



**The Hashemite Kingdom of Jordan
Ministry of Water and Irrigation
Water Authority of Jordan**

Wadi Arab Water System II

Environmental and Social Impact Assessment Study



CONSOLIDATED
CONSULTANTS
GROUP

Non Technical Summary

November, 2015

INNOVATIVE SOLUTIONS...PROVEN EXCELLENCE

DESIGN

MANAGEMENT SERVICES

SPECIALIZED STUDIES

Table of Contents

Non Technical SUMMARY	S-1
1 INTRODUCTION.....	S-1
2 PROJECT DESCRIPTION	S-1
3 Legislative and Regulatory Considerations.....	S-4
4 Scoping Process and findings.....	S-5
5 Environmental and Social Baseline Conditions	S-8
6 Environmental and Social Impacts.....	S-13
7 Environmental and Social Management Plan (ESMP)	S-15
8 Conclusion Recommendation.....	S-29

List of Tables

Table S- 1: Results of the Scoping Session.....	S-6
Table S- 2: Summary PAP's Eligibility Determination Key.....	S-17
Table S- 3: Environmental and Social Management Plan (ESMP)	S-22

List of Figures

Figure S- 1:: Project Layout.....	S-3
Figure S-2: Biogeographic Zones of the Project Area	S-11

NON TECHNICAL SUMMARY

1 INTRODUCTION

The shortage of water in Jordan is a chronic problem that dates back as early as the 1970s. The late King Hussein was always keen at emphasizing that the development of the country's water sector is vital for the development of all other sectors in the country. Also, King Abdullah the Second considers the water issue to be of top priority in the work of the government. These considerations reflect the seriousness of the water problem in Jordan.

CDM International Inc. was retained by the United States Agency for International Development (USAID) to undertake the Water/Wastewater Infrastructure Project (WIP) for the purpose of improving the utilization of limited water resources in Jordan for the next 25 years and bringing about urgently needed enhancements to the water and wastewater systems. One of the tasks is to conduct Environmental and Social Impact Assessment (ESIA) to the Wadi Arab Water System II (a component of WIP Project) according to local, as well as European Investment Bank (EIB) guidelines. It worth mentioning that, the construction of this project is intending to be financed by EIB and AFD. However, financing remains subject to approval by their governing bodies and satisfactory legal documentation.

ESIA is a process where the future consequences of a proposed action or undertaking are identified and mitigated before irrevocable decisions are made. A well-constructed ESIA provides the basis for responsible corporate decision-making that is forward-looking and globally participatory. Potential issues are identified as early in the process as possible and solutions are developed to maximize project benefit while minimizing both front-end and downstream costs to development. CDM International Inc. commissioned Consolidated Consultants Engineering & Environment (CC) for the preparation of ESIA for the project of Wadi Arab Water System II. Accordingly, a team of experienced practitioners has been assembled to prepare the Scoping Statement Report/TOR and ESIA for the proposed project.

The executive summary covers the project description, the legislative and regulatory consideration, the scoping process, the environmental and social baseline condition, the environmental and social impacts and the environmental management plan.

2 PROJECT DESCRIPTION

Project Name: Wadi Arab Water System II

Location: The project is located in Shouneh/Manshyeh - Irbid Governorate; **Figure S- 1** shows the location of all facilities on Google maps. The City of Irbid is located approximately 70 km north of Amman and the Zabda Reservoir is located in Irbid at an elevation of 625 meters. The Village of Manshyeh is located in the Jordan Valley approximately 25 km to the west of Irbid at an elevation of -190 meters. The intake off the KAC and intake pump station is proposed to be located on the south side of the Village of Manshyeh while the WTP will be located to the east of the village.

The transmission pipeline will be routed in the Mosul-Haifa oil Pipeline, locally known as the TAP line (TAP) right-of way from the WTP to a location 2.25 km east of PS 3 where the pipeline changes direction to head northeast to the Zabda Reservoir following the existing Wadi Arab pipeline ROW acquired during the 1983 project.

Pump Station 0 (PS0) will be located adjacent to the reservoir within the WTP area. Pump Station 1 (PS1) will be located on newly acquired land approximately 2 km east of the WTP at elevation 10 meters. Pump Station 2 (PS2) will be located on land currently owned by WAJ and is approximately 3.8 km east of PS1 at elevation 235 meters. Pump Station 3 (PS3) will be located on land currently owned by WAJ and is approximately 8 km east of PS2 at elevation 422 meters. The existing Zabda Reservoir is located on land currently owned by WAJ and is approximately 9.3 km northeast of PS3.

Key Stakeholders:

- Client: Government of Jordan (GoJ) represented by Water Authority of Jordan (WAJ)
- Funding Agency/ Design: U.S. Agency for International Development design services.
- Funding Agency/ Construction: European Investment Bank (EIB) and Agence Française de Développement (AFD) joint financing of construction. However, financing remains subject to approval by their governing bodies and satisfactory legal documentation.

Scope of Work and Project Components: The project has the following components:

- Intake, Intake Pump Station and WTP (a new plant will have a design flow of 30 MCM/yr.
- Transmission Pipeline and Pump Stations (a transmission system comprises four (4) pump stations and approximately 25.6 km long pipeline. The pipeline size and type has been determined to be Welded Steel Pipe (WSP) with 1000mm in diameter. PS0 is located on the WTP site, PS1 is a new site while PS2 and PS3 are on existing WAJ owned land. PS1 and PS3 will include balancing reservoirs while PS2 will have a blending reservoir for mixing existing Wadi Arab Water System I water with proposed Wadi Arab II water.

Project Background and Rationale: The City of Irbid is located on a plateau at an elevation of around 500 m (1,640 ft) above sea level, while the sources of water associated with the study area are generally in the low lying valley areas as low as 200 m (656 ft) below sea level. More specifically, the sources of water relevant to the western region of the Irbid Governorate include:

- Groundwater from the Wadi Arab well field.
- Groundwater from the Mukheiba wells.
- Surface water from Lake Tiberius.
- Surface water from the Yarmouk River and the Al Wehdeh Dam.
- Treated Wastewater.

Additional Water supply is required for the region to cover the deficit, thus a 30MCM/year will be transferred from Lake Tiberius to the King Abdullah Canal (KAC) and it will be treated to comply with JISM Jordan Water Quality Standards (JWQS) (2008), and WHO Guidelines for Drinking-Water Quality” fourth edition (2011). This additional water will be provided as a result of the proposed implementation of the Red Sea-Dead Sea/Phase I swap agreement

During the project construction, 380 job opportunities (i.e. laborers, operators, drivers and engineers) will be created, while the project operation is expected to result in deferent levels of technical employment; the number of staff planned for the operation is expected to exceed 100 employees.

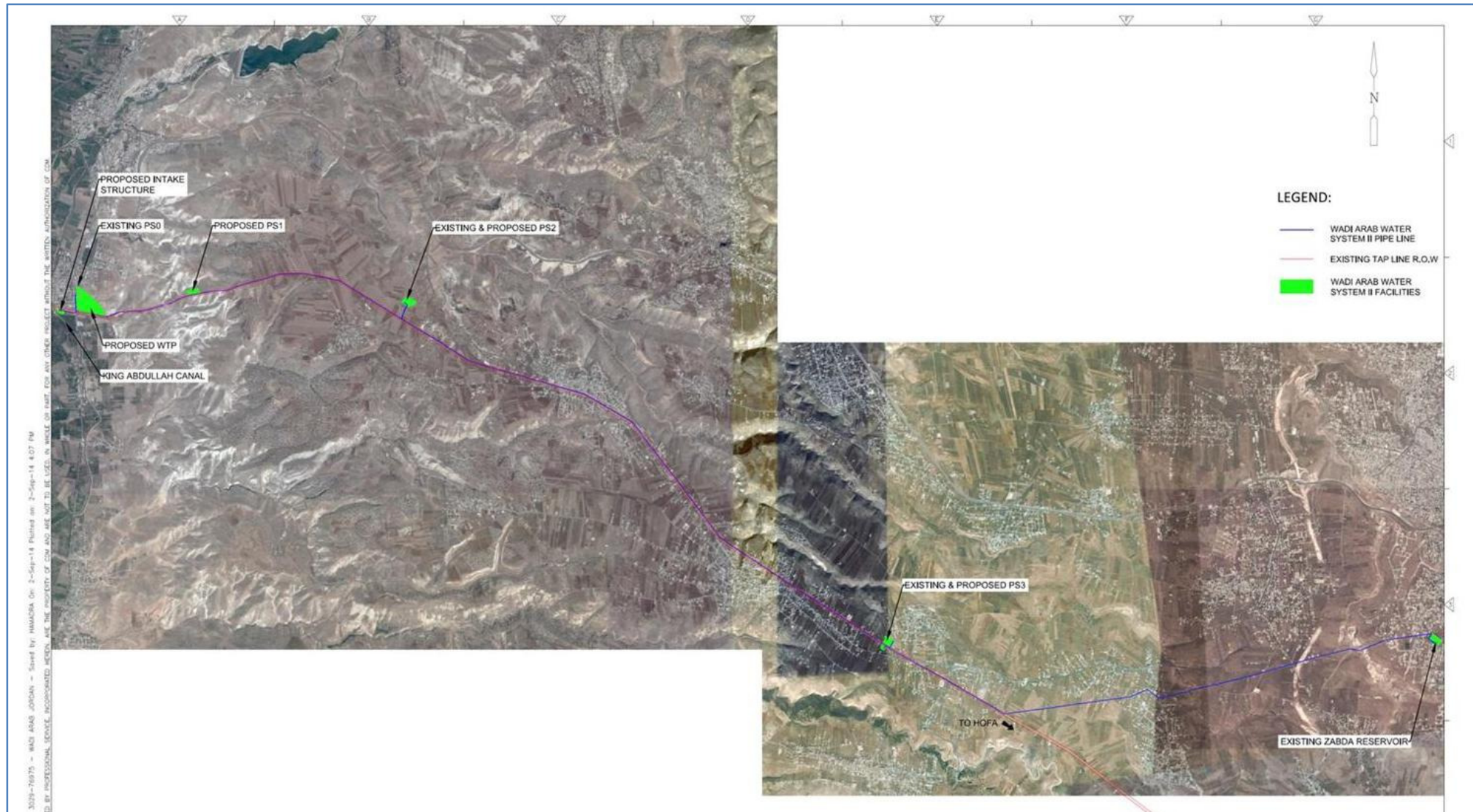


Figure S- 1:: Project Layout

3 LEGISLATIVE AND REGULATORY CONSIDERATIONS

Legal requirements have been reviewed and applicable laws and regulations have been identified and summarized below is a list for some national legal requirements that have been identified.

- Environment Protection Law No. (52) for the year 2006
- Water Authority Law No. 18 for the year 1988
- Ministry of Agriculture Law No. 44 for the year 2002
- Public Health Law No. 47 for the year 2008
- Labour Law No. (8) for the year 1996
- Acquisition Law (Expropriation), No. 12, year 1987

Regulations

- ESIA Regulation No. 37 for the year 2005
- Air Quality Protection Regulation No. 28 of the year 2005
- Regulation No. 24 of the year for the Management of Hazardous and Dangerous Materials
- Regulation No. 27 for the year 2005 for the Management of Solid Waste
- Underground Water Regulation No. 85 of 2002

Standards

- Ambient Air Quality Standards No. 1140/2006
- Water Quality Standards (JWQS) (2008)
- JISM Jordanian Standards for Treated Sludge and Sludge Disposal, JS 1145 (2006)
- Standards for the prevention and elimination of noise (2003).
- Standard for the Maximum Allowable Limits of Air Pollutants Emitted from Stationary Sources (JS 1189/1998).

Agreements

- Implementation of Phase I-RSDS Project- Desalination at Aqaba

Other policies, guidelines

It is requested to have the ESIA prepared in compliance with:

- Environmental and Social Handbook version 9.0 of 02/12/2013, for the Environmental Investment Bank (EIB)

4 SCOPING PROCESS AND FINDINGS

The Jordanian ESIA regulation number (37) of the year 2005 and the EIB Guidelines for Environment and Social Assessment require the consultation with all related project stakeholders in order to identify valued environmental and social components to be addressed in the ESIA study (scope). The ESIA assessed significance of the anticipated impacts of the proposed project (activities) on each identified component. The scoping process for this project was launched in March 2015.

The main outcome of the scoping session was the Terms of References (TOR) for the ESIA. The conclusions and the TOR based on the analysis of the findings, the results of supporting research, and professional opinion were submitted to the MoE who approved it. The TOR is also submitted to EIB/AFD where comments were received and addressed in the Draft ESIA Report.

Based on the scoping session, Consultant's rapid field diagnosis, as well as Consultant experience the Valued Environmental Components (VECs) that was studied through the ESIA have been summarized and rated according to their significance. **Table S- 1** below presents the VECS and their significance for each phase of the study. The significance of the impacts, as well as residual impact after mitigation was addressed in the ESIA.

Table S- 1: Results of the Scoping Session

VEC No.	Valued Component	Construction			Operation and Maintenance		
		Significant	Medium significance	Insignificant	Significant	Medium significance	Insignificant
1	Physical Environment						
1.1	Water Quantity and Quality			-ve	+ve		
1.2	Air Quality			-ve			Neutral
1.3	Flooding in Wadi Area		-ve				Neutral
1.4	Wastewater From Domestic Use			-ve			-ve
2	Socio-economic						
2.1	Noise	-ve					-ve
2.2	Traffic and Transportation		-ve				Neutral
2.3	Public Health and Safety		-ve		+ve		
2.4	Land acquisition and compensation		-ve				Neutral
2.5	Employment	+ve			+ve		
3	Biodiversity			-ve			+ve
4	Archeology , Cultural & Natural Heritage			-ve			Neutral

VEC No.	Valued Component	Construction			Operation and Maintenance		
		Significant	Medium significance	Insignificant	Significant	Medium significance	Insignificant
5	Waste hazardous Material Management						
5.1	Construction Waste		-ve				Neutral
5.2	Sludge Management			Neutral		-ve	
5.3	Chlorine Storage and Handling			Neutral	-ve		
5.4	Halogenated Methane			+ve			+ve

1. (+ve) Positive Impact is predicted
2. (-ve) Negative Impact is predicted
3. (Neutral) No positive or negative impacts predicted.

5 ENVIRONMENTAL AND SOCIAL BASELINE CONDITIONS

Physical Environment

Water Resources in Jordan: The water shortage in Jordan is extremely severe due to the nature of the area and due the transboundary resources, which are shared with neighbourhoods who own same problem. More than 90% of Jordan land receives less than 100 mm per annum of rainfall.

The total precipitation amounts to 8.2 km³ and about 92% of it is lost by evaporation. The country is estimated to be below the water poverty line by 682 million cubic meters (MCM)/year. The developed surface water potential was approximately 295 MCM in 2007, and is projected to reach 365 MCM by 2022 by building new dams and desalination projects.

The reduction in rainfall due to climate change impact will reduce the available water sources for irrigation for both sources; from outside Jordan and the sources initiated inside the Kingdom. While the sources decrease, the demand is increasing.

➤ Water Resources in Northern Governorates

The sources of water relevant to the western region of the Irbid Governorate include:

- Groundwater from the Wadi Al Arab well field. This is the current major source of potable water
- Groundwater from the Mukheiba wells located at the Northern boundary of Jordan near the Yarmouk River, at Al-Hamma town.
- Surface water from Lake Tiberius
- Surface water from the Yarmouk River and the Al Wehdeh Dam.
- Treated Wastewater.

➤ The Jordan River

The Jordan River, the river with the lowest elevation in the world, originates on the slopes of Jabal al-Sheikh (Mount Hermon) on the Syrian-Lebanese-Israeli border, flows southward through northern Israel to the Lake of Tiberius, and then divides Israel and the occupied West Bank on the west from the Kingdom of Jordan on the east before emptying into the Dead Sea at an elevation of about 400 meters below sea level.

The environmental and ecological values of the basin have declined drastically during the last sixty years: its water has been diverted; its ecological systems crimped and its natural absorption capacities have been pushed to the limits. Large flows of untreated wastewater and saline water are discharged directly into the basin and substantial parts of the basin are no longer accessible for the inhabitants who live there.

Through education and advocacy campaigns, major research and regional rehabilitation efforts, some real changes have already been made. For instance, new sewage treatment plants have been constructed or planned in Jordan, Israel and Palestine, which will enable treatment of polluted wastewater flowing currently into the river. Earlier research concluded that the Jordan River will require 400 - 600 MCM of fresh water per year to reach an acceptable rehabilitation level.

A recent agreement between Israel and Jordan allows for 10,000 m³/day of fresh water from Lake Tiberius to flush the Jordan River.

➤ **Surface Water Flow**

The major water resources in the Jordan River Valley are the Jordan River, Lake of Tiberius and the Yarmouk River. The Lake of Tiberius is the largest fresh surface water reservoir in the region. The basin of the Upper Jordan River (UJR) is the main water contributor to the Lower Jordan River (LJR). The basin of the Yarmouk is the second largest water contributor to the Lower Jordan River. It covers a total estimated area of 6,968 km² and is shared between Syria (77%), Jordan (22%) and Israel (1%).

Most of the side Wadis do not discharge into the river anymore, and a substantial part of the water resources from the Upper Jordan River, including the Lake of Tiberius, has been diverted. Where the Jordan River had historically an annual flow of around 1,250 MCM, it contains today not more than 40 to 100 MCM per year, with its maximum base flow more or less at the confluence of Wadi Al Rayyan (Yabis).

The northern most section of the river is regulated in Israel by the Degania Dam at the exit of Tiberius Lake. South of the Yarmouk River, the river is fed by streams and channels, although most water resources of the Wadis in Jordan have been developed and diverted for agricultural or domestic purposes, and only undeveloped Wadis supplying winter flows and floods directly into the LJR. Seven dams were constructed in Jordan since the 1960's with a total live storage capacity of 265 MCM, which diverts water mainly for agricultural purposes.

➤ **Water Balance**

During the 1950s the Jordan River closely resembled its historic natural water balance, not yet much influenced by artificial human interception: about 605 MCM was discharged into the Jordan River through the Lake of Tiberius and 455 MCM originated from the Yarmouk River. Additional inflow came from the Yarmouk basin as well as from the Zarqa River basin, as well as from annual rain floods from the West Bank. The outflow of the Jordan River in 1950 into the Dead Sea was about 1285 CM. This amount was about equal to the total evaporation from the surface of the Dead Sea, leading to an average stable surface water table of the Dead Sea.

By the year 2000 the water balance had changed drastically and substantial flows were meanwhile diverted by the riparian countries of the Jordan River Basin.

➤ **Lake Tiberius**

Lake Tiberius capacity is about 4000 MCM, and receives most of its water from the northern Jordan River. The average annual water inflow to Lake Tiberius is 800 MCM. About the same quantity leaves the lake annually: through evaporation (280 MCM), via the National Water Carrier (370 MCM) for water supply throughout Israel which represents 50% of drinking water need, and overflow (80 MCM) into the southern Jordan River through the Degania dam. Additionally about 90 MCM/Y are pumped for local consumption around the lake and allocated to the Kingdom of Jordan as part of the 1994 Peace Treaty. The water salinity in the lake is 240 ppm.

➤ **Water Balance in the Northern Governorates**

The groundwater in the northern governorates is currently 72 MCM/year with an additional 19 MCM to be supplied by improvements to eastern wells and Disi water allocation. If the available water for northern governorates is 91 MCM/year, the supply can meet the demand until year 2019, but the supply will be much lower than the demand if the demand of Syrian refugees is counted.

If the available water for the northern governorates is increased to 121 MCM/year by the Exchange Water (30MCM per year) as per the Peace Treaty, the supply can meet the demand of up to year 2035 and beyond but the supply can meet the demand of only up to year 2028 if the demand of Syrian refugees is counted.

Air Quality: with US-EPA approved analyzers and certified meteorological sensors, was used to monitor and assess the air quality by continuously measuring the concentrations of; Sulfur Dioxide (SO₂), Nitrogen Oxides (NO_x, NO & NO₂), Carbon Monoxide (CO) and Carbon Dioxide (CO₂), in addition to recording the meteorological parameters, Wind Speed, Wind Direction, Temperature, and Relative Humidity.

The monitoring of the ambient air quality (SO₂, NO_x, CO, and CO₂) near the proposed project (Wadi Al-Arab WWP) during the period June 12-14, 2015 showed that the hourly, 8-hr (for CO) and daily average concentrations were far below the relevant limits stated in the Jordanian Ambient Air Quality Standard (JS 1140/2006).

Results of wind speed and wind direction monitoring showed that the prevailing wind direction was west-northwest (WNW) with a frequency of 25.0 %, followed by northwest (NW) with a frequency of 18.1%. While the prevailing wind speeds were those speeds of 0.5-1.5 m/sec with a frequency of 37.5%. The obtained prevailing directions are consistent with the predominant conditions known in the entire country.

Ambient Noise Level Measurements: Spot noise monitoring was carried out at 5 proposed facilities locations of the project; namely; Intake Pump Station, Water Treatment Plant, PS1, PS2 and PS3. In order to determine the ambient baseline sound level profile, measurements were undertaken using data logging Sound Level Meter Model Extech HD600 (Hand Held Type II noise meter).

The proposed locations for the project facilities generally experience higher levels of noise than that of the relevant Jordanian standard. The proposed locations are within rural and farming areas, and the existing practices of water pumping at WAJ stations or for irrigation at private farms, the higher domestic travel at day time, and high transporting of agriculture crops at night time, leads to the conclusion that the effect is negligible.

Biological Environment: The alignment under consideration was divided into 2 major segments (**Figure S-2**), based on the biogeographic regions crossed by the proposed pipeline. This segmentation is basically to cope with the construction and operation phases of the project.

The First (Eastern) Segment (A) includes the part of alignment starting at the Zabda reservoir in Irbid in a heavily populated area, ending at Sama- Makhraha Area.

The second Segment (B) encompasses the alignment starting at Makhraha Area all the way west reaching the Eastern Ghor Canal ending at the intake pump station totaling 8.5km, falling entirely within the Irano-turaneanecozone of Jordan.

Segment (A) Mixed forest and non forest Mediterranean area and are usually vegetation rich with Mediterranean elements, and as the area is interspersed with many run offs and wadis of various sizes, substantial vegetation can be supported.

The monotonic habitat coverage and deterioration of the first part of Segment A, leaves little chance for biodiversity to inhabit or depend on this type of habitat for feeding. Field investigation proved that this part of the corridor is not of any significance to bird populations.



Figure S-2: Biogeographic Zones of the Project Area

Segment (B) Scarcely scrubby and bushy areas exist outside populated areas; these spots are often productive for migrant warblers and shrikes.

Within the Irano-Turanian climate vegetation is sparse and limited to annual and little shrubby vegetation. Most habitats in these areas are deteriorated due to increased urbanization. The poor habitat coverage and deterioration leaves little chance for wild birds to inhabit or depend on this type of habitat for feeding. Field investigation proved that this part of the corridor is not of any significance to bird populations

Mammals: At least 12 species of mammals has been confirmed previously from areas close to the study site. This includes the Golden Jackal, *Canis aureus*. This species occurs in high populations around the thick and bushy vegetation around the Jordan River, and perhaps visit the area occasionally seeking food. However, its presence in the study area can be considered accidental. A noteworthy species is the Egyptian Mongoose, *Herpestes ichneumon*, collected from areas along the Jordan Valley extending from North Shounha to Wadi Al Mujib. The Red Fox, *Vulpes vulpes*, is a wide spread species occurring in all types of habitats. Similarly, the Wild Boar, *Sus scrofa*, can be found even in at higher elevations while foraging. This is a quite common species breeding in areas around the Jordan River, and invades farmlands and cultivated fields and considered as a pest.

Reptiles: At least 23 species of reptiles and two species of amphibians (*Bufo viridis* and *Rana bedriagae*) occur in the study area. This is based on some field observations, as well as published records. Noteworthy species is the Greek Tortoise, *Testudo graeca*, especially in the upper part that should be considered during digging. Other species are considered common and have no threat criteria.

Socio-Economic Conditions: Irbid Governorate is located to the far north of the Kingdom, and its land extends to the Jordanian-Syrian borders in the north and the borders with Palestine from the West. The governorate is bordered by Syria (the Golan Heights) from the north, the Jordan

River from the west, Mafraq Governorate from the east, and Jarash, Ajlun and Balqa Governorates from the south.

Irbid Governorate has the second largest population and the highest population density in Jordan. According to DOS (2012) statistics, the total population of the governorate of Irbid has reached about 1.137 million people which accounts for 17.8% of Jordan's overall population.

Irbid, among other Jordanian major cities, witnessed waves of migrants which formed significant proportion of its population growth next to natural increase rates. The growth rate was 18.16% and 17.8% for years 1994 and 2004 respectively. The increase escalated with the beginning of the first quarter of 2011. Syrian refugees started to come into Jordan in response to the instability of their country in the wake of the Arab Spring and the following Syrian civil war. According to UNHCR website, Irbid currently host about 143,215 Syrian persons of whom 61% are children and 4% are elderly at the age 60+.

The total area of Irbid Governorate is estimated at about 1571.8 km² which accounts for 1.8% of Jordan's total geographic area. Due to its unique geographic location Irbid at the vicinity of the borders with Israel, Syria and the Palestinian territories, Irbid is considered one of the most important trading centers in Jordan, and is considered a major ground transportation hub between Amman, Syria to the north, and Mafraq to the east.

The official statistics about unemployment in Irbid shows that unemployment rate in Irbid reached 12.7% in year 2011 (10.7% among males and 22.8% among females) compared to Jordan 12.9% unemployment rate.

Latest official statistics on poverty indicators published by the Department of Statistics, based on the Household Income and Expenditure Survey 2010, show that the poverty ratio in Irbid has reached 15% which is slightly higher than the Kingdom's average of 14.4%. The number of the 'poor' in Irbid Governorate is 163,933 people, accounting for 18.7% of the total number of the 'poor' in Jordan.

Irbid is considered to be one of the most active regions of Jordan in terms of agricultural activities. The Governorate produces citrus, olives and grain, in addition to the production of honey and livestock.

The environmental footprint of the Greater Irbid is characterized by 88 l/day of fresh water resources per person (Irbid Governorate).

Waste generation per capita is estimated at 0.6 kg per day (Irbid Governorate level). Solid waste arriving at Akaider landfill from Greater Irbid is 300 tonnes per day as well as a good quantity of liquid waste.

Archaeological Baseline Conditions: The field survey and investigations revealed eleven archaeological sites, each site was briefly described and recommended actions were included in details so as to reduce the negative indirect impacts on the existed archaeological site.

The survey located 11 not directly threatened sites. The periods best represented are:

1. Chalcolithic-Early Bronze Ages 4200-3200BC
2. Classical (Roman +Byzantine) 64 B.C-336AD.
3. Modern or Undefined period.

6 ENVIRONMENTAL AND SOCIAL IMPACTS

Impacts on the Physical Environment

Impacts on Natural Water Flow and Risks of Flash Floods: As the transmission main will pass through several wadis, some of the construction is likely to cause impacts on natural water flow mainly from piling cut and construction materials within Wadi courses. In addition, construction during rainy seasons would hold risks of flash floods on the project, project workers and the locals. These impacts can be summarized as follows:

1. Landscape Damage, Change of Natural Drainage System
2. Wadi Crossing

Impacts on Air Quality: The expected increases in dust levels during construction phase, will result from site preparation, cut and fill operations, in addition to the movement of the construction machinery. These activities will have negative impacts on segments crossing the residential areas of the project corridor. While during the operation phase it is not expected to have a significant impact on air quality during the operational phase since there is no major source of emission in the processes that are intended to be used. However, the results of air quality measurements might be of great benefit to determine the future contribution of the proposed project to the existing baseline conditions of air quality.

Impacts on Noise Level: The proposed locations for the project facilities are generally experiencing a higher level of noise than the relevant Jordanian standard, although, the locations are within rural and farming areas. The existing practices of water pumping at WAJ stations or for irrigation at private farms, in addition to the higher domestic travel at day time, and high transporting of agriculture crops at night time is the reason.

The anticipated impacts of additional noise levels during construction and operation are minimal when the below proposed mitigation measures are implemented:

Generated Solid Wastes from Construction Activities: Construction activities in such a large-scale project are anticipated to generate considerable quantities of solid wastes, including:

- (Construction Waste) Sand and rock fragments that will result from the site preparation activities and the cut operations for installing the pipe and the other related water “pumping/collection” facilities.
- Metals, wooden and plastic fragments resulting from the different construction activities
- The human solid wastes; the accumulation of such wastes will be concentrated at the project offices, camps and storage yard that will be constructed within the project corridor area.

Impacts on the Biological Environment: The ecological characteristics as well as biodiversity in general will be affected by the construction activities and later during operation and maintenance activities. The impacts are foreseen as being insignificant along the pipeline alignment. Despite insignificant, a detailed description of such impacts and their significance are indicated below. Such impacts would affect particularly the habitats for local wildlife and on prevalent vegetation associations and species.

Ecological concerns include:

- Loss of habitats particularly.
- Maintenance operations
- The expected increase of accessibility to particular habitats in the higher Mediterranean habitat.
- Wildlife disturbance during the construction.
- Wildlife disturbance during the operation.
- Wildlife persecution and/or vegetation cover removal.

Impacts on the Socio-Economic Conditions: Eleven socio-economic components and receptors were identified based on the understanding of the proposed project and the socio-economic character of the study area and the local communities at question of anticipated impacts by the proposed project on the social valued components, these components are as follows:

1. Land Use
2. Involuntary Resettlement / Land Acquisition
3. Utilities and Infrastructure
4. Roads and Transport
5. Resident and Nomadic Population Settlements
6. Syrian Refuges
7. Health & Safety
8. Employment Opportunity
9. Labour and Working Conditions
10. Social Matrix
11. Local Community Involvement, Community Liaising and Development

Impacts on the Archaeological Baseline Conditions: None of the eleven archaeological sites within is under direct threat by the proposed project activities. Still, precaution and management measures should be taken into consideration regarding the need to conserve any chance-found sites during construction activities. Minor and indirect impacts are expected on the above mentioned sites.

7 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

Mitigation Strategy

The proposed mitigation strategy follows the logical order of environmental mitigation which is based on the following strategic choice in order of implementation priority:

- I. Avoidance / Prevention of avoidable stressors which are expected to cause deleterious impacts (by applying alternative environmentally and socially sound approaches/activities);
- II. Containing and minimizing the unavoidable impacts to ensure it is as minimal as possible;
- III. Restoration and rehabilitation of the affected receptor;
- IV. Compensating for receptors or damages that cannot be restored through offering equivalent, financial compensation, livelihood programmes or a combination of two or more of these measures whenever necessary to comply with the EIB requirements; and/or
- V. Providing additional benefits to the recipient / host community through the company social responsibility programme.

Such a strategy should be combined with community engagement and communication programme, and effective and pro-active grievance mechanism thus to address locals and project affected people complaints.

A separate report has been developed to cover resettlement and land acquisition issues related to the project. **Appendix 10** (Volume 2 of the ESIA Report) provides survey for Public affected People (PAPs), suggested compensation plan, in addition to grievance and redress mechanisms to solve any issue related to acquisition or loss of business.

PAP's Entitlement

As required by the EIB Involuntary Resettlement Standard (Social Standard number six), the following guidelines have been addressed:

1. Identification of PAPs who are likely to be displaced or to face economic losses or livelihood impacts are entitled to be:
 - informed about their options and rights pertaining to resettlement;
 - consulted on, offered choices among, and provided with technically and economically feasible resettlement alternatives; and
 - provided prompt and effective compensation at full replacement cost for losses of assets attributable directly to the project.
2. In the case of physical relocation of PAP's, then displaced persons are entitled to be:
 - provided assistance (such as moving allowances) during relocation;
 - provided with residential housing, or housing sites, or, as required, agricultural sites for which a combination of productive potential, vocational advantages, and other factors is at least equivalent to the advantages of the old site; and
 - Where necessary to achieve the objectives of the standard:

- i. offered support after displacement, for a transition period, based on a reasonable estimate of the time likely to be needed to restore their livelihood and standards of living; and
- ii. provided with development assistance in addition to compensation measures, such as land preparation, credit facilities, and training or job opportunities

Based on the above guidelines, Project ARAP-specific eligibility criteria and identification key was prepared to guide the determination of PAP's eligibility for RAP measures and case by case entitlements. The eligibility key is provided in **Table S- 2**.

Case by case PAP's entitlements against identified impacts by the proposed Project land acquisition and ROW activities are to be developed by the project based on the measures provided in this ARAP and shall fully comply with EIB social standard on involuntary resettlement.

ESMP

The Environmental and Social Management Plan for the Proposed Project is presented in **Table S- 3**, which describes the measures that the contractor and the operator are responsible for the construction / operation of Wadi Arab Water System II will take to mitigate the potential negative impacts and capitalize on the positive outcomes of the project on the environment and on local communities.

The objective of the ESMP is to ensure that all steps are taken to address the potential impacts of the project. The ESMP:

- Draws together the measures proposed to mitigate negative, and to maximize positive, environmental and social impacts.
- Defines the specific actions required, roles and responsibilities for these actions.
- Describes capacity building and training requirements for the implementation of the ESMP.
- The measures in the ESMP are based on the assessment of potential impacts as stated in this ESIA document and are summarized below.

Table S- 2: Summary PAP's Eligibility Determination Key

Type of Impact	Resettlement Stressors	Duration of the Impact	PAP Category	Eligibility	Remarks
Relocation or loss of shelter (i.e. loss of land/property) Loss or damage of assets within the to be acquisition Parcel	LA	Permanent	Owners and Squatters	Eligible for satisfactory financial compensation with full consent of the PAP	<p>The compensation should always take into consideration the current market price of the affected Parcel/asset, the respective cost of adjacent similar Parcel/assets, and the cost of equivalent whenever applicable. In the case of not reaching agreement with the PAP on the amount of compensation, then the compensation shall be determined by the court which has the right to hire experienced and trust-worthy property assessors (valuators).</p> <p>Whenever there is property or assets within the to-be acquisition Parcel, then the acquisition should be for the whole property (Parcel, buildings, assets, etc.) identified and documented at the time of the Parcel evaluation, unless the owner is interested and willing to keep certain assets. If full acquisition is agreed, then the compensation should be for all acquisitioned land and property, while of the agreement is made to have the owner holding ownership of certain assets, then the cost of these assets is to be excluded from the valuation of the acquisition costs and compensation decided.</p>
			Tenants and Users	<p>Eligible to be provided with equivalent alternative to the lost shelter and/or business; and if necessary</p> <p>Eligible to livelihood assistance for transitional period</p>	<p>Based on the type of impact, those PAPs if displaced should be</p> <ol style="list-style-type: none"> 1) provided with residential housing, or housing sites, or, as required, agricultural sites for which a combination of productive potential, vocational advantages, and other factors is at least equivalent to the advantages of the old site; and 2) Where necessary to achieve the objectives of the EIB social standard no. 6: <ol style="list-style-type: none"> a. offered support after displacement, for a transition period, based on a reasonable estimate of the time likely to be needed to restore their livelihood and standards of living; and b. provided with development assistance in addition to compensation measures, such as land preparation, credit facilities, and training or job opportunities.
Partial loss of land	LA	Permanent	Owners	Eligible to satisfactory	Partial acquisition of land should be conditioned by (1) the Parcel area is

Type of Impact	Resettlement Stressors	Duration of the Impact	PAP Category	Eligibility	Remarks
&/or loss or damage of assets within the to be acquisition Parcel			and Squatters	compensation with full consent of the PAP	<p>too large and the affected part is marginal and on one side of it, (2) having the land area decided to be left and not acquisitioned fully functional in terms of area and dimensions without affecting any future plans for construction or use, and (3) the acquisition is with full consent of the respective owner.</p> <p>The compensation should always take into consideration the current market price of the affected asset, the respective cost of adjacent similar assets, and the cost of equivalent whenever applicable. In the case of not reaching agreement with the PAP on the amount of compensation, then the compensation shall be determined by the court which has the right to hire experienced and trust-worthy property assessors (valuators).</p> <p>Whenever there is property or assets within the to-be acquisitioned Parcel portion, then the acquisition should be for the property (land area, buildings, assets, etc.) identified and documented at the time of the Parcel evaluation within the land portion decided for acquisition, unless the owner is interested and willing to keep certain assets. If full acquisition is agreed, then the compensation should be for all acquisitioned land and property, while of the agreement is made to have the owner holding ownership of certain assets, then the cost of these assets is to be excluded from the valuation of the acquisition costs and compensation decided.</p>
Reduction in land/property market value due to the ROW (equal to the acquisition land area and/or the ROW area within the affected property/asset)	ROW	Permanent	Owners and Squatters	Eligible to satisfactory compensation with full consent of the PAP	<p>Reduction in property value due to Project ROW activities is equal to the market price of the land area where the ROW will enforce restrictions on construction and use within the set-back area or beyond it.</p> <p>The compensation should always take into consideration the current market price of the affected land, the respective cost of adjacent similar property, and the cost of equivalent whenever applicable. In the case of not reaching agreement with the PAP on the amount of compensation, then the compensation shall be determined by the court which has the right to hire experienced and trust-worthy property assessors (valuators).</p>
loss or damage of assets	ROW	Permanent	Owners and Squatters	Eligible to (1) restoration of the damaged asset to its original condition, or (2) satisfactory	Damages to assets should be restored to its original condition and up to the satisfaction of the respective PAP. Financial compensation can only be considered/offered/negotiated if (1) the restoration of the damaged asset is not possible, (2) restoration to original condition fails and the PAP is

Type of Impact	Resettlement Stressors	Duration of the Impact	PAP Category	Eligibility	Remarks
				compensation with full consent of the PAP	<p>justifiably not satisfied with such restoration, or (3) the respective PAP inform the Project during ROW negotiation that he, for justifiable reason, do not accept restoration and request compensation instead.</p> <p>Justifiable reasons are limited to (1) having the lost asset no longer relevant like for example restoration of cesspits and cesspools, (2) the lost asset interfere with the ROW and should not be restored in its original location, and/or (3) the lost asset cannot be resorted and productive as its current productivity within justifiable time frame like for example removing fruit trees that cannot be successfully trans-located and require more than three years to restore its present productivity.</p> <p>The compensation should always take into consideration the current market price of the affected asset, the respective cost of adjacent similar assets, and the cost of equivalent whenever applicable. In the case of not reaching agreement with the PAP on the amount of compensation, then the compensation shall be determined by the court which has the right to hire experienced and trust-worthy property assessors (valuators).</p>
Loss of access to property / assets	Construction Activities	Temporary	Owners, Squatters, Residential Tenants and other Users	Whenever the loss of access results in proven economic loss cases to PAPs and with evident causality link to the project, then those PAP's are Eligible to compensation equal to the value of the loss	<p>Only through the RAP grievance mechanism, upon compensation claims and for proven economic loss cases with evident causality link to the project. Also, this should come after having all designed and possible mitigation measures by the ESMP implemented and found, for one reason or another, failing to mitigate such impacts including establishing alternative access and/or to rehabilitate the access.</p> <p>Evident on the claimed compensation should be made available by the grieving PAP to the Grievance Committee along with the grievance application. Failing to provide acceptable evidence will result in rejection of the grievance claim.</p>
			Businesses (owners and tenants)	Whenever the loss of access results in proven economic loss cases to businesses PAPs, the loss should be estimated upon occurrence and compensated for with the	<p>Only through the RAP grievance mechanism, upon compensation claims and for proven economic loss cases with evident causality link may, but not necessarily be limited to, (1) impacts on productivity (e.g. above average death of poultry at poultry farms within the construction impact area caused by disruption of utilities or reduced in and out access to the farm), and (2) the business owner and/or employees loss of access to the business site which prevent them from maintaining business as usual.</p>

Type of Impact	Resettlement Stressors	Duration of the Impact	PAP Category	Eligibility	Remarks
				full consent of the respective PAP's	<p>This should come after having all designed and possible mitigation measures by the ESMP implemented and found, for one reason or another, failing to mitigate such impacts including establishing alternative access and/or to rehabilitate the access.</p> <p>Evident on the claimed compensation (causality link to the project and evidence on economic loss occurrence and on economic value) should be made available by the grieving PAP to the Grievance Committee along with the grievance application. Failing to provide acceptable evidence will result in rejection of the grievance claim.</p>
Loss of income sources or means of livelihood, whether or not the PAPs must move to another location	LA	Permanent	Tenants and other users	Eligible to income restoration or livelihood development measures and/or compensations	<p>Though such an impact can affect owners, tenants and users, respective PAP's entitlement for resettlement measures under this specific Project are mainly related to economic losses on tenants and users of the property who will need to find alternative location which can cost them higher and/or be less comfortable and productive compared to the property issue of LA.</p> <p>Applicable only through the RAP grievance mechanism. Evident on the claimed compensation (causality link to the project and evidence on economic/livelihood loss occurrence and on economic value) should be made available by the grieving PAP to the Grievance Committee along with the grievance application. Failing to provide acceptable evidence will result in rejection of the grievance claim.</p>
	ROW	Permanent	Owners, Squatters, Tenants and other users	Eligible to income restoration or livelihood development measures and/or compensations	<p>Loss of income and/or means of livelihood by limiting the owner free use of his property. This includes (1) reduced property market value, (2) actual removal of physical elements like warehouses, parking lots, etc. (3) actual removal of tress and vegetation, (4) prohibiting any type of construction with the ROW, and (5) prohibiting planting deep rooted tress within the ROW.</p> <p>Applicable only through the RAP grievance mechanism. Evident on the claimed compensation (causality link to the project and evidence on economic/livelihood loss occurrence and on economic value) should be made available by the grieving PAP to the Grievance Committee along with the grievance application. Failing to provide acceptable evidence will result in rejection of the grievance claim.</p>

Type of Impact	Resettlement Stressors	Duration of the Impact	PAP Category	Eligibility	Remarks
	Construction Activities	Temporary	Tenants (businesses and residential) and other uses	Eligible to income restoration or livelihood development measures and/or compensations equivalent to incurred losses	<p>Proven economic loss cases may, but not necessarily be limited to, (1) impacts on productivity (e.g. above average death of poultry at poultry farms within the construction impact area caused by elevated noise levels, dusting), (2) loss of use value, (3) income reduction to below minimum daily income by business caused by customers loss of access to the business (e.g. supermarkets, service shops, etc.), (4) losing utilities like cesspools, disconnection of water and electrical supply, etc., and (5) Removal and deconstruction of assets and facilities within the ROW crossing the property like for example productive trees, house gardens, children play grounds, stairs, walls and fences, etc.</p> <p>Applicable only through the RAP grievance mechanism. Evident on the claimed compensation (causality link to the project and evidence on economic/livelihood loss occurrence and on economic value) should be made available by the grieving PAP to the Grievance Committee along with the grievance application. Failing to provide acceptable evidence will result in rejection of the grievance claim.</p>
			Owners and Squatters	Eligible to income restoration or livelihood development measures and/or compensations equivalent to incurred losses	<p>Limiting the owners and squatters ability to implement their plans for using their lands and properties like for example their construction plans for new buildings or for expanding their houses, for planting trees (e.g. olive trees), water harvesting, water storage wells, stairs, etc. it worth mentioning that some of PAP's affected by similar impacts showed the RAP consultant during the consultation process their already existing plans for the construction of multi-story residential apartments building which will be certainly and significantly affected by the proposed ROW.</p> <p>Applicable only through the RAP grievance mechanism. Evident on the claimed compensation (causality link to the project and evidence on economic/livelihood loss occurrence and on economic value) should be made available by the grieving PAP to the Grievance Committee along with the grievance application. Failing to provide acceptable evidence will result in rejection of the grievance claim.</p>

Table S- 3: Environmental and Social Management Plan (ESMP)

Construction Phase							
Environmental Components	Expected Impact	Significance	Mitigation Measures	Location	Monitoring	Frequency	Responsible Party
Physical Environment							
Water quality and Quantity	No expected impacts during construction	Negligible					
Wadi Crossing	Natural Water flow and risks of flash flood	Significant (-ve)	Avoid construction on winter season	Wadis within the corridor	schedule of construction	Weekly	Contractor & Supervisor
Air Quality	Dust due to different construction activities, may affect agricultural crops in the surrounding farms and residential areas. .	Significant(-ve)	Cover construction materials during storage. Spray with water whenever needed. Establish a barrier between WTP and surrounding residential area and farms .	Construction site and surroundings	Check the cover of stored material Check spraying of water whenever needed	daily	Contractor & Supervisor
	Dust during material transfer	Minor(-ve)	Cover construction material during transfer.	Access road	Check all project trucks to have a cover while transporting	daily	Contractor & Supervisor
	Emission from construction equipments.	Minor(-ve)	Regular maintenance of the Equipments. Emission control on equipment shall be maintained along with engine mufflers.	Construction site	Check record of maintenance	Weekly	Contractor & Supervisor
Noise	Increase the noise level to the residential area surrounding the working site	Moderate(-ve)	Construction activities should be limited to day time and working weekdays. Where applicable, use equipment with less noise levels.	Construction site	Check the working hours	Weekly	Contractor & Supervisor

Construction Phase							
Environmental Components	Expected Impact	Significance	Mitigation Measures	Location	Monitoring	Frequency	Responsible Party
Waste management Municipal waste	Accumulation of liquid and solid wastes mainly from machinery and staff residence	Moderate(-ve)	Installation of holding tanks.	At working site (camp if any)	Empty the holding tank on regular basis	Weekly or monthly; According to no. of workers	Contractor & Supervisor
Construction waste	Accumulation of excavation materials and debris	Moderate(-ve)	Designate a specific area as a temporary solid waste dumping area	Designated area	Check the surrounding area for any illegal dumping	daily	Contractor & Supervisor
	Oil and lubricants of the equipment	Moderate(-ve)	All maintenance and oil change of construction equipment should be done in a specified area. Collected and stored on-site, in a banded tank. Transported Off-site by a licensed regulated waste transporter, to a licensed facility for recycling.	Surrounding corridor	Check the surroundings for any spoiled oil or its package	weekly	Contractor & supervisor
Biological Environment							
Flora	Removal of vegetation cover and tree stands.	Minor(-ve)	Avoidance of unnecessary removal of vegetation cover and trees.	Corridor of the transmission main	Check the corridor for any unnecessary removal of trees and vegetation	Weekly	Contractor & Supervisor
Fauna	Disturbance to wildlife especially at night due to machinery or resident staff.	Minor(-ve)	Avoid working night's shifts.	Corridor of the transmission main			Contractor & supervisor
	Fragmentation of habitats		Provide access for species to move easily	Corridor of the transmission main	Check existence of the access	daily	Contractor & supervisor

Construction Phase							
Environmental Components	Expected Impact	Significance	Mitigation Measures	Location	Monitoring	Frequency	Responsible Party
	Increased accidental and deliberate persecution of wildlife		Orientation of all workers at the beginning of the project to avoid wildlife persecution and hunting	Corridor of the transmission main			
Socio-Economic							
Occupational Health and safety	Dusting	Moderate to high (-ve)	Provide employees with health checkups		Site inspection and auditing.	Every six months	Contractor & supervisor
	-Elevated noise levels	Moderate to high (-ve)	-Integrating health training into regular employee training - All workers should use Personal Protection equipment.	Construction site	-Site supervisor daily reports	Daily	Contractor & supervisor
	- Accidents, injuries Risk of accidental Injuries during the project construction and/or due to vehicular traffic	Moderate to high (-ve)	-Keep unauthorized persons away from dangerous work zones • Put warning signs (written in Arabic and English) at strategic site	Construction site	Site supervisor daily reports	Daily	Contractor & supervisor
Public Health and Safety	Dusting	Moderate to high (-ve)	Spray working area with water Cover stockpiles Shield trucks of construction	Construction site	Site inspection and auditing.	Daily	Contractor & supervisor
	Elevated noise level	Moderate(-ve)	Construction activities should be limited to day time and working weekdays. Where applicable, use equipment with less noise levels.	Construction site	Check the working hours	Weekly	Contractor & Supervisor

Construction Phase							
Environmental Components	Expected Impact	Significance	Mitigation Measures	Location	Monitoring	Frequency	Responsible Party
	Loss of access	Moderate to high significance (-ve)	Communicate with residents before beginning of construction. Provide temporary access to residents especially close to public places such as schools, and mosque	Construction site	Site inspection and auditing	Weekly	Contractor & supervisor
Utilities and infrastructure	Accidental impacts on the services, or interruption of any utilities.	moderate significance (-ve)	Coordinate with related authorities to avoid , minimize, or fix any interruption of services	Construction site	Regular reporting on risks and incidents	Weekly	Contractor & supervisor
Road and transport	Safety considerations during the mobilization of the heavy machineries	Moderate e (-ve)		Access roads	-	Weekly	Contractor & supervisor
Employment opportunity	Staff and labourers working on site being subject to labour code violations	Moderate (-ve)	Provide employee with information regarding their rights. Set wages above prevailing national minimum wage.	Construction site	-Application of HR policy on terms of employments -Annual auditing	Twice a year	Contractor & Supervisor
	Create new job opportunities for locals	Significant(+ve)	Priority should be given to local residents for any job opportunity. Make sure of the availability of all specialties required for this project.	Construction site	Regular reporting on number of locals vs. non-locals hired	Monthly	Contractor & supervisor

Construction Phase							
Environmental Components	Expected Impact	Significance	Mitigation Measures	Location	Monitoring	Frequency	Responsible Party
Involuntary resettlement And business disruption	Loss of business	Moderate (-ve)	ARAP report has been developed (refer to Appendix 10)	Construction site	Monitor the implementation of land acquisition and compensation plan	Before and during Construction	WAJ Contractor & supervisor
Local community involvement	Objection of the residents	Minor (-ve)	Establishing good communication and engagement of local community at early stage of the development		-Documentation of outreach efforts	Before and During Construction	Contractor & supervisor
Archaeological sites							
Archaeological sites	Impact on already known sites	Minor (-ve)	-Coordinate with Supervisor of the Cultural Resources Management Office of the Department of Antiquities regarding the location of any known archaeological site in the construction area. - If any known sites will be threatened by construction, agreement must be reached with the Department of Antiquities in order to minimize damages to the sites	Construction site	Site inspection and Auditing	Weekly	Contractor & supervisor Ministry of Antiquities
	Impact on new discovered sites during construction	Minor (-ve)	carry out an emergency salvage excavation	Construction site		Weekly	Contractor & supervisor Ministry of Antiquities

Operation Phase							
Environmental Components	Expected Impact	Significance	Mitigation Measures	Location	Monitoring	Frequency	Responsible Party
Physical Environment							
Water quality and Quantity	Increase on supply high quality drinking water	Significant (+ve)			Water Quality to meet Jordanian standards	Daily	WAJ/ Yarmouk water Company
Waste Management Municipal Waste	Increase in domestic waste	Minor(-ve)	Connect to wastewater collection system (if any) Or, to appropriate holding tank	WTP & Pump stations	Emptying the holding tank	Monthly	WAJ/ Yarmouk water Company
Sludge Management	Production of Sludge	Moderate (-ve)	Coordinate with Royal scientific society for the quality of waste If possible use as fertilizer. Otherwise coordinate with related authority to dispose in the municipal landfill	WTP	Disposal record	Weekly	WAJ/ Yarmouk water Company
Chlorine storage and handling	Causing irritation or injury	Moderate(-ve)	Follow proper Storing and handling procedure	WTP	Check storage and handling situation	Monthly	WAJ/ Yarmouk water Company

Operation Phase							
Environmental Components	Expected Impact	Significance	Mitigation Measures	Location	Monitoring	Frequency	Responsible Party
Socio-Economic							
Health and safety	Noise elevated levels due to project on-site activities at the main facilities.	Minor (-ve)	Provide employees with health checkups	WTP and PSs	Site supervisor daily reports	Daily	WAJ/ Yarmouk water Company
	Accidental exposure to nuisance emissions	Moderate (-ve)	Ensuring good project management procedures	WTP and PSs	Site inspection and auditing.	Weekly	WAJ/ Yarmouk water Company
	inhalation or accidental ingestion due Mishandling of chemicals by workers	Moderate (-ve)	Training and proper supervision.	WTP and PSs	Site supervisor daily reports	Daily report	WAJ/ Yarmouk water Company
Economy	Create new job opportunities for treatment plant operation and maintenance.	Significant(+ve)	Priority should be given to local residents for any job opportunity	WTP and PSs	Regular reporting on number of locals vs. non-locals hired	WTP and PSs	WAJ/ Yarmouk water Company

8 CONCLUSION RECOMMENDATION

Assessment and analysis of the site conditions and proposed impacts of the project showed that all anticipated impacts of the proposed project can be mitigated through coordination with relevant authorities, or applying mitigation measures specified for each aspect and phase of the project.

Wadi Arab Water System II project is essential as it will enhance the living standards at Irbid Governorate by providing additional 30 MCM to Irbid residents; especially with the unplanned increase in the population due to Syrian refugees.

All the potential impacts arising from the project activities have been well assessed and evaluated. The project will create positive impacts on the local society, culture and economy such as creating job opportunities for the local labour during the construction phase and land-take or business loss involved to the project will be limited to the location of intake, WTP, PSO, and PS1 and pipeline and will be addressed in the Abbreviated Resettlement Action Plan Report (ARAP), which is a standalone report..

Concurrently, adequate mitigation measures have been taken to eliminate, when possible, or reduce the negative impacts due to construction of the transmission main and WTP on the environment. These measures include maintaining of the air quality, the historical environment, and preserving the flora and fauna existing in the surrounding environment.

The project company should be committed to implement an environmental and social management and monitoring plan which will ensure that the construction and the operation of the Wadi Arab Water System II involves full implementation of all proposed mitigation measures and complies with high environmental standards.

Recommendation

- Coordinate with related authority such as Irbid Governorates, traffic department, municipalities, Ministry of Antiquities... etc. before the beginning of the project
- Contractor should comply with all mitigation measures in order to minimize impacts of the project on the Environment.
- Establish good communication plan with local people especially tribal leaders, and communicate regularly on key issues of concern for affected communities
- Avoid raising expectations or changing public messaging by developing a consistent message, providing realistic expectations, and delivering on promises.