assets as a result of planned construction activities.	Possible compensation for nuisance values or impacts on business activities	Not addressed	None	As a planned project activity MWI to negotiate and pay compensation

Loss of business or income from dislocation caused by project activities.	Owner Payment for lost income Employee Compensation for income lost as result of loss of employment or reduced wages/salary.	Not addressed	None	As a planned project activity MWI to negotiate and pay compensation
Other Compensation – Damage / destruction resulting from unplanned Construction Activities				
Damage or destruction to assets resulting from unplanned actions.	Payments to replace lost assets at market value. Replacement of asset by contractor at cost to project.	Not addressed	None	As an unplanned project activity Contractor to negotiate and pay compensation
Loss of access beyond duration of planned compensated for event.	Further nuisance effects.	Not addressed	None	As an unplanned project activity Contractor to negotiate and pay compensation
Loss of business or income from dislocation caused by unplanned activities.	Further loss of income and incremental loss of customer base.	Not addressed	None	As an unplanned project activity Contractor to negotiate and pay compensation
Other Compensation – Temporary Access to Lands Beyond Project ROW for Project Purposes				
Right to use	Compensation due for use of lands.	Not specifically addressed. If required assumed to be a case by case negotiation.	Use of Civil Law	Contractor

5.2 MONITORING PLAN

The proposed Monitoring Plan (MP) comprises four elements

- CEMP Monitoring
- CP Monitoring
- Environmental Quality Monitoring
- External Monitoring

At the operational stage remaining impacts will be managed through a series of O&M Procedures developed under the framework of the proposed EMS for the operation of the Project. These are not reviewed further in the ESA.

CEMP

Monitoring will be undertaken to verify and document that construction and commissioning activities associated with the construction of the pipeline and associated facilities (temporary and permanent) are conducted in compliance with the requirements of the CEMP. It will also ensure the feedback necessary to update and revise the CEMP is available.

The principal mechanism by which monitoring will be achieved will be a programme of site inspections and audits. However, it is also required in this EMP that the EPCC has the capacity to undertake environmental quality monitoring in response to complaints from the community.

Primary responsibility for monitoring compliance with the CEMP will rest with the EPCC Environmental Monitoring Units⁴ (EMU). Staff from the EMU will carry out regular site inspections using pre-prepared checklists. Monthly inspection and compliance reports will be issued to PC and to the MoE.

These inspections are intended to provide the contractor with an internal record of his performance in respect of the CEMP and to indicate areas of non-compliance.

To further facilitate effective implementation of the CEMP, weekly meetings will be held between EPCC and PC Environmental Units to discuss project issues and areas of concern to all parties.

The application of contract penalties as specified in the CEMP will be based on the findings of validation inspections carried out on a quarterly basis by PC using the same checklists used by the EPCC in their internal inspections.

PC will retain the capacity to undertake audits to monitor project construction sites and camps including sites beyond the construction corridor i.e. waste disposal sites. Annual audits will be undertaken of all major facilities including the following:

- Main Construction Camps and Yards;
- Labour Camps;
- Main Non-Hazardous Material Storage Area;
- Hazardous Materials Storage and Use;
- Waste Disposal Sites,

⁴ Given the length of Project Pipeline it is expected that monitoring would be split between individual EMUs assigned to the management of Project Sections. Environmental monitoring reports for the various project Sections will then be collated by the Environmental Manager and submitted to the DPAC.

Subsidiary and/or temporary camps, yards and storage area, small sites, and other sites outside the area of construction, for example, quarries and fabrication yards, may be subject to audit on a random basis.

The CEMP requires that the EPCC retains the capability to undertake environmental quality monitoring in respect of water quality, air quality (dust) and noise in response to complaints received or at the request of PC. In all cases the decision to undertake such surveys will rest with PC.

The equipment required for this purpose should be purchased by the EPCC to specifications provided by PC. All EPCC EMU staff shall be trained in the use of such equipment.

CP Monitoring

Two forms of Compensation Plan monitoring are proposed.

- Internal Project Monitoring of the Performance of the CP with respect to the effectiveness of the processes established and ultimately therein, the disbursement of compensation.
- Independent Monitoring of the Processes and the Compensation Award.

Environmental Quality Monitoring

Three EQM programmes are proposed:

- (i) Water Quality: This will comprise Baseline and monitoring surveys. In both cases, sampling and testing of water quality in compliance with JS 286/2001 Drinking Water Quality.

For the Baseline study, water will be abstracted from three well sites selected by MWI to represent the well field. These samples shall be tested during the detailed design phase and a report prepared for submission to WAJ for approval for use as a potable water source.

After the first year of well operation the frequency and parameters to be tested will be as defined under JS 286/2001.

Water quality shall be monitored during operations by the operator and monthly compliance reports (with respect to JS 286/2001) provided to DPAC, MoE and WAJ.

- (ii) Biodiversity: Biodiversity assessments will be carried out for the well field area and the alignment from the well field to the public highway. In the well field this will comprise of a review and a specific well sites and proposed alignments for local access roads and power lines. Outside the well field it will comprise of a rapid appraisal of the final alignment. In each case the objective of the assessment will be to define baseline conditions and to identify sites at risk that may need to be the subject of specific design consideration and or construction planning and management.

During construction sites identified as at risk will be subject to monitoring by an ecologist during the period they are considered to be at greatest risk.

After construction is completed further monitoring will be required over a period of 3 years to ascertain if possible changes to access patterns resulting from project construction and associated possible changes in resource use patterns have affected or could affect any identified significant resources.

This will take the form of discussions with traditional communities and site visits. 6 visits are proposed for an ecologist over the duration of 3 years.

(iii) Condition of Renewable Water Resources: Disi Project documentation is explicit in determining that a principal benefit of the Disi project is that it will reduce the extraction pressure on the renewable aquifers that currently supply potable water to Amman and therefore will permit some recovery in the quality and quantity of water available from these resources in the future.

Accordingly, the project should seek to measure the extent to which these benefits actually accrue.

It is understood that most of these aquifers are regularly monitored by the authorities and that good existing trend data is available. In this case it is proposed that DPAC prepare a 2008 baseline report of the key aquifers indicating their present status and forecast their future status based on present trends.

This document should be reviewed and updated at the time of start of operation of the Disi Conveyor and every 5 years thereafter for at least 15 years.

External Monitoring

The different international financing agencies will determine their own monitoring programme in compliance with their specific requirements.

5.3 COMMUNICATIONS STRATEGY

It is proposed that the Project Company establish a Communications Strategy. In part this will address the specific needs of the EMP but it is also intended to ensure that relations with affected communities remain positive throughout project construction and operation, and to ensure that the project has in place a specific strategy and policy for dealing and other external parties.

Future consultation is anticipated according to the schedule below.

Action / Stage	Meeting
Draft Design	Community Meeting 1
Final Design	
Before construction start (CS)	Community Meeting 2
90 days after CS	Community Meeting 3
360 days after CS	Community Meeting 4
720 days after CS	Community Meeting 5
1080 days after CS	Community Meeting 6
1460 days after CS	Community Meeting 7

5.4 IMPLEMENTATION PLAN

5.4.1 Proposed Institutional Framework

An Institutional framework is to be established to implement the EMP. The structure proposed is shown in Figure 3.

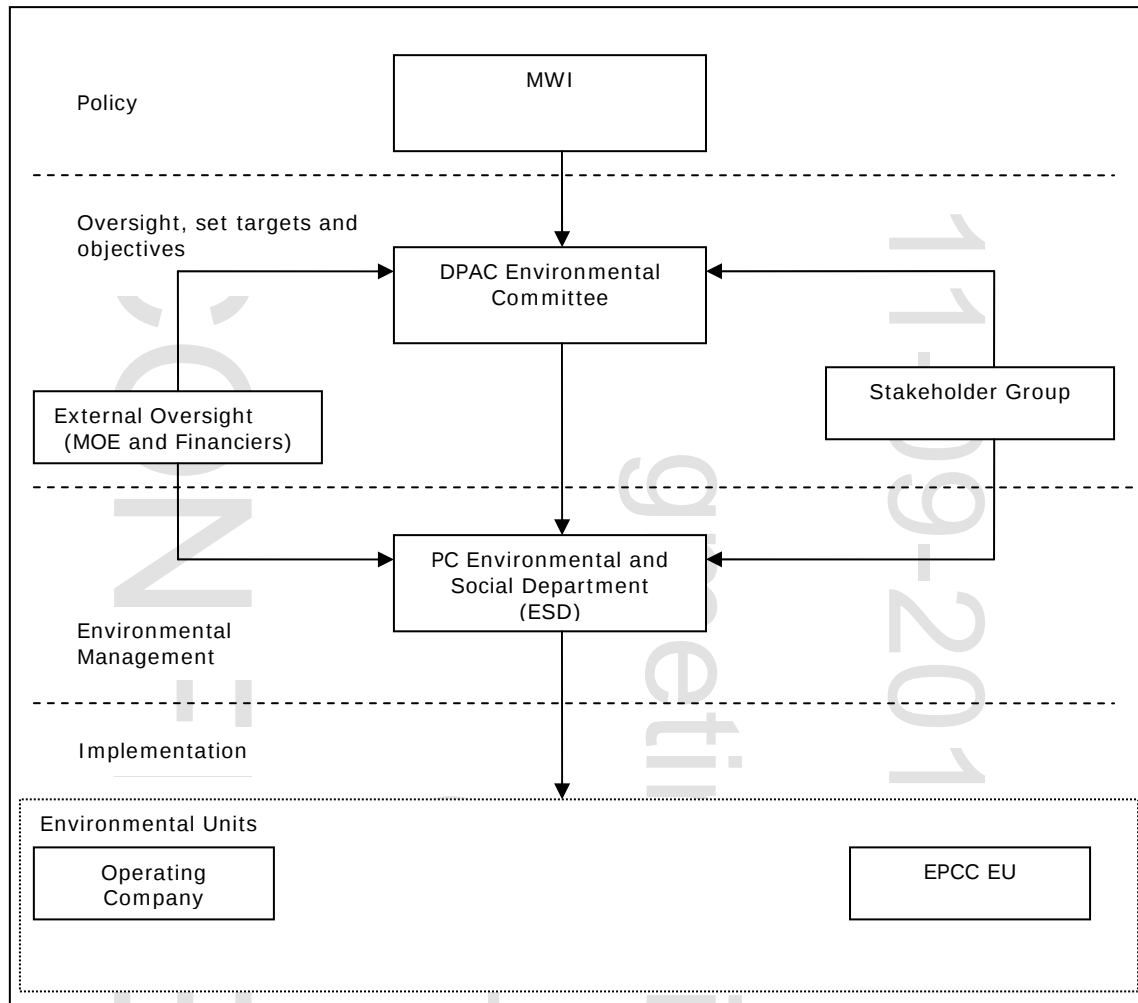


Figure 3 Proposed EMP Implementation Structure

The principle roles of each of these parties in the implementation of the EMP are summarised below.

MWI

MWI represent the highest level of DP management and will be responsible for:

- Establishing the environmental policy for DP.
- Review, approval and release of the Annual Environmental Report.

DPAC Committee

The DPAC Environmental Committee will comprise of the review unit for DP environmental performance. Its members will be drawn primarily from MWI and representatives from other stakeholders.

PC

The PC will have primary responsibility for the design and implementation of the EMP.

EPCC Environmental Department

The EPCC will have primary responsibility for the execution of the Construction Environmental Guidelines (CEMP). Therefore, the EPCC will be required to establish environmental units for that purpose.

Stakeholder Group (SG)

The importance of stakeholder consultation is recognised in this EMP. Therefore it is proposed to establish a formal structure in which information may be passed between parties on a regular basis. The composition of this group can be determined at a later date but should include the following core members:

- PC Community Affairs Manager;
- Operations managers (as required);
- NGOs;
- Representatives from MoE; and,
- Representatives from MWI.

Other stakeholders may be invited to attend meetings to discuss specific issues these might include MoA, NRA, Police Department, Ministry of Agriculture.

External Oversight

MoE as the nominated National Authority for environmental affairs will undertake their normal oversight function on behalf of the Government.

International financiers will undertake external oversight to ensure compliance with their guidelines and standards and any conditions they may have imposed on project financing.

5.4.2 EMP Reporting and Review Process

Figure 4 provides a summary of the proposed Project Reporting Structure.

Without routine management review and support, the EMP will quickly cease to be a useful management tool. It shall therefore be the policy of PC to conduct a mid term review of its EMP during the Construction Programme.

5.4.3 Key EMP Milestones

The principal EMP Milestones are placed in the context of overall Project Milestones in Figure 5.

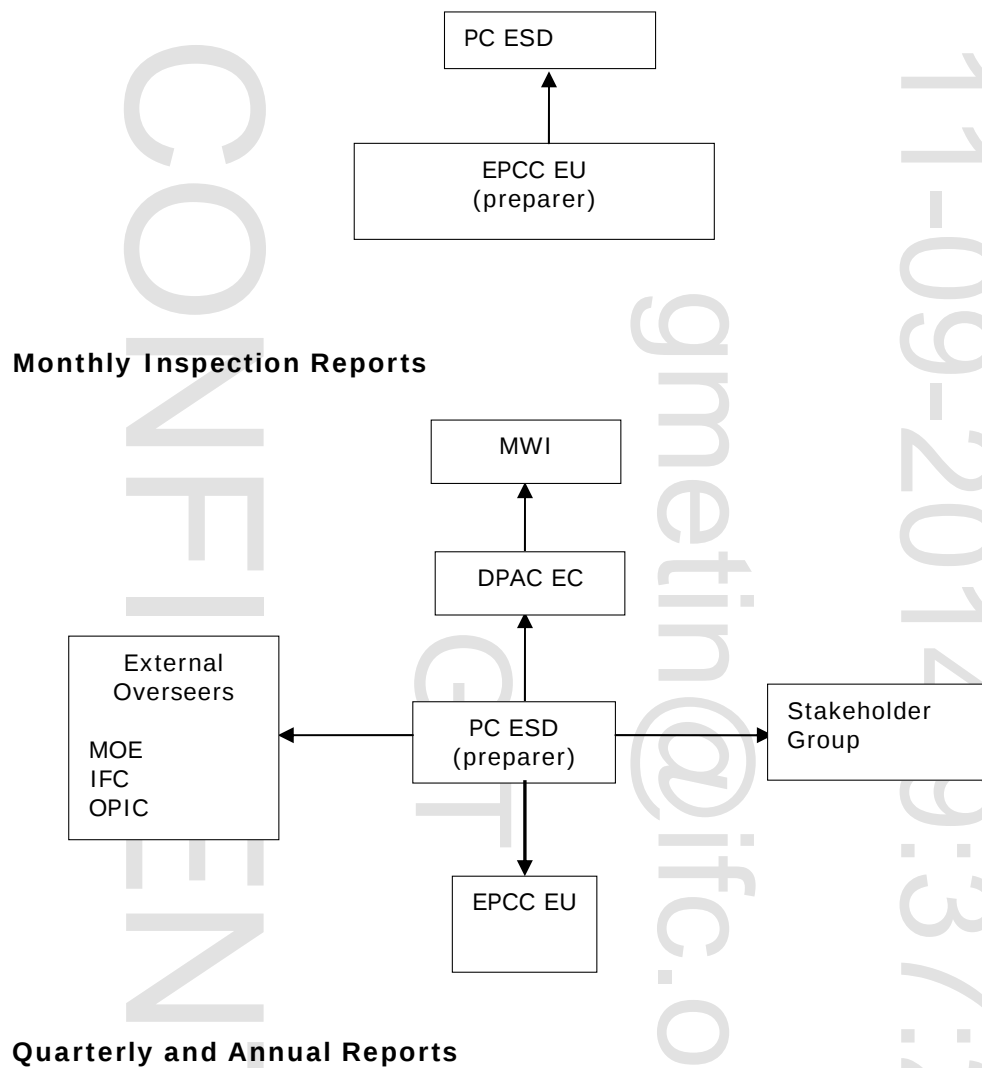


Figure 4 Summary of CEMP Reporting Structure

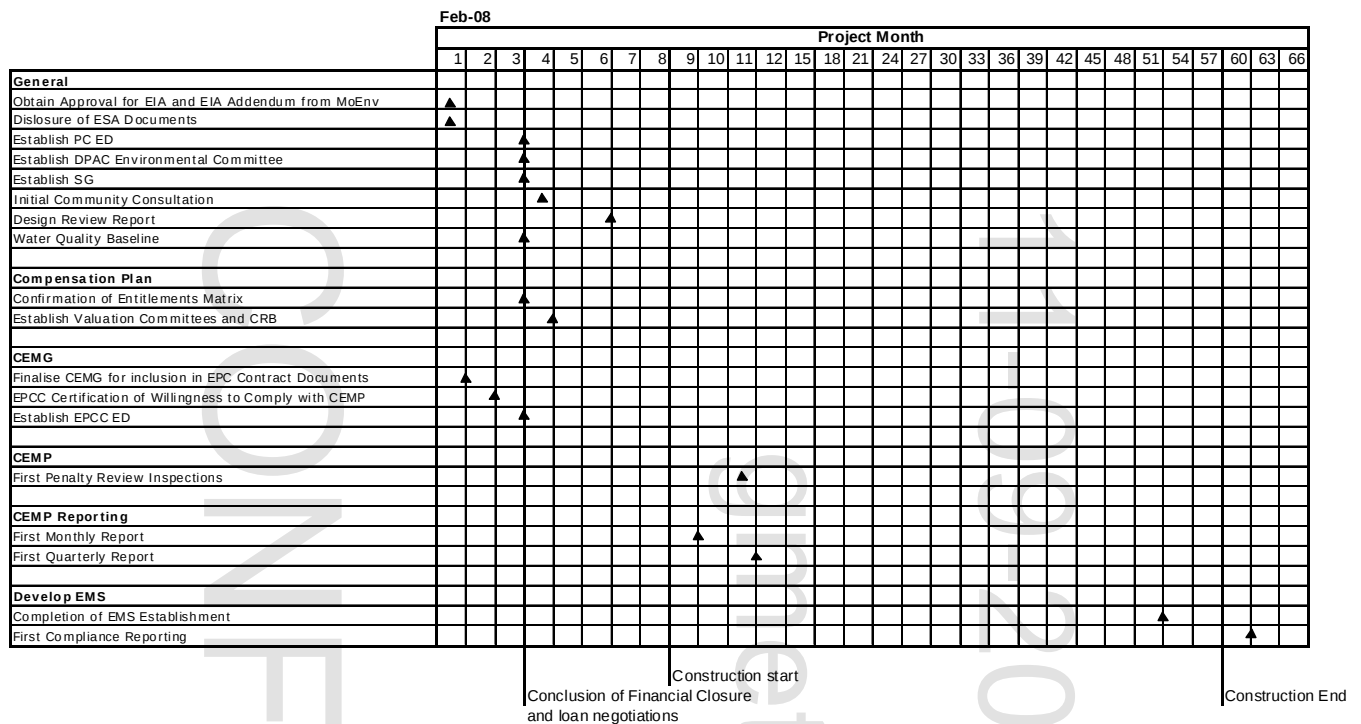


Figure 5 EMP and Project Milestones

6. PUBLIC CONSULTATION AND DISCLOSURE

6.1 PUBLIC CONSULTATION

During the course of the 2004 ESA a two phase Consultation programme was undertaken.

Phase One

Under the auspices of the Ministry of Water and Irrigation, two scoping sessions for the Project were held, on March 27th and April 3rd 2003 in Amman and Aqaba, respectively. Both sessions were well attended, and by a wide spectrum of government, national and NGO's representatives.

During the Scoping Sessions project representatives provided project information to attendees and substantive discussions were held. The principal findings of the Sessions are summarised in Table 3.

Of perhaps most importance was the almost unanimous support for the project among attendees.

In addition to the formal scoping sessions, the Consultants initiated a direct consultation process with the Governors and Mayors of the five Governorates of the south and other stakeholders in the region to garner their comments and views. In all cases the comments received were very constructive and strong support was expressed for the project.

Phase Two

In compliance with World Bank procedures, a second round of consultation sessions was held to present the findings of the Draft 2004 ESA to project-affected groups. To this end three consultation sessions were held on November 13th, 18th and 20th in Abu Alanda, Amman and Aqaba, respectively.

Arabic and English summaries of the Draft ESA study were distributed to attendees.

The resulting discussions were wide ranging and resulted in a number of issues being raised for discussion in the ESA, Table 4.

Table 3 Significant Issues Identified in the Public Consultation Sessions Phase 1

Assessed Component	Significant Issues
Water Resources	Contribution of the Disi Project to the Jordan Water Budget and alleviating water shortages.
Abiotic Environment	- Potential impacts of noise and dust to nearby communities and farms. - Increase in traffic during construction. - Need for planned construction access roads in the desert area. - Potential impact on soil stability and air quality during construction. - Public Safety of workers and local communities during construction. - Transportation from Aqaba Port and the need to coordinate with Port Institute.
Biotic Environment	- Destruction of Vegetation and disturbance of natural habitats. - Illegal hunting during construction. - Accumulation of solid waste - Potential impact on important bird areas.
Agricultural Resources	- Impact of dust on farms. - Sustainability of agricultural activities in the Disi area in terms of cost return, economic value and social value. - Reduction of agricultural areas or removing olive trees along the conveyor route.
Social Component	- Allocation of percentage of required labour for the local residents alongside the pipeline and Disi. - Abiding by government rules for public safety. - Launching public awareness of the project pre and during construction. - Compensation for any damage incurred during construction. - Taking all utilities and services into consideration in the design of the project. - Improving way of life with better water quality. - Disruptions of traffic movements - Impacts on tribal people
Archaeological and Cultural Heritage	Impact on archaeological sites, mainly the Cave of Seven Sleepers and Khirbet Es-Sug Mausoleum.

Table 4 Significant Issues Identified in the Public Consultation Sessions Phase 2

Assessed Component	Significant Issues
Social Component	- Contractor compliance to procedures of implementation and construction - Access to commercial shops to remain open during construction. - Taking all utilities and services into consideration in the design of the project. - Reinstating of existing roads. - Will the Disi project lead to a change in water tariff? - Coordination with MWI and MPWH regarding the route of the Disi Conveyor. - The environmental and social impacts due to the termination of the water permit contracts in Disi farms. - Provide training for locals to employ them in the operation of the Disi project. - The right of the Disi people to have drinking water and give organizations rights to dig smaller wells for agricultural use. - Improving way of life with better water quality. - Contractor to conform with the environmental and social management plan.
Water Resources	Contribution of the Disi Project to the Jordan Water Budget and alleviating water shortages.
Abiotic Environment	All new structures to be built in harmony with the surrounding environment.
Archaeological and Cultural Heritage	Impact on archaeological sites, mainly the Cave of Seven Sleepers and Khirbet Es-Sug Mausoleum.

2008 Consultation Sessions

Three further sessions were held in February 2008, at Disi Municipality, at Al Qatraneh Municipality and Quweismah (which includes Abu Alanda). The main issues of concern in each Municipality are highlighted below:

Issue	Disi	Al Qatraneh	Quweismah
How will the community benefit from this project?	x	x	
How will government address the community's need for water.	x	x	
Will there be job opportunities for the men of the municipality?	x		
Will university students receive scholarships for science related subjects and then be hired by GAMA during the	x		
Disi Aquifer is not a renewable source. Has the government looked into other alternatives for water?	x		
What is the fate of the current 20 wells that supply Amman with water?		x	
Have alternative routes been considered to minimize the construction cost and to avoid any possible damage to		x	x
What will happen to roads that are damaged by the construction of the pipeline? Again project experience for		x	
Will there be any pipeline maintenance stations close to Qatraneh?		x	
Other contractors during previous projects promised to hire workers from the municipality and failed to do so. Will		x	
Will dust and noise be taken into consideration when constructing the project?		x	
What is the duration of the project?			x
How will the company address negative impacts such as excavation activities and crossing streets?			x
Is the company aware of the proposed Municipality of Greater Amman to construct a bridge at one of the			x
Will the project consider working longer shifts in sensitive areas so as not to affect the businesses?			x
Will the Contractor meet the community after finalizing the pipeline alignment?			x