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UPGRADE OF MAFRAQ WASTEWATER TREATMENT PLANT

Scoping Statement

October 2007
This publication was produced for review by the United States Agency for International Development. It was prepared by Engicon.

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1. INTRODUCTION

1.1 PROJECT BACKGROUND

The Ministry of Water and Irrigation (MWI) / Water Authority of Jordan (WAJ) is cooperating with the United States Agency for International Development (USAID) to study and upgrade the existing wastewater treatment plant (WWTP) for the city of Mafraq in northern Jordan. In addition to upgrading the plant, the project will implement an effluent reuse scheme that would contribute to the country's water conservation strategy.

In 2001, the US firm CH2M HILL prepared a Concept Design as well as an Environmental Assessment (EA) for the upgrade of Mafraq WWTP and reuse application. Four years later, the treatment process was changed into a low-cost/low-technology concept by Stearns and Wheler[1]. In 2007, the Jordanian firm Engicon was assigned the task of providing the detailed design services, as well as updating of the EA to accommodate the new design concept. Accordingly, the updated EA would abide by Jordanian environmental legislations as well as USAID regulations.

In accordance with USAID environmental regulations Title 22 CFR Part 216, an Environmental Assessment will be prepared for the proposed project. The EA requires holding a Scoping Session to identify and discuss the environmental issues associated with the project. Participants in the Scoping Session included representatives of government, and public and private institutions that have expertise or interest in the project's environmental issues. The results of the Scoping Session have been incorporated into this Scoping Statement. The Scoping Statement presents a description of the project's significant environmental issues as well as the methodology for evaluating them in the EA.

1.2 SCOPING STATEMENT OBJECTIVES

The objectives of the Scoping Statement, as required by USAID environmental regulations 22CFR 216.3 (a) 4, are summarized as follows:

- Identify the significant environmental issues that will be analyzed further in the EA, including direct and indirect environmental effects.
- Provide a schedule and methodology for preparation of the EA.
- Provide a description of the environmental analyses to be conducted and the disciplines required.

2. DESCRIPTION OF CURRENT SITUATION

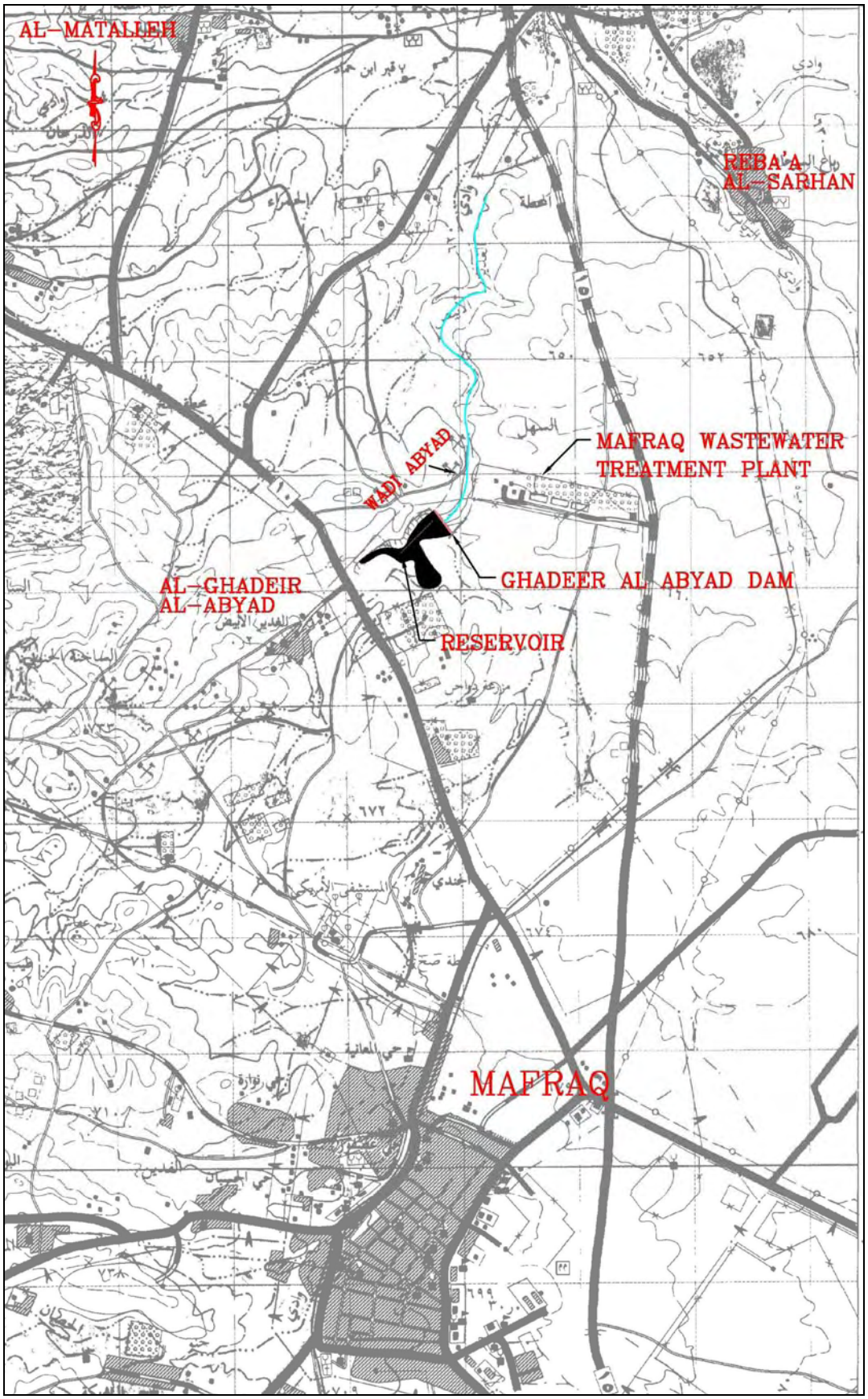
2.1 EXISTING FACILITY DESCRIPTION

The Mafraq wastewater treatment plant is located approximately 3 km north of Mafraq city on a 370-dunum site (Figure 1). WAJ has acquired a further 90 ha of land adjacent to the plant, making the total land area 1,270 dunums. The plant utilizes stabilization ponds consisting of anaerobic, facultative and polishing ponds. A

[1] Stearns & Wheler (2005): Assessment of the Upgrading of the Mafraq Wastewater Treatment Plant

chlorination raceway, currently not in operation, is located at the end of the plant. The administration and laboratory building is near the plant's entrance.

Figure 1: Mafraq WWTP Location Map



Within the fenced WWTP site, approximately 600 dunums are currently being cultivated by local farmers who lease the land. The farmers use the treated effluent to irrigate olive trees, corn, alfa alfa, berseem, and apple trees. The berseem and grains are used for animal fodder (Figure 2).

Figure 2: Reuse Area near the WWTP

The effluent is pumped from the chlorination raceway to the fields where it is distributed in ditches for flood irrigation using a border check system. Operation of the WWTP is the responsibility of the Directorate of WWTP Operation at WAJ.

2.2 PERFORMANCE OF THE WWTP

The existing plant is designed to accommodate a daily inflow of 1,850 m^3 with an influent biochemical oxygen demand (BOD5) concentration of 845 mg/l and an influent total suspended solids (TSS) concentration of 920 mg/l. The present influent flow exceeds the design capacity, as does the TSS concentration (Table 1).

Table 1: Design Criteria and Actual Influent Characteristics

Parameter	Unit	Design	Amount for Year 2006
Influent	m^3/day	1,800	1,866
BOD5	mg/l/day	825	602
TSS	mg/l/day	850	997

Source: Directorate of WWTP Operations / Water Authority of Jordan

The treatment plant is operating at 69.7% of its efficiency with an effluent Chemical Oxygen Demand (COD) exceeding the Jordanian specifications for reclaimed domestic wastewater (JS 893/2006) (Table 2).

Table 2: Effluent Quality of Mafraq WWTP for Selected Parameters

Parameter (mg/l)	JS for Irrigation*	JS for Wadi Discharge	Effluent Quality by Year**				
			2002	2003	2004	2005	2006
BOD5	300	60	214.5	160	188.4	231.4	187
COD	500	150	527	540	634	510.7	615
TSS	300	60	124.8	621	176.7	185	127.4

*This is for selected standards in Table 3 (Characteristics C) for treated effluent reused for irrigation of field crops, industrial crops, and forest trees. **Source: Directorate of WWTP Operations / Water Authority of Jordan

In addition, the current condition of the treatment ponds, civil works, and mechanical equipment has been observed to be in poor condition and they are in urgent need of rehabilitation (Figure 3).

Figure 3: Existing Mafraq Treatment Ponds

3. DESCRIPTION OF THE PROPOSED PROJECT

3.1 PROJECT LOCATION

The new plant proposed by the project will replace the existing WWTP and be located on the same site. Land adjacent to the existing WWTP has been acquired with the aim of utilizing the treated effluent for irrigation.

3.2 PROJECT OBJECTIVES

The main objectives of the proposed project are as follows:

- Construct new units within the WWTP in order to upgrade the existing plant. The new upgraded plant will treat projected sewage flows up to the year 2025.
- Meet effluent standards consistent with JS 893/2006 for restricted agricultural reuse and wadi discharge.
- Contribute to the minimization of the extraction of groundwater resources for irrigation uses by providing an alternative source of water to local farmers.
- Prevent groundwater contamination by improving the overall quality of the effluent from the wastewater treatment plant.

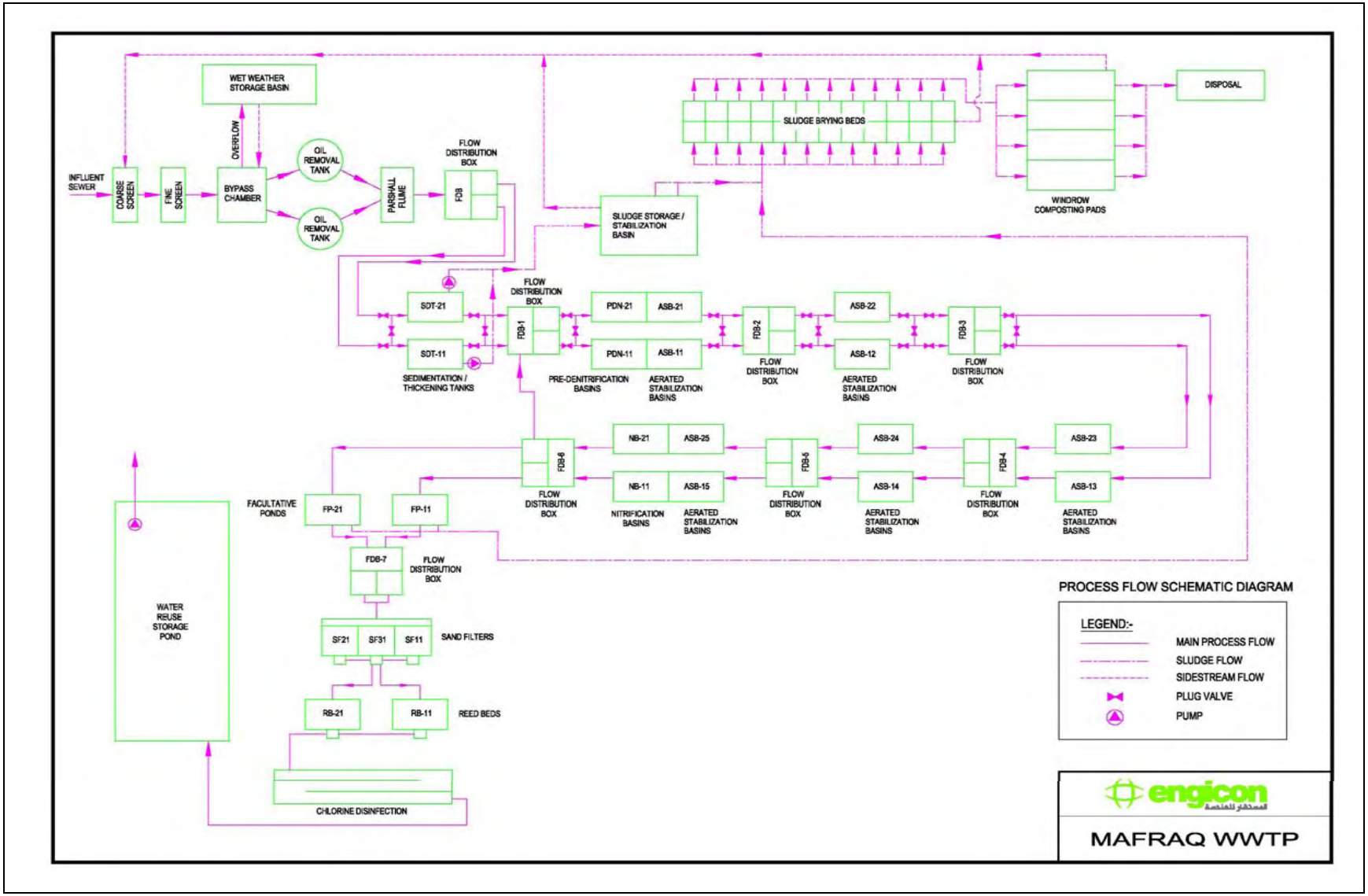
3.3 PROJECT COMPONENTS

The upgraded wastewater treatment plant serving Mafraq city will have a capacity of 6,500 m^3/day and include the following unit processes:

- Septage Receiving Station
- Screening Facility
- Wet Weather Storage Lagoon
- Influent Pumping Station
- Settling/Thickening Tanks
- Pre-dentitrification Basins
- Aerated Stabilization Basins
- Facultative Lagoons
- Dosing Basins
- Recirculating Sand Filters
- Nitrate Recycle Pumping Station
- Reed Beds
- Maturation Ponds
- Chlorine Disinfection
- Sludge Storage/Stabilization
- Sludge Drying Beds
- Windrow Composting
- Water Reuse Storage Pond

Figure 4 on the following page shows the flow diagram of the proposed treatment process.

Figure 4: Flowchart of Proposed Mafraq WWTP Process



Space has been reserved for a water reuse storage pond with a size of 90,000 m^3 and a water reuse pumping station. According to the proposed reuse scheme, which requires an additional 820 dunums of land to be acquired, the following is expected:

- No effluent discharge into the wadi during the summer.
- No effluent discharge during winter except for seasonal emergency cases.

However, if no additional land is acquired for reuse, around 150,000 m^3 will be discharged annually in 2010 (reaching up to 520,000 m^3 in 2025) into the nearby wadi.

Regarding use of chemicals, it will be limited to sodium hypochlorite for chlorination during epidemics. This chemical is in liquid form and will be stored in the amount of around 500 kg onsite.

3.4 PROPOSED EFFLUENT STANDARDS

According to JS 893/2006, reclaimed water can only be used to irrigate trees, cooked vegetables, and fodder. Wadi discharge and aquifer recharge are also permitted, but with stricter requirements. The project proposes effluent standards that are in line with the current Jordanian requirements for wadi discharge as per JS 893/2006 (Table 3).

Table 3: Effluent Design Criteria

Parameter	Unit	Amount / Jordanian Standard
BOD5	mg/l	60
COD	mg/l	150
TSS	mg/l	60
Total Nitrogen	mg/l	70
Nitrates	mg/l	80
Dissolved Oxygen	mg/l	> 1.0
pH	-	6-9
E. Coli	colonies/100 ml	1,000
Intestinal helminthe eggs	eggs/l	$\leq$ 0.1

4. DESCRIPTION OF STUDY AREA

The study area is defined as a 1270-dunum site consisting of the existing Mafraq WWTP and areas immediately adjacent to the plant that have been acquired by WAJ. What follows is a brief review of the topics that will be covered in greater detail in the EA.

4.1 LAND USE

The existing 370-dunum WWTP site consists of about 110 dunums of treatment ponds, pumping stations, maintenance roads and an administration building; about 600 dunums of fields are irrigated with treated effluent. The irrigated fields are

planted with the following crops: olive trees, corn, alfa alfa, berseem, and apple trees. The area acquired around the plant is barren with no vegetation and is not currently used.

According to recent satellite images, the area to the west of the wadi within 3 to 5 km of the plant is rugged, rural and hilly. To the east of the wadi it is mostly flat, with slopes of up to 4 percent. Land use consists mainly of rain-fed and irrigated agriculture and grazing land.

4.2 POPULATION

According to the census conducted by the Department of Statistics in 2004, it is estimated that in 2006, the population of Mafraq city was 51,482, around half of which is currently sewered. This number is expected to increase to around 82,076, with an expected 75 percent sewered population by 2025. Field investigations and satellite images show that there are no permanent residents within approximately 2 km of the project site.

4.3 WATER RESOURCES

The B2-A7 Aquifer groundwater in the vicinity of the treatment plant flows to the northwest with the final discharge point of the Yarmouk River (Figure 5). Other aquifers in the vicinity of the project area are not being tapped. Water levels in the vicinity of the WWTP have fallen by an average of 1 meter per year over the last 18 years from around 180 meters below ground level (mbgl) in 1980 to around 198 mbgl in 1998[2].

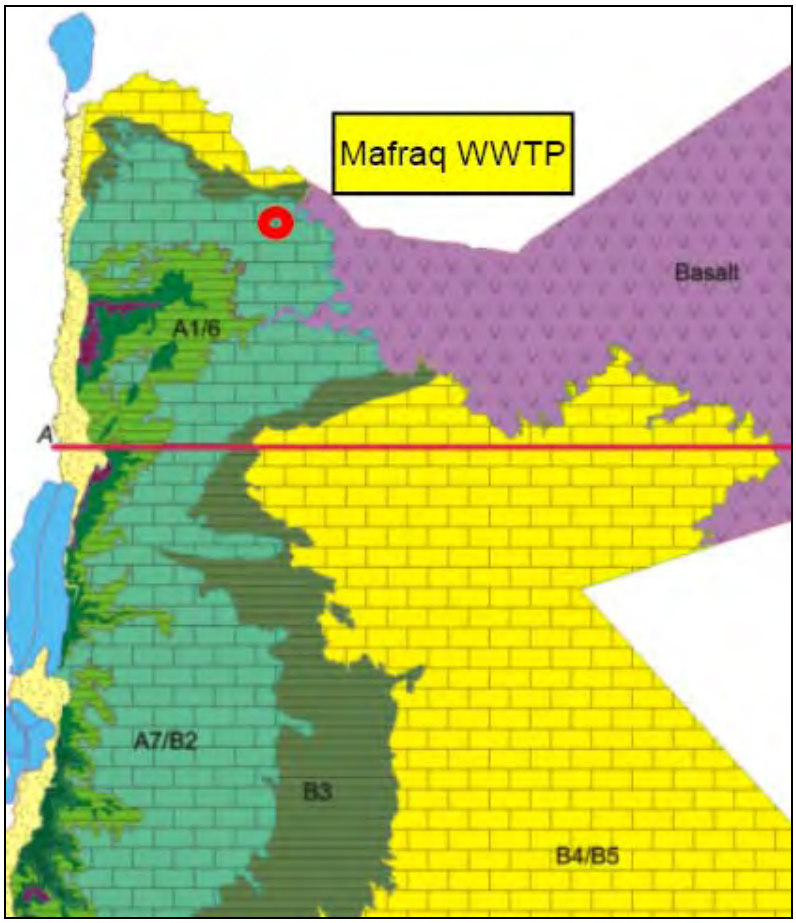
The only nearby surface water resource is Wadi Al Abyad and the Ghadeer Al Abyad Dam, located approximately 1 km upstream from the WWTP site. Adjacent to the WWTP site, the wadi only has flow during high precipitation events, usually in the winter or when there are spills from the Ghadeer Al Abyad Dam, when water flows over the emergency spillway[3].

4.4 CLIMATE

The average temperature in Mafraq ranges between 16-33^{o}C during the summer and 2-12^{o}C during the winter. Precipitation in the area is generally low (approximately 150 mm/year). Under average conditions, greater than 90 percent of the rainfall occurs during the months of November through March. The wind direction is southerly to south westerly during winter and fall and westerly and north westerly in the warmer seasons of spring and summer. The wind speed ranges from 3 to 6 knots[4].

[2] Abu Ajamieh, M. (2000) Hydrogeology of the Amman-Zarqa Groundwater Basin
[3] CH2M HILL (2001), Mafraq WWTP and Reuse Application—Task 1 Report: Treated Wastewater Reuse Feasibility and Conceptual Design
[4] Jordan Meteorological Department Website (www.jmd.gov.jo)

Figure 5: Groundwater Basins in the Area



4.5 SOILS

The soils on the site are characterized as gently undulating basalt plain with moderately deep to deep colluvium or eolian cover that is moderately calcareous. The average depth of the soil profile ranges between 1 to 6 meters. Soil types within the WWTP facility and the surrounding areas are generally similar. They are derived from eolian sediments deposited over historic alluvial fan sediments, previously eroded from calcareous rock parent material. These are generally fine textured soils with clay loams, silty clay loams and clays throughout the profile. These soils have a moderate to good potential for irrigation and grazing[5].

4.6 FLORA AND FAUNA

Except for the small area of cultivated lawn and flower beds adjacent to the administration building and a few trees at the plant's entrance, the only vegetation observed at the site is the treated effluent-irrigated fields. The rest of the site appears to be bare of vegetation. The project site and surrounding area is classified as part of the Irano-Turanian region, which is characterized by treeless land with mostly shrubs and bushes[6]. The preliminary investigations show that there are no protected birds or

[5] CH2M HILL (2001), Mafraq WWTP and Reuse Application—Task 1 Report: Treated Wastewater Reuse Feasibility and Conceptual Design

[6] The General Corporation for Environment Protection (2000) Jordan Country Study on Biological Diversity

other animal species within the project area or its immediate vicinity. However, several binds were observed within the reuse area during the site visit.

5. EXISTING ENVIRONMENTAL ISSUES

The identification of environmental issues presented below is based on the EA prepared in 2001, the assessment for the concept design made in 2005 (refer to Section 1.1), and the environmental review conducted as a result of visits to the project site. The issues presented along with any other relevant environmental issues were discussed during the Scoping Session and revised accordingly, to be used in this Scoping Statement.

The environmental issues are placed in the categories of Socioeconomic, Public Health or Natural Resources. These categories are expected to be maintained in the Scoping Session and the Scoping Statement. Each issue must be evaluated for its potential significance both during the construction and operation phases of the project. Direct and indirect impacts within these categories will also be considered in the Scoping process.

5.1 SOCIOECONOMIC ISSUES

5.1.1 Water Supply and Demand

Farmers in the area of the wastewater treatment plant obtain most of their irrigation water from private wells, as well as from farming ponds that capture winter run-off and water tankers. Some farmers also use water stored in Ghadeer Al Abyad Dam. Demand for groundwater to be used for irrigation has contributed to falling groundwater tables in the area.

5.1.2 Employment and Development

The existing plant provides employment for 3 operators, 3 unskilled workers, one inspector, and one chemical engineer responsible for operating the treatment facilities. The availability of affordable irrigation water in the form of plant effluent enables four farmers to grow animal fodder and olive trees on 240 dunums of the site. The farmers employ around 18 permanent workers. During the harvest, many more are temporarily employed.

A major recent development in Mafraq is the launch of the Mafraq Special Economic Zone in November 2006. The zone will evolve over the next 19 years serving as a transport, logistic and industrial hub for Jordan, Saudi Arabia, Syria, and Iraq. The number of jobs expected to be created in Mafraq Special Economic Zone are 13,000 by 2015. This number is expected to increase to 32,000 in 2025. The location of the zone will be close to the treatment plant, but it will not be served by the plant's facilities. The estate will construct and operate its own treatment plant.

5.1.3 Odor

The nearest residential area to the treatment plant is Serhan, located 2.5 northeast of the plant. Mafraq city is 3 km to the south (Figure 1 on page 2). Inquiries have suggested that there have been no complaints from the inhabitants regarding odors from the plant, although some odor is noticeable near the anaerobic treatment ponds.

5.2 PUBLIC HEALTH ISSUES

5.2.1 Vector Attraction and Breeding

Treatment ponds can attract aquatic insects such as mosquitoes, which are known vectors of malaria and encephalitis. It is not known at this time whether or not vector breeding is a problem at the site.

5.2.2 Occupational Safety and Health

If proper hygienic measures are not taken, and the level of treatment at the existing plant is not meeting the required standards, there is an increased risk of human infection. Workers could be exposed to a variety of pathogenic organisms such as bacteria, protozoa, viruses, and helminths, all of which may be found in sewage.

5.2.3 Reuse Issues

The high nitrogen content of the effluent from the treatment plant may indirectly pose risks to the animals that are consuming the cultivated fodder. If the fodder is not diluted or cut with other fodder of lower nitrogen content, it could cause gastric problems in some of the livestock. Contact with the treated effluent, with quality below the Jordanian standards (JS 893/2006), currently used to irrigate the reuse fields poses a health risk to the farm workers.

Currently, no potential industrial users of the effluent in the Mafraq area were identified, due to the present lack of industry in the Mafraq area. However, considering the launching of the special economic zone in Mafraq, future potential industrial users should be considered.

5.3 NATURAL RESOURCES ISSUES

5.3.1 Groundwater Depletion

Farmers in the Mafraq area primarily use water from wells to irrigate their crops. Groundwater table levels are falling each year as the aquifers are being depleted. Section 4.3 provides further details.

5.3.2 Groundwater Contamination

The high organic load of the effluent that is used for irrigation of the land poses the risk of groundwater contamination of the aquifers. At present, an excess of reuse effluent is applied to the cropland and some of the water that cannot be taken up by the crops migrates through the soil to the groundwater. This may be causing severe contamination by nitrogen since the nitrogen content of the effluent can reach up to 135 mg/l Ammonium (NH4) and has an average of 110 mg/l[7]. The current standard is set at 80 mg/l.

An increase in the salinity of groundwater in the Mafraq area, most likely due to over-extraction for agricultural development, has also been reported. In addition, the

[7] Data provided by the Directorate of WWTP Operations / Water Authority of Jordan, 2005

current plant, which utilizes a pond system, increases the Total Dissolved Solids (TDS) concentration of the effluent, which can reach up to 1,280 mg/l, due to high pan evaporation (approximately 10 percent of the influent flow). Infiltration of effluent with a high TDS value can further degrade the groundwater.

5.3.3 Surface Water

The farmers utilizing the treated wastewater are under contract to take all the effluent of the treatment plant during both the summer and winter seasons. Therefore, even when water is not required, they still apply it on the land. This application method may lead to the discharge of excess nutrients into the nearby wadi by surface storm flow runoff. Contributing factors include the site gradient and storm water flow pattern on the site.

6. SIGNIFICANT AND NON-SIGNIFICANT ENVIRONMENTAL ISSUES

This section presents the environmental issues relevant to the proposed project that were identified prior to and following the Scoping Session. These issues in addition to the methods used to evaluate their significance are described herewith, along with comments made by the participants and likely sources for obtaining additional information.

6.1 SCOPING PROCESS

The Scoping Process serves to identify the significant and non-significant environmental issues that will be addressed in detail in the EA. Based on the results of a preliminary environmental review, a list of environmental issues for the proposed project was developed. A Pre-Scoping Brief (Appendix A) was distributed to all the invitees prior to holding the Scoping Session. The Brief described the proposed project, as well as the relevant environmental issues associated with both the existing and the proposed WWTP and reuse scheme.

Fifty one invitations to the Scoping Session were sent out and a total of fifty nine people attended (Appendix B). The Session was held on 21 August 2007, from 10.00 am to 2.00 pm, at the Mafraq Municiaplity Hall. Following opening remarks by WAJ, Eng Raid Zureiqat, Chief of Party, Engicon, presented the project, focusing on the technical aspects. This was followed by a discussion period designated for technical issues. Lama Bashour, Environmental Task Leader, Engicon, then made a brief presentation on the identified environmental issues associated with the upgrade of the treatment plant. The session was also attended by project CTO, Eng. Ramzi Sabella, and Mission Environment Officer, Dr. Amal Hijazi.

Following an open discussion, the participants broke out into groups to discuss the most important issues in greater detail. The breakout group topics were distributed into the following categories: Socio-economic, Public Health, and Natural Resources issues. After that, the participants filled out an Environmental Issues Questionnaire (Appendix C).

The Scoping Session allowed people who have an interest and/or expertise in the issues pertaining to the Mafraq WWTP project to learn more about the project and to voice their opinions on the identified environmental issues as well as other environmental issues of concern.

6.2 PRELIMINARY LIST OF ENVIRONMENTAL ISSUES FOR SCOPING

The following is a list of the environmental issues identified prior to the Scoping Session, for both the existing and proposed WWTP and reuse scheme. The list contains the issues described in the Pre-Scoping Brief and the Environmental Issues Questionnaire:

Socio-economic Issues	Public Health Issues	Natural Resources Issues
• Water supply and demand • Employment and development • Land use • Public perception • Archeological sites • Traffic	• Sanitation • Occupational safety and health • Reuse benefits and hazards • Air quality (dust) • Odor • Noise	• Groundwater depletion • Groundwater contamination • Sludge disposal • Wadi discharge effect on habitat • Surface water • Wildlife habitat • Soil disturbance • Vegetation

All the participants at the Scoping Session were requested to fill out an Environmental Issues Questionnaire (Appendix C) in which they rated the effect the proposed project may have on the environment, during construction and operation of the proposed plant and reuse sites.

The level of significance of each issue was rated by marking the appropriate category ranging from ‘no significance’ (0) to ‘high significance’ (3). The respondents marked a plus (+) or minus (-) sign indicating a positive or negative effect the specified issue is expected to have on the environment.

Forty three questionnaires were returned at the end of the Session, compared to a total number of fifty nine participants (excluding the presenters). It should be noted that all the participants of the Scoping Session had the opportunity to voice their opinions on the environmental issues during the open discussions and the task groups. The determination of issue significance in this Scoping Statement therefore incorporates the opinions expressed during discussions and task groups in addition to the results of the questionnaires.

In summary, all the issues that were identified in the Pre-Scoping Brief were rated by the participants as significant, either during construction or during operation. However, regarding the positive and negative impacts, only 34 of the questionnaires actually incorporated the (-) or (+) sign in their responses, and therefore, only these 34 were included in the analysis of the type of impact. Appendix D contains the raw data of the questionnaire results.

6.3 SIGNIFICANT ISSUES

6.3.1 Socioeconomic Issues

6.3.1.1 Water Supply and Demand

Water for agricultural use in the Mafraq area is in short supply. The groundwater extraction rate in the area far exceeds sustainable levels. Demand for irrigation water is expected to increase due to an increasing population and associated pressure to

utilize nearby land which is well-suited for agriculture if adequate supplies of water can be provided. The proposed project would alleviate some of the existing pressure that is depleting groundwater sources for agriculture. In addition, if some of the agricultural demands can be met with reuse water that replaces groundwater, this can indirectly serve to increase the available supply of drinking water.

According to the questionnaire results, 74% of involved participants thought this issue is of significance during construction and 95% during operation phase. Also, 74% of participants voted for the potential positive impact during construction and 94% during operation.

There was a discussion related to the price of the reclaimed water in the break out group. One of the participants raised the issue of supplying this water for free, whereby others suggested giving encouraging prices.

6.3.1.2 Employment and Development

The proposed project is expected to have a positive effect on the local economy and working population. New jobs will be created during the construction phase of the WWTP. During its operation, the current number of workers would be increased, creating more job opportunities for the residents of the area. Furthermore, a larger number of farm workers will also be employed at the new farms created by the increased availability of reclaimed water. This in turn is expected to have a positive "ripple effect" within the local economy.

Consequently, the appreciation of these effects was demonstrated during the scoping questionnaire as 100% of the respondents rated this issue as significant during construction and 90% during operation. In addition, 100% of respondents recognized the related positive outcomes during both construction and operation.

One valid concern that was raised during the group discussion is that contractors usually bring their own staff, then again it was suggested to solve this by immediate contact between the project management and the vocational training centres in Mafraq to train local labor prior to construction. Regarding the operation phase, the suggestion was to train the staff in advance on WWTP operation onsite at other treatment plants.

6.3.1.3 Land Use

Construction of the new treatment facilities would not be expected to have any significant effect on long-term land use. However, reuse of the effluent on agricultural land in the plant's vicinity will have a significant effect on land use such that that it will turn barren land into productive farmland. In addition, there will be indirect effects related to increased employment and temporarily or permanently increased population in the immediate area.

Respondents came to support our assessment for this issue as 48% granted significance for land use during construction and 88% during operation. As for their consideration of positive impacts, 50% thought it will be tangible during construction and 91% during operation. This shows good public awareness of the benefits for using reclaimed water for irrigation.

Suggestions from group discussion implied that land in the plant's vicinity should be offered for free, with reduced prices on water. Many participants stressed on

imposing the crops. Fodder cultivation was also encouraged since it withstands saltiness.

6.3.1.4 Public Perception

The use of treated wastewater for agricultural needs is becoming more and more accepted among farmers in Jordan. Farmers will, however, need to be better informed about the risks and benefits of using the treated effluent. This in turn may serve to allay possible negative perception of wastewater reuse among the general public. Public perception of the project's goals is a significant issue that must be fully considered before successful implementation of the reuse scheme can be expected.

Participants were more concerned with public perception during the operation phase, so 74% voted for significance during construction and 81% during operation, whereas one of the comments came recommending the early start of public awareness sessions during construction. The stance towards how positive this issue will be came as 85% during construction and 79% during operation.

During the group discussion, suggestions were made on reaching out for locals through campaigns that would explain the benefits of this project, such as the socio-economic benefits of effluent reuse.

6.3.1.5 Archeological Sites

During excavation work, borings and construction, the project may damage or destroy known or undiscovered archeological sites. The previous EA study has shown that there were no known archeological sites within the project area. This was confirmed by the Department of Antiquities in Mafraq[8]

Correspondingly 55% of the votes were awarded for the significance during construction and 38% during operation, and 65% of participants voted for negative effects during construction and 41% during operation.

6.3.1.6 Traffic

Although the treatment plant is located on a major highway, it is unlikely that there will be major disruptions in traffic flow resulting from the movement of heavy machinery and construction materials. This issue will, however, need to be further evaluated.

As indicated by participants, traffic has some relevance during construction so 62% of respondents granted it significance, this percentage falls down to 33% during operation. About 59% of respondents believe that there will be\ negative effects during construction and 44% during operation.

[8] According to the previous EA (CH2M HILL (2001), Mafraq WWTP and Reuse Application—Task 3 Report: Environmental Assessment): "A site visit was made on May 24, 2001 with Mr. Naser Khassawneh, District Inspector of Mafraq, Department of Antiquities. This investigation determined that there are no visible signs of any significant archeological sites within the WWTP area."

6.3.2 Public Health Issues

6.3.2.1 Sanitation

As mentioned in Section 2.2, the existing treatment plant is not meeting current Jordanian wastewater treatment standard (JS 893/2006). The proposed WWTP is expected to have a positive effect on the health of the workers operating the plant and the farmers utilizing the treatment plant's effluent because they will have a reduced risk of coming into contact with inadequately treated wastewater.

The community at large will benefit from improved sanitation, due to reduced risk of overflows of partially untreated or untreated waste in addition to the greater availability of public sewer service for the residents in the area. The projected population growth is built into the project so that the plant will be able to treat the projected sewage generated until the year 2025.

The significance of the sanitation issue is fairly appreciated by 64% of participants during construction and 83% during operation, whilst its positive impact attained 38% of votes during construction and 68% during operation.

Positive feedback was acquired during the group discussion when participants stated that sanitation is expected to improve due to increased coverage of the sewer networks and the enhancement of effluent.

6.3.2.2 Occupational Safety and Health

During construction of the WWTP, hazards associated with the use of heavy machinery, dust and noise pollution will need to be addressed. The proposed plant is expected to be more technically and mechanically complicated than the existing plant. Therefore, during operation of the new facilities, workers involved in the daily functions of the plant will need to be well-trained and well-disciplined in exercising all the necessary safety precautions.

Again, participants gave a high weight for this significant issue, 86% are concerned with its risks during construction, and 81% during operation. The somewhat positive reception of its effects comes as a surprise, with 71% of the votes during construction and 65% during operation. This can be justified as an optimistic confidence in safety standards enforcement.

Participants during the group discussion were concerned with safety of workers while dealing with aeration ponds or sludge handling. Others proposed the need to enforce occupational safety measures and first-aid equipment.

6.3.2.3 Reuse Issues

Reuse of the proposed WWTP's effluent provides numerous benefits to the farmer, the community and the environment, if the treated effluent reuse is implemented correctly. Some of the benefits include elimination of the need for costly fertilizer, improved soil conditioning, and conservation of groundwater resources, as well as other socio-economic environmental enhancement gains. If, however, the effluent is not treated to the required standard or if the crops grown with the reuse water are not appropriate (i.e. unrestricted crops, such as those that can be directly consumed without cooking), then health risks may be incurred.

Soil salinity due to application of the treated effluent is an important reuse issue that needs to be investigated. If it occurred, soil salinity can, over time, damage soil structure, causing surface crusting reduced infiltration, and restricted subsoil drainage and root development.

It is the Consultant's assumption that the environmental effects associated with reuse of treated effluent from the proposed WWTP will be based on the design standards and practices of the plant. Evaluation of potential reuse hazards and benefits will therefore be limited to those associated with the proper operation of both the WWTP and reuse components of the project.

Significance of this issue was granted by 55% of respondents during construction phase and high percentage of 95% during operation. Benefits recognition was demonstrated, to some extent, with votes for positive effects of 47% during construction and 76% during operation.

During the group discussion, participants recommended the provision of warning and guidance signs for the locations of the reuse to inform the public of the associated health hazards and needed precautions.

6.3.2.4 Dust and Noise

During the construction phase of the proposed project there will be a significant increase in dust and noise pollution from excavation and use of heavy machinery. Appropriate safety measures for the workers would be expected to mitigate these impacts.

A percentage of 71% of respondents considered the issue of dust as significance during construction and 55% during operation. It is perceived as having negative effects by 59% of respondents during construction, whilst this percentage decline to 38% during operation.

Noise significance was only anticipated by 50% of respondents during construction and 69% during operation. Negative effects were recognized by 76% during construction, and 47% during operation.

6.3.2.5 Odors

During the proposed plant operation, odors from raw and insufficiently treated wastewater are expected to decrease because the new plant is expected to achieve a higher standard of treatment.

It seems that respondent were more concerned with its effects during operation. Accordingly 48% of respondents stated its significance during construction and 81% during operation. Likewise its negative effects were anticipated by a percentage as low as 24% during construction, and 56% during operation. During the group discussion, odor from sedimentation and dehydration tanks was discussed.

6.3.3 Natural Resource Issues

6.3.3.1 Groundwater Depletion

The proposed project is expected to contribute to the relief of groundwater depletion by substituting treated effluent for the groundwater which would be used for irrigation

in the Mafraq area. In fact, many efforts, such as the USAID-funded Reuse for Industry, Agriculture, and Landscaping (RIAL) Project, have shown that there is demand for treated effluent in irrigation in Jordan. Figure 6 shows an example of one pilot project in Wadi Mousa area.

However, the true significance of this issue was not completely reflected on the questionnaire results whereby 48% of respondents regarded it as significant during construction and only 64% during operation. Also the proposed project's contribution to groundwater depletion prevention was not highly appreciated as 29% of participants considered its positive effect during construction, and only 47% during operation.

Figure 6: Alfalfa Grown with Reclaimed Water in Wadi Mousa

Source: USAID/Jordan, Water Reuse as a Tool for Integrated Water Resources Management: USAID's Recent Experience in Wadi Mousa with effluent reuse under the Reuse for Industry, Agriculture and Landscaping project (RIAL)

6.3.3.2 Groundwater Contamination

The main issue associated with groundwater quality for the proposed project is contamination due to treated effluent infiltration on irrigated land or in the wadi as a result of treated effluent discharge.

Based on the initial environmental review, it appears unlikely that groundwater would be contaminated from field application or even emergency wadi discharge of the new WWTP's treated effluent. This opinion is based on preliminary information on the location of the groundwater table and the expected low concentrations of contaminants in the treated effluent. The likely treatment system for the new WWTP will have less pan evaporation than the current plant since this configuration is expected to have a smaller free surface. Hence, the TDS value of the effluent from the new WWTP will be equal to or less than that of the existing WWTP. The issue of groundwater contamination will be further evaluated in the EA.

However, 45% of respondents acknowledged this issue as significant during construction and 64% during operation, as per response on the type of impact 35% believed it would be negative during construction, while 56% thought it would be positive during operation.

Maintaining groundwater quality was one of the points raised in the discussion, and it was suggested to line ponds with HDPE to avoid any leachate leakage.

6.3.3.3 Sludge Disposal

As mentioned in Section 3.3, the sludge generated by the proposed WWTP will be treated using a sludge digester, drying beds, and composting prior to application on the land. The quality of the resultant sludge and the method of application will be in accordance with the detailed quality standards for Category 1 of the Jordanian Specification for uses of treated sludge and sludge disposal (JS 1145/2006). This sludge category can be used for all purposes in line with the standard's detailed conditions.

Sludge disposal was of a concern to a good percentage of 60% of participants during construction and 83% during operation. Positive impacts got 35% of the votes during construction and 68% during operation.

The outcome of sludge composting process was raised during discussion by one of the participants. Another was concerned with the disposal of the sludge in the existing ponds.

6.3.3.4 Wadi Discharge and Effects on Habitat

The proposed scenario for effluent reuse involves wadi discharge of treated effluent only in emergency cases, such wadi discharge is expected to take place in the winter months when agricultural demand for the reuse water is low and the hydraulic load on the WWTP is the highest. However, as mentioned in Section 3.3, the possibility that the excess water (466,842 m^3 per year) is not reused at all should also be considered.

Wadi Al Abyad is located at the western end of the site. There is usually little or no flow in the wadi largely due to the effect of the Ghadeer Al Abyad Dam, located less than 1 km upstream of the project site. Emergency discharges into the wadi, as well as possible continuous discharge in the other scenario, could therefore serve, albeit temporarily, to enhance the habitat around the wadi by restoring some of the vegetation and attracting wildlife that were found in that section of the wadi before construction of the dam.

This issue was marked as significant by 52% of respondents during construction and 88% during operation, with an expected low percentage of responses on the positive effect of 18% during construction and 41% during operation. In fact, 50% of the respondents believed that wadi discharge will have a negative impact on habitat. This is an important indication of the negative public perception regarding wadi discharge of treated wastewater, and needs to be technically addressed in the EA both in public health/perception aspect and expected impact on stream water quality and flora and fauna.

6.3.3.5 Surface Water

During construction, soil disturbance would not be expected to have a significant effect on surface water quality. There is a cliff of approximately 10 meters into the wadi at the western edge of the site and it is likely that precipitation runoff from the construction areas would be contained on the site.

During operation of the WWTP and due to the presence of a large storage pond (90,000 m^3), it is expected that wadi discharge of the treated effluent is unlikely. In that case impact on surface water in the area as a result is not anticipated. However, in case wadi discharge (described in Section 3.3) is in fact necessary, the impact on surface water needs to be assessed. In addition, surface run-off during irrigation is possible and may prove to be of significance.

In that matter, 48% of participants considered it as significant during construction and 74% during operation. As expected, answers had a negative trend, with 41% of respondents voting for negative effects during construction and 53% during operation.

6.3.3.6 Bird Habitat

During construction of the WWTP, the associated noise and dust pollution may have a slightly negative effect on birds foraging or nesting in or migrating through the area.

During the operation, however, bird habitat in the area may be enhanced by the presence of the storage pond filled with treated effluent that is much cleaner than the existing plant's malfunctioning stabilization ponds. In addition, some of the existing ponds will be utilized in the new design and will also serve to increase the habitat enhancement.

In their responses to the questionnaire, 50% of participants believed in the significance of such an issue during construction and 60% during operation. In addition, only 41% of participants were aware of the negative impact on bird habitats during construction, and 41% appreciated the positive effects on habitat enhancement during operation.

However, during the discussion, participants showed concern regarding bird transmitted diseases (such as bird flu) and their implications to public health. The effect of bird attraction on the nearby airport was also mentioned.

6.3.3.7 Vegetation and Soils

During construction of the WWTP, soil disturbance may cause reduced soil stability, loss of soil structure and soil erosion. The existing vegetation on the site will probably be removed, depending on the specific siting of the proposed facility structures.

Following construction, it is expected that some landscaping will be done to replace the soil and/or vegetation disturbed. The irrigation of nearby land with the treated effluent will improve soil structure and condition. In addition to the development of cropland, some uncultivated, native vegetation may also be established. In addition, soil salinity, discussed in Section 6.3.2.3, should be addressed.

Only 40% of respondents were concerned with soil conditions during construction and 52% during operation. 44% of votes were granted for negative effects during construction and a low percentage of 32% respondents viewed the positive effects on soil during operation.

As for vegetation, 50% of respondents marked it as significant during construction, and 76% during operation. 38% of respondent assessed the negative effects during construction, whilst 76% recognized the positive effects during operation.

6.4 NON-SIGNIFICANT ISSUES

All of the environmental issues that were identified prior to the Scoping Session were discussed in the Session. The results of the questionnaire and discussions show that none of these issues were considered by the participants to be non-significant during both the construction and operation phases of the project.

6.5 OTHER ISSUES OF CONCERN

During the Scoping Session, a number of issues that had not been previously identified were raised. These issues came up during open discussions and break out group meetings. They are as follows:

- The issue of the proper wastewater treatment during construction and decommissioning of the existing treatment plant was raised because of similar past experiences where coordination between existing operation and new construction had been poor.
- Management of construction waste and proper disposal was stressed to ensure that it is clearly mentioned in the scope of work of the WWTP construction contractor.
- Increase in the number of rodents, insects, and reptiles due to improper handling and treatment of the wastewater during construction.
- Enforcement of the provision of flood prevention measures, to secure the project area in case of shock loads.
- The possibility of power generation through the plant processes: suggestions were made on applying new processes for producing new source of energy.
- Handling of chemicals on site, which is limited to chlorination tanks giving rise to the risk of leakage that needs to be addressed.

7. PROPOSED ENVIRONMENTAL ASSESSMENT METHODOLOGY

7.1 DATA SOURCES AND ANALYSIS

Most of the data pertaining to the environmental conditions at the project site and vicinity have been collected for previous reports, Basis of the Design Report and the Pre-Scoping Brief. Details on the groundwater and surface water resources in addition to some documentation on the project site's flora and fauna will be obtained for the EA. Additional data on the proposed price of reuse water and available economic development plans for the Mafraq area will also be obtained.

Qualitative information about the relative ease of permeability of treated effluent into the groundwater at the reuse sites will be obtained from the project's geologist and hydrogeologist and the Geotechnical Report that was prepared in 2001.

Original sampling or fieldwork such as soil samples or water samples is not considered to be necessary for the purposes of the EA, which will rely on existing data especially the EA prepared in 2001, in addition to the incorporation of recent and updated data from WAJ, Department of Statistics and other government entities, along with the use of most recent Jordanian standards.

7.2 DISCIPLINES REQUIRED

The following people are expected to participate in the preparation of the EA:

- Environmental Task Leader
- Chief of Party
- Environmental Scientist
- Environmental Engineer
- Geologist/Hydrogeologist
- Reuse Expert

7.3 PROPOSED EA REPORT OUTLINE

The following proposed EA Report Outline is based on the guidelines in USAID Handbook 3, Appendix 2D, Part 216.6 (c):

1. Executive Summary

This section summarizes the report's conclusions, any areas of ongoing discussion and any outstanding issues to be resolved.

2. Purpose

The EA will briefly describe the background for the proposed project. It will discuss the need for the proposed action in addition to any alternatives.

3. Alternatives Including the Proposed Action

This section will include a description of the WWTP process and operational units. It will also compare the proposed action with the alternatives considered in terms of their environmental impacts. All reasonable alternatives that were eliminated from consideration will be discussed here including the no-action alternative. The preferred alternative is identified here, along with any mitigation measures.

4. Affected Environment

This section provides a brief description of the environment in the project area, which will be affected by the proposed project or any of the alternatives. The amount of data and analyses included in this section will be in keeping with the relative significance of the impact. More general, background information will be summarized or referenced.

5. Environmental Consequences

This section of the EA provides the basis for the comparisons made in Section 3. It includes the environmental impacts of the proposed action and the alternatives. Most of this section concentrates on the significance of short-term and long-term effects of the proposed project, direct and indirect effects and proposed mitigation measures. Other considerations will include possible conflicts between the proposed project and any other land-use plans and policies, energy requirements, conservation measures and socio-economic impacts.

6. List of Preparers

The names and qualifications of the people responsible for preparing the EA and/or significant background papers will be presented.

7. Appendix

This section will contain more detailed data, background material and references used in the EA.

7.4 SCHEDULE

Work on the EA is scheduled to commence on October 18, 2007 upon approval of this Scoping Statement and the draft EA will be submitted for approval by November 15, 2007. The following table summarizes the main activities in the EA and the expected duration of effort required for each.

Activity	1	2	3	4
Gathering and Updating Data				
Conducting Environmental Issues Analysis				
Developing Mitigation and Monitoring Plan				
Preparation of Draft EA				

Appendix A
Pre-Scoping Brief

USAID
FROM THE AMERICAN PEOPLE

سلطة المياه
WATER AUTHORITY

Pre-Scoping Brief

Upgrade of Mafraq Wastewater Treatment Plant

Date:
August 21, 2007

Submitted by:
Engicon
P. O. Box 926963
Amman 11190, Jordan

1. INTRODUCTION

1.1 PROJECT BACKGROUND

The Ministry of Water and Irrigation (MWI) / Water Authority of Jordan (WAJ) is cooperating with the United States Agency for International Development (USAID) to study and upgrade the existing wastewater treatment plant (WWTP) for the city of Mafraq in northern Jordan. In addition to upgrading the plant, the project will implement an effluent reuse scheme that would contribute to the country's water conservation strategy.

In 2001, the US firm CH2M HILL prepared a Concept Design as well as an Environmental Assessment (EA) for the upgrade of Mafraq WWTP and reuse application. Four years later, the treatment process was changed into a low-cost/low-technology concept. In 2007, the Jordanian firm Engicon was assigned the task of providing the detailed design services as well as updating of the EA to accommodate the new design concept. Accordingly, the updated EA would abide by Jordanian environmental legislations as well as USAID regulations.

1.2 SCOPING SESSION OBJECTIVES

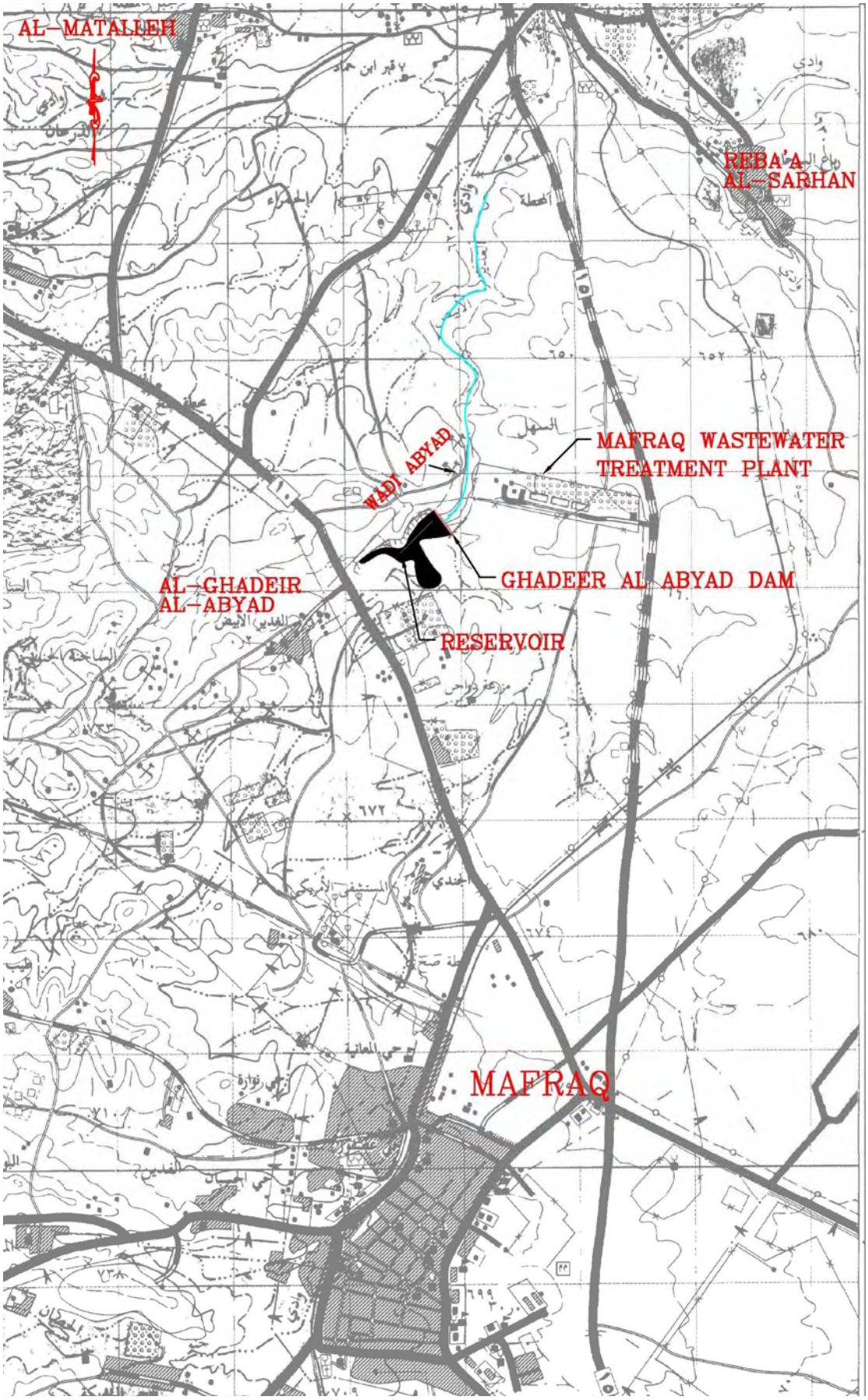
The EA process includes holding a Scoping Session to identify and discuss the significant environmental issues associated with the project. Participants in the Scoping Session include representatives of government, public, and private institutions as well as other stakeholders who have expertise or interest in the project's environmental issues. This Pre-Scoping Brief provides a summary of the proposed project and presents the preliminary environmental issues that have been identified. The Scoping Session will require the participants to comment on the identified environmental issues and suggest others that may be relevant. The results of the Scoping Session will then be incorporated into a Scoping Statement and the Environmental Assessment. The Scoping Statement will present a description of the project's key environmental issues as well as the methodology for evaluating them in the EA.

2. DESCRIPTION OF CURRENT SITUATION

2.1 EXISTING FACILITY DESCRIPTION

The Mafraq wastewater treatment plant is located approximately 3 km north of Mafraq city on a 370-dunum site (Figure 1). WAJ has acquired a further 90 ha of land adjacent to the plant, making the total land area 1,270 dunums. The plant utilizes stabilization ponds consisting of anaerobic, facultative and polishing ponds. A chlorination raceway, currently not in operation, is located at the end of the plant. The administration and laboratory building is near the plant's entrance.

Figure 1: Mafraq WWTP Location Map



Within the fenced WWTP site, approximately 600 dunums are currently being cultivated by local farmers who lease the land. The farmers use the treated effluent to irrigate olive trees, corn, alfa alfa, berseem, and apple trees. The berseem and grains are used for animal fodder (Figure 2).

Figure 2: Reuse Area near the WWTP

The effluent is pumped from the chlorination raceway to the fields where it is distributed in ditches for flood irrigation using a border check system. Operation of the WWTP is the responsibility of the Directorate of WWTP Operation at WAJ.

2.2 PERFORMANCE OF THE WWTP

The existing plant is designed to accommodate a daily inflow of 1,850 m^3 with an influent biochemical oxygen demand (BOD5) concentration of 845 mg/l and an influent total suspended solids (TSS) concentration of 920 mg/l. The present influent flow exceeds the design capacity, as does the TSS concentration (Table 1).

Table 1: Design Criteria and Actual Influent Characteristics

Parameter	Unit	Design	Amount for Year 2004
Influent	m^3/day	1,800	2,003
BOD5	mg/l/day	825	589
TSS	mg/l/day	850	866

Source: Directorate of WWTP Operations / Water Authority of Jordan

The treatment plant is operating at 69.7% of its efficiency with an effluent Chemical Oxygen Demand (COD) exceeding the Jordanian specifications for reclaimed domestic wastewater (JS 893/2006) (Table 2).

Table 2: Effluent Quality of Mafraq WWTP for Selected Parameters

Parameter (mg/l)	JS for Irrigation*	JS for Wadi Discharge	Effluent Quality by Year				
			2000	2001	2002	2003	2004
BOD5	300	60	237	173	214.5	160	188.4
COD	500	150	490	400	527	540	634
TSS	300	60	247	183.5	124.8	621	176.7

*This is for selected standards in Table 3 (Characteristics C) for treated effluent reused for irrigation of field crops, industrial crops, and forest trees.

In addition, the current condition of the treatment ponds, civil works, and mechanical equipment has been observed to be in poor condition and they are in urgent need of rehabilitation (Figure 3).

Figure 3: Existing Mafraq Treatment Ponds

3. DESCRIPTION OF THE PROPOSED PROJECT

3.1 PROJECT LOCATION

The new plant proposed by the project will replace the existing WWTP and be located on the same site. Land adjacent to the existing WWTP has been acquired with the aim of utilizing the treated effluent for irrigation.

3.2 PROJECT OBJECTIVES

The main objectives of the proposed project are as follows:

- Construct new units within the WWTP in order to upgrade the existing plant. The new upgraded plant will treat projected sewage flows up to the year 2025.
- Meet effluent standards consistent with JS 893/2006 for restricted agricultural reuse and wadi discharge.
- Ultimately minimize extraction of groundwater resources for irrigation uses by providing an alternative source of water to local farmers.
- Prevent groundwater contamination by improving the overall quality of the effluent from the wastewater treatment plant.

3.3 PROJECT COMPONENTS

The upgraded wastewater treatment plant serving Mafraq city will have a capacity of 6,500 m^3/day and include the following unit processes:

- Septage Receiving Station
- Screening Facility
- Wet Weather Storage Lagoon
- Influent Pumping Station
- Settling/Thickening Tanks
- Pre-dentitrification Basins
- Aerated Stabilization Basins
- Facultative Lagoons
- Dosing Basins
- Recirculating Sand Filters
- Nitrate Recycle Pumping Station
- Reed Beds
- Maturation Ponds
- Chlorine Disinfection
- Sludge Storage/Stabilization
- Sludge Drying Beds
- Windrow Composting
- Water Reuse Storage Pond

Space has been reserved for a water reuse storage pond with a size of 90,000 m^3 and a water reuse pumping station.

3.4 PROPOSED EFFLUENT STANDARDS

According to JS 893/2006, reclaimed water can only be used to irrigate trees, cooked vegetables, and fodder. Wadi discharge and aquifer recharge are also permitted, but with stricter requirements. The project proposes effluent standards that are in line with the current Jordanian requirements for wadi discharge (Table 3).

Table 3: Effluent Design Criteria

Parameter	Unit	Amount / Jordanian Standard
BOD5	mg/l	60
COD	mg/l	150
TSS	mg/l	60
Total Nitrogen	mg/l	70
Nitrates	mg/l	80
Dissolved Oxygen	mg/l	> 1.0
pH	-	6-9
E. Coli	colonies/100 ml	1,000
Intestinal helminthe eggs	eggs/l	$\leq$ 0.1

4. DESCRIPTION OF STUDY AREA

The study area is defined as a 1270-dunum site consisting of the existing Mafraq WWTP and areas immediately adjacent to the plant that have been acquired by WAJ. What follows is a brief review of the topics that will be covered in greater detail in the EA.

4.1 LAND USE

The existing 370-dunum WWTP site consists of about 110 dunums of treatment ponds, pumping stations, maintenance roads and an administration building; about 600 dunums of fields are irrigated with treated effluent. The irrigated fields are planted with the following crops: olive trees, corn, alfa alfa, berseem, and apple trees. The area acquired around the plant is barren with no vegetation and is not currently used.

The area within 3 to 5 km of the plant is rugged, rural and hilly to the west of the wadi. To the east of the wadi it is mostly flat, with slopes of up to 4 percent. Land use consists mainly of rain-fed and irrigated agriculture and grazing land[1].

4.2 POPULATION

It is estimated that in 2005, the population of Mafraq city was 46,883, of which 49.8 percent is currently sewered. This number is expected to increase to 82,076, with an

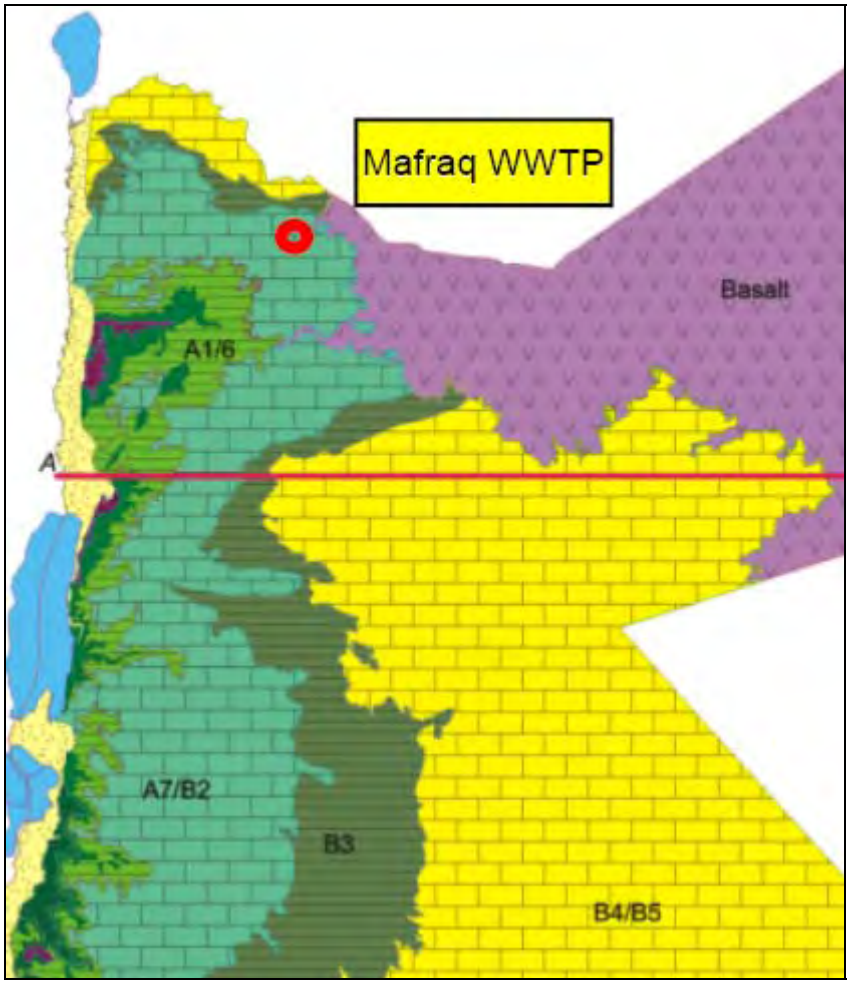
[1] CH2M HILL (2001), Mafraq WWTP and Reuse Application—Task 1 Report: Treated Wastewater Reuse Feasibility and Conceptual Design

expected 75 percent sewered population by 2025. There are no permanent residents within approximately 2 km of the project site[2].

4.3 WATER RESOURCES

The B2-A7 Aquifer groundwater in the vicinity of the treatment plant flows to the northwest with the final discharge point of the Yarmouk River (Figure 4). Other aquifers in the vicinity of the project area are not being tapped. Water levels in the vicinity of the WWTP have fallen by an average of 1 meter per year over the last 18 years from around 180 meters below ground level (mbgl) in 1980 to around 198 mbgl in 1998[3].

Figure 4: Groundwater Basins in the Area



The only nearby surface water resource is Wadi Al Abyad and the Ghadeer Al Abyad Dam, located approximately 1 km upstream from the WWTP site. Adjacent to the WWTP site, the wadi only has flow during high precipitation events, usually in the winter or when there are spills from the Ghadeer Al Abyad Dam, when water flows over the emergency spillway[4].

[2] CH2M HILL (2001), Mafraq WWTP and Reuse Application—Task 1 Report: Treated Wastewater Reuse Feasibility and Conceptual Design
[3] Abu Ajamieh, M. (2000) Hydrogeology of the Amman-Zarqa Groundwater Basin
[4] CH2M HILL (2001), Mafraq WWTP and Reuse Application—Task 1 Report: Treated Wastewater Reuse Feasibility and Conceptual Design

4.4 CLIMATE

The average temperature in Mafraq ranges between 16-33^{o}C during the summer and 2-12^{o}C during the winter. Precipitation in the area is generally low (approximately 150 mm/year). Under average conditions, greater than 90 percent of the rainfall occurs during the months of November through March. The wind direction is southerly to south westerly during winter and fall and westerly and north westerly in the warmer seasons of spring and summer. The wind speed ranges from 3 to 6 knots[5].

4.5 SOILS

The soils on the site are characterized as gently undulating basalt plain with moderately deep to deep colluvium or eolian cover that is moderately calcareous. The average depth of the soil profile ranges between 1 to 6 meters. Soil types within the WWTP facility and the surrounding areas are generally similar. They are derived from eolian sediments deposited over historic alluvial fan sediments, previously eroded from calcareous rock parent material. These are generally fine textured soils with clay loams, silty clay loams and clays throughout the profile. These soils have a moderate to good potential for irrigation and grazing[6].

4.6 FLORA AND FAUNA

Except for the small area of cultivated lawn and flower beds adjacent to the administration building and a few trees at the plant's entrance, the only vegetation observed at the site is the treated effluent-irrigated fields. The rest of the site appears to be bare of vegetation. The project site and surrounding area is classified as part of the Irano-Turanian region, which is characterized by treeless land with mostly shrubs and bushes[7]. The preliminary investigations show that there are no protected birds or other animal species within the project area or its immediate vicinity. However, several binds were observed within the reuse area during the site visit.

5. EXISTING ENVIRONMENTAL ISSUES

The identification of environmental issues presented below is based on the EA prepared in 2001, the assessment made in 2005, and the environmental review conducted as a result of visits to the project site. The issues presented along with any other relevant environmental issues will be discussed during the Scoping Session and revised accordingly, before a Scoping Statement is issued.

The environmental issues are placed in the categories of Socioeconomic, Public Health or Natural Resources. These categories are expected to be maintained in the Scoping Session and the Scoping Statement. Each issue must be evaluated for its potential significance both during the construction and operation phases of the project. Direct and indirect impacts within these categories will also be considered in the Scoping process.

[5] Jordan Meteorological Department Website (www.jmd.gov.jo)
[6] CH2M HILL (2001), Mafraq WWTP and Reuse Application—Task 1 Report: Treated Wastewater Reuse Feasibility and Conceptual Design
[7] The General Corporation for Environment Protection (2000) Jordan Country Study on Biological Diversity

5.1 SOCIOECONOMIC ISSUES

5.1.1 Water Supply and Demand

Farmers in the area of the wastewater treatment plant obtain most of their irrigation water from private wells, as well as from farming ponds that capture winter run-off and water tankers. Some farmers also use water stored in Ghadeer Al Abyad Dam. Demand for groundwater to be used for irrigation has contributed to falling groundwater tables in the area.

5.1.2 Employment and Development

The existing plant provides employment for 3 operators, 3 unskilled workers, one inspector, and one chemical engineer responsible for operating the treatment facilities. The availability of affordable irrigation water in the form of plant effluent enables four farmers to grow animal fodder and olive trees on 240 dunums of the site. The farmers employ around 18 permanent workers. During the harvest, many more are temporarily employed.

A major recent development in Mafraq is the launch of the Mafraq Special Economic Zone in November 2006. The zone will evolve over the next 19 years serving as a transport, logistic and industrial hub for Jordan, Saudi Arabia, Syria, and Iraq. The number of jobs expected to be created in Mafraq Special Economic Zone are 13,000 by 2015. This number is expected to increase to 32,000 in 2025. The location of the zone will be close to the treatment plant, but it will not be served by the plant's facilities.

5.1.3 Odor

The nearest residential area to the treatment plant is Serhan, located 2.5 northeast of the plant. Mafraq city is 3 km to the south (Figure 1, Page 2). Inquiries have suggested that there have been no complaints from the inhabitants regarding odors from the plant, although some odor is noticeable near the anaerobic treatment ponds.

5.2 PUBLIC HEALTH ISSUES

5.2.1 Vector Attraction and Breeding

Treatment ponds can attract aquatic insects such as mosquitoes, which are known vectors of malaria and encephalitis. It is not known at this time whether or not vector breeding is a problem at the site.

5.2.2 Occupational Safety and Health

If proper hygienic measures are not taken, and the level of treatment at the existing plant is not meeting the required standards, there is an increased risk of human infection. Workers could be exposed to a variety of pathogenic organisms such as bacteria, protozoa, viruses, and helminths, all of which may be found in sewage.

5.2.3 Reuse Issues

The high nitrogen content of the effluent from the treatment plant may indirectly pose risks to the animals that are consuming the cultivated fodder. If the fodder is not diluted or cut with other fodder of lower nitrogen content, it could cause gastric problems in some of the livestock. Contact with the treated effluent currently used to irrigate the reuse fields poses a health risk to the farm workers.

5.3 NATURAL RESOURCES ISSUES

5.3.1 Groundwater Depletion

Farmers in the Mafraq area primarily use water from wells to irrigate their crops. Groundwater table levels are falling each year as the aquifers are being depleted. Section 4.3 provides further details.

5.3.2 Groundwater Contamination

The high organic load of the effluent that is used for irrigation of the land poses the risk of groundwater contamination of the aquifers. At present, an excess of reuse effluent is applied to the cropland and some of the water that cannot be taken up by the crops migrates through the soil to the groundwater. This may be causing severe contamination by nitrogen since the nitrogen content of the effluent is almost 150 mg/l ammonia (NH4)[8]. The current standard is set at 80 mg/l.

An increase in the salinity of groundwater in the Mafraq area, most likely due to over-extraction for agricultural development, has also been reported. In addition, the current plant, which utilizes a pond system, increases the Total Dissolved Solids (TDS) concentration of the effluent due to high pan evaporation (approximately 10 percent of the influent flow). Infiltration of effluent with a high TDS value can further degrade the groundwater.

5.3.3 Surface Water

The farmers utilizing the treated wastewater are under contract to take all the effluent of the treatment plant during both the summer and winter seasons. Therefore, even when water is not required, they still apply it on the land. This application method may lead to the discharge of excess nutrients into the nearby wadi by surface storm flow runoff. Contributing factors include the site gradient and storm water flow pattern on the site.

[8] CH2M HILL (2001), Mafraq WWTP and Reuse Application—Task 1 Report: Treated Wastewater Reuse Feasibility and Conceptual Design

6. ENVIRONMENTAL ISSUES FOR THE PROPOSED WWTP

6.1 SOCIOECONOMIC ISSUES

6.1.1 Water Supply and Demand

Water for agricultural use in the Mafraq area is in short supply. The groundwater extraction rate in the area far exceeds sustainable levels. Demand for irrigation water is expected to increase due to an increasing population and associated pressure to utilize nearby land which is well-suited for agriculture if adequate supplies of water can be provided. The proposed project would alleviate some of the existing pressure to further deplete groundwater sources for agriculture. In addition, if some of the agricultural demands can be met with reuse water that replaces groundwater, this can indirectly serve to increase the available supply of drinking water.

6.1.2 Employment and Development

The proposed project is expected to have a positive effect on the local economy and working population. New jobs will be created during the construction phase of the WWTP. During its operation, the current number of workers would be increased, creating more job opportunities for the residents of the area. Furthermore, a larger number of farm workers will also be employed at the new farms created by the increased availability of reclaimed water. This in turn is expected to have a positive “ripple effect” within the local economy.

6.1.3 Land Use

Construction of the new treatment facilities would not be expected to have any significant effect on long-term land use. However, reuse of the effluent on agricultural land in the plant’s vicinity will have a significant effect on land use. In addition to the direct impact of turning barren land into productive farmland, there will be indirect effects related to increased employment and temporarily or permanently increased population in the immediate area.

6.1.4 Public Perception

The use of treated wastewater for agricultural needs is currently met with some scepticism among the local farmers. Farmers are generally concerned about potentially negative public perception of using the treated effluent for irrigation. The farmers will need to be better informed about the risks and benefits of using the treated effluent. This in turn may serve to allay possible negative perception of wastewater reuse among the general public. Public perception of the project’s goals is a significant issue that must be fully considered before successful implementation of the reuse scheme can be expected.

6.1.5 Archeological Sites

During excavation work, borings and construction, the project may damage or destroy known or undiscovered archeological sites. The previous EA study has shown that there were no known archeological sites within the project area. This was confirmed by the Department of Antiquities in Mafraq[9].

6.1.6 Traffic

Although the treatment plant is located on a major highway, it is unlikely that there will be major disruptions in traffic flow resulting from the movement of heavy machinery and construction materials. This issue will, however, need to be further evaluated.

6.2 PUBLIC HEALTH ISSUES

6.2.1 Sanitation

As mentioned in section 2.2, the existing treatment plant is not meeting current Jordanian wastewater treatment standards. The proposed WWTP is expected to have a positive effect on the health of the workers operating the plant and the farmers utilizing the treatment plant's effluent because they will have a reduced risk of coming into contact with inadequately treated wastewater.

The community at large will benefit from improved sanitation, due to reduced risk of overflows of partially untreated or untreated waste in addition to the greater availability of public sewer service for the residents in the area. The projected population growth is built into the project so that the plant will be able to treat the projected sewage generated until the year 2025.

6.2.2 Occupational Safety and Health

During construction of the WWTP, hazards associated with the use of heavy machinery, dust and noise pollution will need to be addressed. The proposed plant is expected to be more technically and mechanically complicated than the existing plant. Therefore, during operation of the new facilities, workers involved in the daily functions of the plant will need to be well-trained and well-disciplined in exercizing all the necessary safety precautions.

6.2.3 Reuse Issues

Reuse of the proposed WWTP's effluent provides numerous benefits to the farmer, the community and the environment, if the treated effluent reuse is implemented correctly. Some of the benefits include elimination of the need for costly fertilizer, improved soil conditioning, and conservation of groundwater resources, as well as other socio-economic environmental enhancement gains. If, however, the effluent is

[9] According to the previous EA (CH2M HILL (2001), Mafraq WWTP and Reuse Application—Task 3 Report: Environmental Assessment): "A site visit was made on May 24, 2001 with Mr. Naser Khassawneh, District Inspector of Mafraq, Department of Antiquities. This investigation determined that there are no visible signs of any significant archeological sites within the WWTP area."

not treated to the required standard or if the crops grown with the reuse water are not appropriate (i.e. directly consumable vegetables) then health risks may be incurred.

It is an assumption of this Scoping Brief and Environmental Assessment that the environmental effects associated with reuse of treated effluent from the proposed WWTP will be based on the design standards and practices of the plant. Evaluation of potential reuse hazards and benefits will therefore be limited to those associated with the proper operation of both the WWTP and reuse components of the project.

6.2.4 Dust, Odors and Noise

During the construction phase of the proposed project there will be a significant increase in dust and noise pollution from excavation and use of heavy machinery. Appropriate safety measures for the workers would be expected to mitigate these impacts.

During the proposed plant's operation, odors from raw and insufficiently treated wastewater are expected to decrease because the new plant will achieve a higher standard of treatment.

6.3 NATURAL RESOURCES ISSUES

6.3.1 Groundwater Depletion

The proposed project is expected to contribute to the relief of groundwater depletion by substituting treated effluent for the groundwater which would be used for irrigation in the Mafraq area. In fact, many projects, such as the USAID-funded Reuse for Industry, Agriculture, and Landscaping (RIAL) Project, have shown that there is demand for treated effluent in irrigation in Jordan. Figure 5 shows an example of one pilot project in Wadi Mousa area.

Figure 5: Alfalfa Grown with Reclaimed Water in Wadi Mousa

Source: USAID/Jordan, Water Reuse as a Tool for Integrated Water Resources Management: USAID's Recent Experience

6.3.2 Groundwater Contamination

The issue of groundwater contamination can be broken down into two main concerns:

- Contamination due to treated effluent infiltration on irrigated land.
- Contamination due to infiltration of treated effluent discharged to the wadi.

Based on the initial environmental review it appears unlikely that groundwater would be contaminated from either field application or wadi discharge of the new WWTP's treated effluent. This opinion is based on preliminary information on the location of the groundwater table and the low concentrations of contaminants in the treated effluent. The likely treatment system for the new WWTP will have less pan evaporation than the current plant since this configuration is expected to have a smaller free surface. Hence, the TDS value of the effluent from the new WWTP will be equal to or less than that of the existing WWTP. The issue of groundwater contamination will be further evaluated in the Scoping process and in the EA.

6.3.3 Sludge Disposal

As mentioned in Section 3.3, the sludge generated by the proposed WWTP will be treated using a sludge digester, drying beds, and composting prior to application on the land. The quality of the resultant sludge will be in line with the Jordanian Specification for Uses of Sludge in Agriculture (JS 1145/1996). Table 4 below shows these standards.

Table 4: Jordanian Standards for Use of Sludge in Agriculture (JS 1145/1996)

Maximum Allowable Limits for Trace Elements			
Criteria	**Element concentration in sludge (mg/kg dry)**	**Average application (kg/ha/365 days)**	**The maximum accumulation limits of elements in soil (kg/ha)**
As	75	2	41
Cd	85	1.9	39
Cr	3000	150	3000
Cu	4300	75	1500
Pb	840	15	300
Hg	57	0.85	17
Mo	75	0.9	18
Ni	420	21	420
Se	100	5	100
Zn	7500	140	2800
Co	150	1.8	36

Maximum Allowable Limits for Biological Pollutants		
Bio-Pollutant	**Limits of pollutant in sludge (first level treatment)**	**Limits of pollutant in sludge (2^{nd} level treatment)**
TFCC (MPN)	$2*10^6$ per g	$1*10^3$ per g
Salmonella	---	<3/4 g dry

Maximum Allowable Limits for Biological Pollutants		
Bio-Pollutant	**Limits of pollutant in sludge (first level treatment)**	**Limits of pollutant in sludge (2^{nd} level treatment)**
Nematodes	---	<1/4 g dry
Viruses	---	<1 (unit) 4 g dry*

6.3.4 Wadi Discharge and Effects on Habitat

The proposed scenario for effluent reuse involves wadi discharge of treated effluent which is not needed for irrigation or is not stored on the site. Wadi discharge would take place in the winter months when agricultural demand for the reuse water is low. Wadi Al Abyad is located at the western end of the site (Figure 1). There is usually no or little flow in the wadi largely due to the effect of the Ghadeer Al Abyad Dam, located less than 1 km upstream of the project site. Discharging some of the treated effluent into the wadi could serve to enhance the habitat around the wadi by restoring some of the vegetation and attracting wildlife that were found in that section of the wadi before construction of the dam.

6.3.5 Surface Water

During construction, soil disturbance would not be expected to have a significant effect on surface water quality. There is a cliff of approximately 10 meters into the wadi at the western edge of the site and it is likely that precipitation runoff from the construction areas would be contained on the site.

During operation of the WWTP and due to the presence of a large storage pond (90,000 m^3), it is expected that wadi discharge of the treated effluent is highly unlikely. Therefore impact on surface water in the area as a result is not anticipated. However, surface run-off during irrigation is possible and may prove to be of significance.

The issues mentioned above, and any other relevant issues pertaining to the treated effluent's discharge to the wadi and the potential effects on surface water will be evaluated in the Scoping process and in the EA.

6.3.6 Bird Habitat

During construction of the WWTP, the associated noise and dust pollution may have a slightly negative effect on birds foraging or nesting in or migrating through the area.

During the operation, however, bird habitat in the area may be enhanced by the presence of the storage pond filled with treated effluent that is much cleaner than the existing plant's malfunctioning stabilization ponds. In addition, some of the existing ponds will be utilized in the new design and will also serve to increase the habitat ehancement.

Mitigation measures such as timing of construction to accommodate nesting seasons of any species of concern in the area, and creation of small islands on the treatment site for bird habitat, may be discussed in the Scoping process and the EA.

6.3.7 Vegetation and Soils

During construction of the WWTP, soil disturbance may cause reduced soil stability, loss of soil structure and soil erosion. The existing vegetation on the site will probably be removed, depending on the specific siting of the proposed facility structures.

Following construction, it is expected that some landscaping will be done to replace the soil and/or vegetation disturbed. The irrigation of nearby land with the treated effluent will improve soil structure and condition. In addition to the development of cropland, some uncultivated, native vegetation may also be established.

7. PRELIMINARY DESCRIPTION OF SCOPING STATEMENT

The items to be included in the Scoping Statement are based on the Jordan EIA Bylaw and USAID environmental regulations 22 CFR 216. The results of the Scoping Session will be evaluated and also incorporated into the Scoping Statement. The EA for the project will be based on the Scoping Statement. It should be noted that the work will be based on the previous assessment undertaken in 2001. Relevant sections that are affected by time or the change in concept design will be updated accordingly.

A preliminary description of the proposed contents of the Scoping Statement is provided below:

Project Description

This section will present the background for the project including a description of the study area, existing facilities, the proposed project and its alternatives.

Significant and Non-significant Environmental Issues

This section will evaluate the information gathered during the Scoping process and the environmental review in order to present the significant and non-significant environmental issues for the proposed project. A preliminary description of the direct and indirect effects of the existing and the proposed project on the environment will be included in addition to proposed mitigation measures. Significant issues identified in this section will be further analyzed in the EA.

Proposed Methodology

This section will present a description of the timing, content and disciplines involved in preparation of the EA. It will list persons and references which have been and will be consulted, in addition to a tentative planning and decision-making schedule for the project.

Appendix B

List of Agencies Invited and Attendees to the Scoping Session, Letter of Invitation, and Agenda

List of Agencies Invited to the Scoping Session

1. American Center for Oriental Research
2. Ministry of Environment (Engineer Ahmad Qatarneh)
3. Al Al Bayt University
4. Mafraq Chamber of Commerce
5. Arab Women Organization
6. Armed Forces
7. CDM International Inc.
8. Civil Defence
9. Department of Lands and Survey
10. Environmental and Economic Investment Society
11. Environmental Rangers
12. Friends of Archaeology
13. Friends of the Earth
14. Friends of the Environment Society
15. General Federation of Jordanian Women
16. General Union for Voluntary Societies
17. Hashemite Fund for Development of Jordan Badia
18. Hashemite University
19. Jordan Badia Research and Development Center
20. Jordan Environment Society
21. Jordan Society for Sustainable Development
22. Ministry of Agriculture / Mafraq Directorate
23. Mafraq Municipality
24. Ministry of Environment
25. Ministry of Health /Mafraq Directorate
26. Ministry of Planning and International Cooperation
27. Ministry of Public Works and Housing
28. Ministry of Rural and Municipal Affairs
29. Ministry of Tourism & Antiquities / Directorate of Archaeology / Mafraq
30. Ministry of Water & Irrigation
31. Northern Governorates Water Authority (NGWA)
32. NGWA (Engineer Hisham Al Khatib, Wastewater Director)
33. NGWA (Engineer Muhye Il Deen Al-Shbul, Acting Secretary)
34. Queen Zein Charitable Organization
35. Royal Scientific Society

36. Royal Society for the Conservation of Nature
37. Severn Trent Company
38. Special Economic Zone / Mafraq
39. National Center for Agricultural Research and Technology Transfer
40. United Nations Development Programme
41. USAID
42. Water Authority of Jordan
43. Water Authority of Jordan / Mafraq Water Directorate
44. World Health Organization
45. HE Khalid Break (Member of the Jordanian Parliament)
46. HE Saad Srour (Member of the Jordanian Parliament)
47. HE Thaher Fawaaz (Member of the Jordanian Parliament)
48. HE Abdil Karim Daghmy (Member of the Jordanian Parliament)
49. HE Abdil Majid Alkhawaldeh (Member of the Jordanian Parliament)
50. HE Ghanem Abu Rabi (Member of the Jordanian Parliament)
51. HE Fayez Shdeifat (Member of the Jordanian Parliament)

List of Attendees to the Scoping Session

Agency/Organization	Name / Position
Al Al Bayt University	Eng. Mahmoud Jabr Batayneh
	Dr. Adnan Harahsheh / Earth Sciences and Environmental Institute
	Eng. Akram Shdiefat / Water Unit
	Omar Abu Rajouh / Water Unit
Friends of the Earth	Amer Sweiti
General Federation of Jordanian Women	Amna Ali Al Omari
Hashemite Fund for Development of Jordan Badia	Eng. Mohannad Kalaldeh
Hashemite University / Trainee	Mahmoud Nafez Abu Gharbieh
Hayyan Al Musharif Women's Organization	Ashtena Hammad Khazaleh
Jordan Environment Society / Mafraq	Eng. Hayel Al Omoush
Mafraq Regional Center	Eng. Faldan Khreisat
	Eng. Adnan Ayed Al Barhoud
	Eng. Nezar Al Shdiefat
	Eng. Ibrahim Amayreh
	Eng. Sief Deif Allah Al Qurm
	Dr. Mohammad Uqleh Abu Dalbouh
	Khleif Nahar Al Khaldi
Ministry of Agriculture	Dr. Zuhier Al Shurman
Ministry of Energy & Mineral Resources	Nidal Ali Al Qasem
Ministry of Environment	Eng. Izzat Abu Hamra
	Khaled Farid
Ministry of Health	Eng. Mohammad Batayneh
Ministry of Health	Eng. Sanaa' Haddadeen / Environmental Health Directorate
Ministry of Health	Dr. Bilal Al Tahan / / Vocational Health Directorate
Ministry of Public Works & Housing	Sahar Mohammad Al Rifaie
Ministry of Public Works & Housing	Najeh Ahmad Hussien
Ministry of Water & Irrigation	Ali Ahmad Ibrahim Al Mityani
National Center for Agricultural Research & Technology Transfer	Dr. Mohammad Abu Dalbouh / Mafraq General Manager

Agency/Organization	Name / Position
	Eng. Izdehar Hamed Al Shamout
	Huda Khaled Al Kayed
	Eng. Alaa' Adnan Batran
	Eng. Mustafa Mohamad Shdiefat
	Abdel Kareem Mashaqbeh
	Eng. Saleh Toyresh Al Khaldi
Public Security Directorate / Environmental Rangers	Hamzeh Al Tahat
Queen Zein Al Sharaf Charitable Organization	Aishah Shdiefat
Social Development Office / Manshiet Bani Hasan	Ayda Saleh
Social Development Office / Sama Al Sarhan	Khawla Mohamad Hamdan
Um Lo'lo' Women's Organization	Fawzyeh Shreifat
USAID	Dr. Amal Hijazi
	Eng. Ramzi Sabella
Water Authority of Jordan	Eng. Iyad Kakish
	Eng. Mahmoud Al Lawzi
	Eng. Haitham Al Ta'ani
	Ahmad Mahmoud Abu Kharbous
	Eng. Issa Al Sayyed
	Eng. Samaher Al Akhras
	Eng. Huda Qumoq
	Eng. Hisham Al Khateeb
	Eng. Sameer Ibrahim Telfah
	Eng. Mahmoud Ali Asi
	Eng. Hanan Khouri
	Eng. Diana Kawaa'
	Eng. Othman Abu Sneina
	Eng. Su'ad As'ad
	Eng. Majed Joudeh
	Eng. Shatha Basher Saleh
	Eng. Hind Bader
	Eng. Nweiran Abdel Razaq

Agency/Organization	Name / Position
Engicon	Eng Raid Zureiqat / Chief of Party
	Lama Bashour / Environmental Task Leader
	Eng Abdul Wahab Matar / Process Engineer – Deputy COP
	Dr. Mohammad Kharouf / Reuse Expert
	Eng Abdallah Shaka'ah / Project Scheduler
	Eng Nancy Haddadin / Environmental Engineer
	Dina Habjouqa / Project Assistant

Monday 13 August 2007

To:

Dear Sir,

The Ministry of Water and Irrigation (MWI) of Jordan is cooperating with the United States Agency for International Development (USAID) to study and upgrade the existing wastewater treatment plant for the city of Mafraq, in northern Jordan. Engicon, with the assistance of CH2M HILL, is providing the consulting services for this project.

An Environmental Assessment is being prepared to evaluate the anticipated effects that the project may have on the environment. As part of the process of evaluating and mitigating possible impacts, a Scoping Session will be held. During this Session, the participants will be encouraged to discuss the pertinent environmental issues that have been identified.

The Scoping Session will be held on Tuesday the 21st of August, 2007 between 9 am and 3 pm, at Mafraq's Municipality Hall. Lunch will be served during the Session.

We kindly request that you inform us of the names of one or two representatives who will be attending. Please notify in advance Ms. Dina Habjouqa (Engicon) by telephone 06/4602120 or fax 06/4602130.

Enclosed please find a copy of the Scoping Session's agenda and brief.

Please be advised that the Session will be conducted in Arabic.

Yours sincerely,

Engineer Khaldon H. Khashman
Acting Secretary General
Ministry of Water and Irrigation
Water Authority of Jordan

الإثنين ١٣ آب ٢٠٠٧

الى:

تحية طيبة وبعد،

تقوم وزارة المياه والري بالتعاون مع الوكالة الأمريكية للتنمية الدولية (USAID) على دراسة وتحديث محطة تنقية المفرق القائمة في محافظة المفرق شمال الأردن. وتقوم شركة المستشار للهندسة بالتعاون مع شركة (CH2M HILL) بتزويد الخدمات الاستشارية لهذا المشروع.

ويجري في الوقت الحالي تحضير دراسة حول التقييم البيئي ومدى تأثير المشروع على البيئة. وكجزء من عملية التقييم وتقليل التأثير البيئي المحتمل، ستقام جلسة تمهيدية يقوم المشاركون من خلالها بمناقشة القضايا البيئية التي تم بيانها.

تعقد الجلسة يوم الثلاثاء الموافق ٢١ آب ٢٠٠٧ ما بين الساعة التاسعة صباحا والثالثة من بعد الظهر في قاعة بلدية المفرق وتتخلل الجلسة وجبة غذاء.

نطلب منكم شاكرين إعلامنا بمشاركتكم في هذه الجلسة من خلال الاتصال بالسيدة دينا حبجوقة على رقم الهاتف (٠٦ ٤٦٠٢١٢٠) أو فاكس (٠٦ ٤٦٠٢١٣٠). مرفق طيه نسخة عن جدول أعمال الجلسة.

وسيتم إرسال جدول أعمال الجلسة بالإضافة إلى ملخص يصف المشروع المقترح والقضايا البيئية المتعلقة.

يرجى التكرم بالعلم بأن الجلسة ستدار باللغة العربية.

وتفضلوا بقبول فائق الإحترام،

المهندس خلدون حسين الخشمان
أمين عام سلطة المياه بالوكالة
وزارة المياه والري
سلطة المياه

جدول الأعمال

ورشة عمل للدراسة البيئية الخاصة بمشروع
رفع كفاءة محطة تنقية المفرق
قاعة بلدية المفرق
٢٠٠٧/٨/٢١

١٠,٠٠ – ١٠,١٥ صباحا"	:	تسجيل الحضور
١٠,١٥ – ١٠,٣٠ صباحا"	:	الافتتاح: كلمة مندوب وزارة المياه والري كلمة مندوب الوكالة الأمريكية للتعاون الدولي
١٠,٣٠ – ١٠,٤٥ صباحاً	:	وصف المشروع ومكوناته
١٠,٤٥ – ١١,٠٠ صباحاً	:	استفسارات تتعلق بمكونات المشروع
١١,٠٠ – ١١,١٥ صباحاً	:	استعراض للشؤون البيئية الأولية المتعلقة بالمشروع
١١,١٥ – ١١,٤٥ صباحاً	:	استفسارات ومناقشة تتعلق بالشؤون البيئية المطروحة
١١,٤٥ – ١٢,٠٠ ظهرا"	:	إستراحــة
١٢,٠٠ – ١,٠٠ ظهرا"	:	تقسيم إلى فرق عمل: • الشؤون الاجتماعية والاقتصادية • الشؤون المتعلقة بالبيئة الطبيعية • الشؤون المتعلقة بالصحة والسلامة العامة
١,٠٠ – ١,١٥ ظهرا"	:	استعراض نتائج فرق العمل
١,١٥ – ١,٤٥ ظهرا"	:	تعبئة إستمارة الآثار البيئية
١,٤٥ – ٢,٠٠ ظهرا"	:	اختتام الجلسة
٢,٠٠ ظهرا"	:	وجبة غذاء

الرجاء الاتصال بالسيدة دينا حبجوقة في شركة المستشار للهندسة على هاتف رقم: ٠٦/٤٦٠٢١٢٠ أو فاكس رقم ٠٦/٤٦٠٢١٣٠ للتأكيد أو للاستفسار عن المواصلات.

AGENDA

Environmental Scoping Session for Upgrade of Mafraq WWTP

Mafraq's Municipality Hall
21/8/2007

10.00 – 10.15 am	**:**	Registration of Participants
10.15 – 10.30 am	**:**	Opening Remarks Ministry of Water & Irrigation USAID
10.30 – 10.45 am	**:**	Project Description
10.45 – 11.00 am	**:**	Technical Questions
11.00– 11.15 am	**:**	Presentation of Identified Environmental Issues
11.15 – 11.45 am	**:**	Questions and Discussion of Environmental Issues
11.45 – 12.00 pm	**:**	Coffee Break
12.00 –1.00 pm	**:**	Breakout Groups: • Socioeconomic • Natural & Physical Environment Issues • Public Health & Safety Issues
1.00 – 1.15 pm	**:**	Presentation of Results of Breakout Groups
1.15 – 1.45 pm	**:**	Filling Out of Environmental Assessment Questionnaire
1.45 – 2.00 pm	**:**	Concluding Remarks
2.00 pm	**:**	Lunch

Please notify Ms. Dina Habjouqa at Engicon by telephone (06/4602120) or fax (06/4602130) for confirmation or for more information regarding transportation.

Appendix C
Environmental Issues Questionnaire

Upgrade of Mafraq Wastewater Treatment Plant

Environmental Issues Questionnaire

Place a '+' for positive effect and a '–' for negative effect in the appropriate box.

Environmental Issues		Significance during Construction*				Significance during Operation*				Comments
		0	1	2	3	0	1	2	3	
Socio-economic	Water Supply and Demand									
	Employment and Development									
	Land Use									
	Public Perception									
	Archeology									
	Traffic									
	Other:									
Public Health	Sanitation									
	Occupational Safety and Health									
	Reuse Hazards and Benefits									
	Air Quality (i.e. dust)									
	Odor									
	Noise									
	Other:									
Natural Resources	Groundwater Depletion									
	Groundwater Contamination									
	Sludge Disposal									
	Wadi Discharge Effect on Habitat									
	Surface Water									
	Wildlife Habitat									
	Soil Disturbance									
	Vegetation									
	Other:									

* 3 = High significance, 2 = Moderate significance, 1= Low significance, 0 = No significance

مشروع رفع كفاءة محطة تنقية المفرق

استبيان حول الأمور البيئية

الرجاء وضع إشارة '+' للأثر الإيجابي
وإشارة '-' للأثر السلبي

الأمور البيئية		الأهمية خلال فترة التنفيذ				الأهمية خلال فترة التشغيل				ملاحظات
		٠	١	٢	٣	٠	١	٢	٣	
الاجتماعية والاقتصادية	كميات المياه المطلوبة والمتوفرة									
	توفير فرص العمل والتطوير									
	استعمالات الأراضي									
	التوعية العامة									
	المواقع الأثرية									
	الحركة المرورية									
	أمور أخرى:									
الصحة العامة	النظافة العامة									
	صحة وسلامة العاملين									
	مخاطر ومنافع إعادة استخدام المياه المعالجة									
	نوعية الهواء (الغبار)									
	الروائح الكريهة									
	الضوضاء									
	أمور أخرى:									
المصادر الطبيعية	استنزاف المياه الجوفية									
	تلوث المياه الجوفية									
	التخلص من الفضلات الصلبة									
	أثر تسرب المياه المعالجة إلى الأودية على الطبيعة									
	أثر تسرب المياه المعالجة إلى الأودية على المياه السطحية									
	الكائنات البرية									
	تخلخل واضطراب التربة									
	النباتات									
	أمور أخرى:									

٠ = لا أهمية، ١ = أهمية قليلة، ٢ = أهمية متوسطة، ٣ = أهمية كبيرة

Appendix D
Data of Questionnaire Responses

Table A: Significance during Construction& Significance during Operation

Environmental Issues		Significance during Construction										Significance during Operation									
		0		1		2		3		Total Sig.	Result	0		1		2		3		Total Sig.	Result
		No.	%	No.	%	No.	%	No.	%			No.	%	No.	%	No.	%	No.	%		
Socio-economic	Water Supply & Demand	6	14%	5	12%	15	36%	16	38%	**74%**	**Sig.**	0	0%	2	5%	9	21%	31	74%	**95%**	**Sig.**
	Employment & Development	0	0%	0	0%	14	33%	28	67%	**100%**	**Sig.**	0	0%	4	10%	10	24%	28	67%	**90%**	**Sig.**
	Land Use	12	29%	10	24%	13	31%	7	17%	**48%**	**Sig.**	1	2%	4	10%	11	26%	26	62%	**88%**	**Sig.**
	Public Perception	3	7%	8	19%	8	19%	23	55%	**74%**	**Sig.**	2	5%	6	14%	10	24%	24	57%	**81%**	**Sig.**
	Archeology	13	31%	6	14%	6	14%	17	40%	**55%**	**Sig.**	23	55%	3	7%	4	10%	12	29%	**38%**	**Non. Sig**
	Traffic	6	14%	10	24%	7	17%	19	45%	**62%**	**Sig.**	15	36%	13	31%	8	19%	6	14%	**33%**	**Non. Sig**
Public Health	Sanitation	12	29%	3	7%	8	19%	19	45%	**64%**	**Sig.**	5	12%	2	5%	8	19%	27	64%	**83%**	**Sig.**
	Occupational Safety & Health	3	7%	3	7%	9	21%	27	64%	**86%**	**Sig.**	3	7%	5	12%	5	12%	29	69%	**81%**	**Sig.**
	Reuse Hazards & Benefits	13	31%	6	14%	8	19%	15	36%	**55%**	**Sig.**	1	2%	1	2%	11	26%	29	69%	**95%**	**Sig.**
	Air Quality (i.e. dust)	5	12%	7	17%	5	12%	25	60%	**71%**	**Sig.**	13	31%	6	14%	7	17%	16	38%	**55%**	**Sig.**
	Odor	16	38%	6	14%	5	12%	15	36%	**48%**	**Sig.**	3	7%	5	12%	5	12%	29	69%	**81%**	**Sig.**
	Noise	13	31%	8	19%	7	17%	14	33%	**50%**	**Sig.**	8	19%	5	12%	8	19%	21	50%	**69%**	**Sig.**
Natural Resources	Groundwater Depletion	15	36%	7	17%	6	14%	14	33%	**48%**	**Sig.**	11	26%	4	10%	4	10%	23	55%	**64%**	**Sig.**
	Groundwater Contamination	17	40%	6	14%	3	7%	16	38%	**45%**	**Border**	8	19%	7	17%	4	10%	23	55%	**64%**	**Sig.**
	Sludge Disposal	10	24%	7	17%	9	21%	16	38%	**60%**	**Sig.**	5	12%	2	5%	9	21%	26	62%	**83%**	**Sig.**
	Wadi Discharge Effect on Habitat	18	43%	2	5%	5	12%	17	40%	**52%**	**Sig.**	3	7%	2	5%	8	19%	29	69%	**88%**	**Sig.**
	Wadi Discharge Effect on Surface Water	17	40%	5	12%	6	14%	14	33%	**48%**	**Sig.**	6	14%	5	12%	7	17%	24	57%	**74%**	**Sig.**
	Wildlife Habitat	13	31%	8	19%	12	29%	9	21%	**50%**	**Sig.**	6	14%	11	26%	10	24%	15	36%	**60%**	**Sig.**
	Soil Disturbance	17	40%	8	19%	7	17%	10	24%	**40%**	**Border**	9	21%	11	26%	12	29%	10	24%	**52%**	**Sig.**
	Vegetation	17	40%	4	10%	9	21%	12	29%	**50%**	**Sig.**	6	14%	4	10%	12	29%	20	48%	**76%**	**Sig.**

Table B: Effects during construction& effects during operation

Environmental Issues		Significance during Construction						Significance during Operation					
		No Effect		Positive Effect		Negative Effect		No Effect		Positive Effect		Negative Effect	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Socio-economic	Water Supply & Demand	2	6%	25	**74%**	7	21%	0	0%	32	**94%**	2	6%
	Employment & Development	0	0%	34	**100%**	0	0%	0	0%	34	**100%**	0	0%
	Land Use	5	15%	17	**50%**	12	35%	0	0%	31	**91%**	3	9%
	Public Perception	3	9%	29	**85%**	2	6%	2	6%	27	**79%**	5	15%
	Archeology	3	9%	9	**26%**	22	65%	10	29%	10	**29%**	14	41%
	Traffic	3	9%	11	**32%**	20	59%	6	18%	13	**38%**	15	44%
Public Health	Sanitation	6	18%	13	**38%**	15	44%	4	12%	23	**68%**	7	21%
	Occupational Safety & Health	0	0%	24	**71%**	10	29%	1	3%	22	**65%**	11	32%
	Reuse Hazards & Benefits	6	18%	16	**47%**	12	35%	3	9%	26	**76%**	5	15%
	Air Quality (i.e. dust)	3	9%	11	**32%**	20	59%	6	18%	17	**50%**	11	32%
	Odor	17	50%	9	**26%**	8	24%	1	3%	14	**41%**	19	56%
	Noise	1	3%	7	**21%**	26	76%	10	29%	8	**24%**	16	47%
Natural Resources	Groundwater Depletion	14	41%	10	**29%**	10	29%	8	24%	16	**47%**	10	29%
	Groundwater Contamination	15	44%	7	**21%**	12	35%	7	21%	19	**56%**	8	24%
	Sludge Disposal	9	26%	12	**35%**	13	38%	3	9%	23	**68%**	8	24%
	Wadi Discharge Effect on Habitat	16	47%	6	**18%**	12	35%	3	9%	14	**41%**	17	50%
	Wadi Discharge Effect on Surface Water	11	32%	9	**26%**	14	41%	4	12%	12	**35%**	18	53%
	Wildlife Habitat	14	41%	6	**18%**	14	41%	3	9%	14	**41%**	17	50%
	Soil Disturbance	14	41%	5	**15%**	15	44%	8	24%	15	**44%**	11	32%
	Vegetation	13	38%	8	**24%**	13	38%	3	9%	26	**76%**	5	15%