Republic of Iraq
Emergency Water Supply Project
(P094650)

Environmental and Social Safeguards Audit
Ghammas Sub-Project

Updated March, 2015
EXECUTIVE SUMMARY

The Ghammas Water Supply Project (GWSP) is a component of the World Bank-assisted Iraq Emergency Water Support Project (EWSP - Project ID No. P094650) aimed at addressing the urgent need for safe and adequate water supply to the people of Ghammas, Al-Nasr and Wasit urban centers and surrounding neighborhoods. Prior to the project, the communities were experiencing substantial challenges due, in part, to lack of adequate and safe water supply, which is attributable to aged and deteriorated water infrastructure. The EWSP, including the GWSP is required to comply with the Bank’s Environmental and Social Safeguard policies, and relevant environmental and social standards of the Government of Iraq (GoI).

Subsequently, an environmental and social audit was undertaken to observe and record the project’s attendant current and cumulative environmental and social impacts, as well as to ensure that the implementation of the environmental and social mitigations measures is consistent with the recommendations of the Environmental and Social Management Plan (ESMP), and as necessary, suggest appropriate corrective measures.

The primary objectives of the audit are to:
- Develop an up-to-date summary of the assessment, monitoring and reporting approaches of project’s potential environmental and social impacts;
- Investigate and verify the project civil work’s compliance with the Occupational Health and Safety standards, and
- Prepare a practical safeguards corrective action plan, as necessary, to remedy any residual or unaddressed adverse environmental or social impacts.

Limitation of the Audit: The notable constraint of the audit is attributable to heightened security concern in the project area, which essentially impeded the requisite monthly safeguard monitoring and supervision at the early stage of the implementation process.

Highlight of the Findings: Consistent with the Bank’s Environmental and Social Safeguard requirements, an Environmental and Social Impacts Assessment (ESIA) with the adjoining ESMP was prepared for the GWSP. The audit was necessary to ensure that the project implementation process is in line with the recommendations of the ESMP, and to develop a remedial action plan where gap existed. Subsequently, a site visit was conducted on September 9, 2014, for the purposes of assessing the current state of environmental and social safeguards. Through the site visit, it was ascertained that all the expected environmental impacts as described in the ESIA/ESMP were minor, well controlled and mitigated. Nonetheless, the site visit delineated a safeguards corrective action plan to bring various impact areas into full compliance. Specific findings/notations included:
The Soil, Surface and Ground Water Resource required no special corrective actions. Due to the location of the project area, the observed noise impact was relatively insignificant. Minor air pollutions such as the emissions of PM, NOₓ and SOₓ due to vehicular and other equipment fuel combustion were noted. The contractor consented to monitor air emissions with portable devices and document as necessary.

Some deficiencies in the safety equipment were noticed; however, the contractor made commitment to rectify and document as recommended. The contractor also consented to maintain an onsite accident and/or injury record.

No ecological and biodiversity conservation impact was recorded, nevertheless, the contractor was advised to plant native plants and vegetation upon completion of construction.

No “chance find” of any cultural heritage was observed and/or recorded.

No displacement and/or resettlement of citizen were recorded and hence no compensation was made.

As the project shifts from construction to operational phase, it is imperative to update and circulate the operational phase monitoring program, including appropriate emergency response plans.

**Corrective Action Plan:** The corrective measures suggested include the following:

1. Proper onsite vehicle and equipment management and consistent measurements of air and noise qualities;
2. A system for record-keeping of on-site accidents and injuries;
3. Creation of a Grievance Redress Mechanism for the operational phase;
4. **an intake screen needs to be procured and installed** in order to protect the intake pipe in the river;
5. **a chlorine container submerged tanks supported by water showering system** be added to the contract. This is to minimize the effect on the workers and the adjacent communities in the case of the accidental chlorine leakage. This would also bring the WTP in line with current Iraqi standards;
6. **the water quality testing laboratory needs additional equipment** (including, but not limited to, an oven and filter paper) to be able to conduct all necessary testing; and
7. A comprehensive staff training programs for effective monitoring and reporting, including emergency response measures during the operational and maintenance phase water treatment plant.
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CHAPTER 1: INTRODUCTION

1. The Emergency Water Support Project (P094650) IDA credit helps finance the costs associated with addressing the urgent needs for safe and adequate water supply to the people of Ghammas, Al-Nasr and Wasit urban centers and surrounding communities who are presently experiencing drinking water challenges as a result of unsafe water quality and inadequate water supply attributed to deteriorated and aged water infrastructure.

2. The financial assistance helps to respond to the emergency situation through the provision of abundant volume of safe drinking water to the target population. The project includes the upgrading and in most cases, replacement of some of the existing water supply and distribution infrastructure. The project is also aimed to strengthen the in-house capacity of the Iraqi Ministry of Municipalities and Public Works (MMPW) in the area of planning, management, and supervision of the project implementation process, as well as operations and maintenance.

3. This environmental and social safeguards audit is specific to Component 1: Rehabilitation and Upgrading of Ghammas Water Supply Schemes (US$24.52 million). This component involves the replacement of deteriorated and obsolete water treatment assets with a standardized modular water treatment plant (WTP) customized to local site conditions. The nameplate capacity of the modified WTP is 1,000 cubic meters per hour (m³/hr.). The engineering components of this project include the construction of water intake structure, pumping stations, transmission pipelines for untreated water; treated water storage tank; and replacement of approximately 12km of drinking water distribution pipes.

4. Background: Ghammas sub-district is located in the southern part of Al Shamiyah district situated in Al Qadissiyah Governorate, south of Baghdad. Ghammas is situated at about 70 miles southeast of Al Diwaniyah city, the seat of the governorate. Ghammas is one of the main municipal areas in Al Shamiyah district. The 2007 population estimate of the Ghammas sub-district was 84,000 with a projected population growth rate of approximately 2.9 percent per year. The primary occupation of residents in the sub-district is predominantly agriculture and animal farming.

Baseline Conditions:

5. Water Source: The main source of water in Ghammas City is the Ghammas River which is a tributary of the Euphrates River, and is located at about 1.5 km from the city center. The intake and untreated water transmission line is situated at about 20-30 meters from the treatment plants. About 50 percent of the total area and 31 percent of the population is served by a piping system which delivers about 15-20 liters per capita per day (l/c/d). The remaining population is served by tanker trucks that pump water directly from the river. The pre-project annual volume of treated water is about 1,830,000 m³ while annual volume of water distributed to customers (as billed) is about 1,007,000 m³. Two WTPs currently serving the area were constructed in 1966 and 1980. The current conditions of the treatment plants are categorized as poor. As a result, the quality of water treated at the plants falls short of the WHO’s standards, and volume is always insufficient to meet the ever increasing demand.
6. **Treatment Plants:** There are two conventional WTPs serving the Ghammas sub-district. The first plant, constructed in 1966 has a design capacity of 100m$^3$/hr., the second plant, constructed in 1980 has a design capacity of 180m$^3$/hr. The two treatment plants are in poor conditions and require extensive rehabilitation of its civil, electrical and mechanical works (low lift pumps and high lift pumps). In addition to the two plants, there is also a compact unit with a nameplate capacity of 100m$^3$/hr., which was constructed in 1998 to augment the delivery capacities the existing plants. The compact unit is equally in poor conditions and may require full maintenance as part of the project.

7. **Storage Tanks:** There are two elevated steel water storage tanks located at the site of the WTPs. The capacities of these tanks are 173m$^3$ and 200m$^3$ respectively. Both tanks are non-operational. There is also a ground reinforced concrete storage tank located inside the second WTP with a capacity of 400 m$^3$.

8. **Pumping Stations:** Two pumps, with 10 meters head each, serve the first WTP, while the second WTP is served by 3 pumps with heads of 20 and 30 meters, respectively. Both the low and high lift pumps are in poor conditions and require rehabilitation and periodic maintenance. These pumps transfer untreated water from the Ghammas River to the WTP and also transfer treated water from storage to the distribution network.

9. **Distribution Network:** The two main transmission pipelines connected to the WTPs are both ductile iron pipes with diameters of 150mm and 200mm and lengths of about 1,000 meters and 3,000 meters respectively. The distribution system is considerably old and is made mostly of asbestos and cast iron pipes. However, some parts of the distribution system is made of unplasticized PVC (uPVC) pipes. About 12,000 meters of pipes with diameters ranging from 100-250 mm are damaged and require replacement. The poor state of the distribution pipeline leads to the loss of more than 45 percent of water discharged through the system.

**Proposed Facilities:**

10. This components of the project included construction of the following:

- **Intake Structure and Untreated Water Lifting Station:** located at Ghammas River and include four vertical centrifugal pumps; ancillary equipment, including surge vessel, gantry cranes, electrical equipment (transformer, emergency generator set, switchgears). The rated pump head is 22.8 m and each of the pump motor power is 30 kW.
- **Raw water transmission pipe:** The pipe is a ductile iron 500mm diameter pipe with length of about 1,800m.
- **WTP:** The WTP has a net output of 24,000 m$^3$/d (1,000 m$^3$/h). The treatment process consists of chemical flocculation, clarification with lamellae units, dual media gravity filtration and chlorine disinfection assembly. In addition, there are chemicals and chlorine storage and dosage assembly, electrical equipment (transformer, emergency generator set, switchgears, etc.) and Instrumentation Control and Automation (ICA).
- **Treated Water Storage tank:** two-compartment rectangular concrete tank with holding capacity of 3,000m$^3$. 

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- **Pumping station**: four pumps (one stand-by and three operational). The nominal head of each pump is 46m and the discharge is 350m$^3$/hr. The pump motor power is 60 kW each.

- **Treated water transmission pipeline**: The pipe is a ductile iron with 500mm diameter and length of 1,600m to deliver water from the WTP to the storage tank.

- **Replacement of about 12 km of PVC distribution pipes** of various diameters ranging in between 100-300mm, and replacement of household connections.

*The Environmental and Social Audit:*

11. This document discusses the findings of an independent environmental and social auditor. The audit was necessary to ensure that project implementation process is in compliance with World Bank’s environmental and social safeguards requirements, as well as the relevant environmental requirements of the Government of Iraq (GoI). Such requirements also include monitoring and reporting criteria. It should be noted that the project site is in an area that is almost difficult for local staff, consultants and World Bank staff to carry out any physical inspection due to prevailing security challenges in the area.

12. The primary objectives of the audit are to:

   - Develop an up-to-date summary of the assessment, monitoring and reporting approaches of project’s potential environmental and social impacts;
   - Investigate and verify the project civil work’s compliance with the Occupational Health and Safety standards, and
   - Prepare a practical safeguards corrective action plan, as necessary, to remedy any residual or unaddressed adverse environmental or social impacts.
CHAPTER 2: FINDINGS OF THE AUDIT

2.1: Potential Impacts Assessment during Project Preparation

13. Consistent with the World Bank’s Safeguard Policy, an ESIA and the adjoining ESMP were developed to identify, minimize and, where necessary, mitigate potential negative short-, medium- and long-term environmental and social impacts that may result from the project implementation, and likewise enhance any positive impacts.

14. The overall negative environmental and social impacts of the project were predicted to be very limited, unaffected, minor and short-term. Most of the predicted negative impacts were expected to occur during the construction phase of the project. Air quality impact due to dust releases from construction activities and possible minor emissions of NOx, CO, SOx, HC, etc. from fossil fuel combustion at the project site were predicted. Also noise impacts from equipment handling and movement were predicted, however, due to the location of the project site, the increase in noise level may not have any significant impact to human and ecological populations. There was predicted issue of possible ecosystem fragmentation due to project site fencing. There was no prediction of any negative social impacts such as population displacement, physical cultural resources or impact on indigenous people.

15. The ESMP recommended key mitigation measures required to address the identified negative impacts. The recommended mitigation measures for the construction phase of the project include:

- Avoidance and reduction of noise by restricting all noise related activities to daytime operation, and when practicable, minimize the use of noise generating equipment.
- Apply road watering during construction works and after heavy movements.
- Ensure that vehicles and machinery are in good condition in order to minimize gas emissions and noise.
- Ensure that construction preparations are located away from populated areas.
- Animal crossing structures should be regularly maintained to avoid closure.
- Minimizing waste generation.
- General waste must be collected and transported to local council approved disposal sites.
- Refuse containers must be located at each worksite.
- Where practical, waste must be segregated and reused / recycled (e.g. scrap metal).
- Personal protection equipment such as eyeglasses, gloves, hard heads and safety belts must be supplied and worn during work activities.

16. Monitoring and reporting activities are required to ensure proper implementation of the mitigation measures. The monitoring program focuses on noise impact, air quality, and water quality. A matrix table for the Environmental Monitoring and Mitigation Plan (EMMP) is presented in Annex 1.
2.2: Site Observations and Potential Impacts

17. A site visit was conducted on September 9, 2014 for the purpose of assessing and ascertaining the current state of environment at the project site. See Annex 2 for .... Through this site visit, it was witnessed that all the expected environmental impacts as described in the ESIA/ESMP were minor, well controlled and mitigated. Nonetheless, the site visit observed some potential impacts and subsequently delineated a safeguards corrective action plan to bring the various unaddressed and residual impacts into full compliance. The observed state of environment included:

- **Soil, Surface and Ground Water Resource Management:** No special corrective actions procedures were required under these classifications, as no significant disturbance, such as erosion was noticed on the soil. Also, no additional corrective steps were needed with respect to surface and ground water resources - there is no surface water in the project area.

- **Air Quality and Noise:** Due to the location of the project area, the noise impact from project activities does not pose any significant harm to human and/or ecological resources. There are issues of combustion emissions from site equipment and vehicle movement. The contractor was previously instructed to take measurements of the levels of PM, NO\(_x\), and SO\(_x\) using portable monitoring devices. At the time of this visit, measurements have been taken, and corrected results are being awaited. These corrected results will establish the difference between baseline levels and construction phase levels, and subsequently help to determine whether continuous monitoring of air quality will be necessary during the operation phase. A timetable has been established for the data analysis.

- **Ecology:** The contractor has been advised to plant native evergreen plants, trees and vegetation upon completion of construction.

- **Biodiversity Conservation:** According to previously-collected data as well as visual investigations, no impact has been recorded on any species, hence no correction plan is needed in this regard. However, due to water intake created to aid construction activities, the subsequent river bank disturbance may have a minor impact on the aquatic species. The contractor has been advised to limit this impact as much as possible; this impact will attenuate once the construction phase is completed.

- **Cultural Heritage:** There were no physical cultural heritage sites identified during the ESIA/ESMP preparation phase. There was also no “chance finds” of any physical cultural resource during the project implementation phase.

- **Social Aspects:** No displacement and/or resettlement of citizen were recorded during the construction phase and hence no compensation was necessary. The contractor created a source of income to some of the local residents by employing a number of them during the implementation phase.

- **Operational Phase Mitigation and Monitoring Program:** As the project is gradually shifting from construction to operational phase, it is imperative to update and circulate the operational phase monitoring program, including appropriate emergency response plans.
2.3: Monitoring and Reporting Arrangements during Implementation

18. During project preparation stage, the ESIA guidance included a summary of comparison between the mitigation measures developed in compliance with Iraqi standards vis-à-vis the World Bank safeguards requirements. The guidance also advised that the mitigation measures must be consistent with both national environmental laws and regulations and World Bank’s safeguard policies.

19. To ensure that the project implementation processes were in compliance with the Iraqi and World Banks’s environmental and social standards, periodic monitoring and inspections of the implementation activities as well as the application of the ESMP’s recommended mitigation measures were scheduled from the early stage of the project.

20. Institutional strengthening through training and capacity building are necessary to ensure the effectiveness of the monitoring and reporting processes. Table 1 below presented the scheduled training for the ESIA implementation.

<table>
<thead>
<tr>
<th>Institutional Strengthening Activity</th>
<th>Position(s) (institutions, contractors, construction supervision consultant)</th>
<th>Scheduling</th>
<th>Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESIA and requirements</td>
<td>Project owner (Ministry of Municipalities and public works) and involved governorate</td>
<td>Throughout project implementation and first year of operation</td>
<td>Project owner</td>
</tr>
<tr>
<td>Mitigation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monitoring</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

21. During the initial phase of the project (mid-2013), there were scheduled monthly monitoring reports. However, in early 2014, these monthly monitoring reports ceased, primarily due to the inability of the safeguards consultants to gain access to the project site because of heightened security concerns.

22. Prior to this period, the recurrent safeguards issues noted at the project site included the following:

- Emission of a large amount of fine dusts and particulate matter due to the excavation, digging, movement of machines, and other construction activities, accentuated by dust from sand storms and other weather effects;
- Similarly, emission of pollutant gases such as NOx, SOx, and CO, HC, etc. released due to the use of a portable electrical generators on-site;
- Noise harmful to unprotected workers due to the use of lorries, cement mixers, etc.;
- Need for precautions (not mentioned in ESMP) ensure that construction activities do not damage existing infrastructure within the working area such as communication cables, raw water pipe lines, etc.; and
- Periodic tests to ensure that the concrete works do not contaminate the ground water, as the site is adjacent to the river, where the water table is close to the ground surface.
2.4: Occupational Health and Safety aspects of the Selected Sites

23. Mitigation measures specific to addressing the onsite occupational health and safety issues were revised with the contractor (the contractor had previously submitted a safety plan, which was approved). However, some deficiencies in the safety equipment were observed, and the contractor had made a commitment to rectify all the deficiencies as necessary. The contractor was also advised to keep record of accidents and/or occupational injuries on site, and carry out periodic inspection of the onsite fire extinguishers.
CHAPTER 3: CORRECTIVE ACTION PLAN

24. Corrective action plan is necessary to remedy the unaddressed and/or residual negative environmental impacts that may have occurred during the project implementation process. The recommended corrective measures include the following:

1. Proper onsite vehicle and equipment management; continuous measurements of air and noise qualities;
2. A system for record-keeping of on-site accidents and injuries;
3. Creation of a Grievance Redress Mechanism for the operational phase; and
4. A comprehensive staff training program for effective monitoring and reporting, including emergency response measures during the operational and maintenance phase.

25. Also as part of the corrective action plan, it is necessary for the project managers as well as relevant staff members to be sufficiently trained on operational phase workers’ health and safety standards, emergency response procedures, etc. The recommended training schedule is presented in Table 2.

Table 2. Ghammas Operational Phase Training Recommended

<table>
<thead>
<tr>
<th>Training Activity</th>
<th>Participants</th>
<th>Scheduling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operational phase environmental mitigation and monitoring</td>
<td>Site manager, site engineer, and other operational staff</td>
<td>1.5 days</td>
</tr>
<tr>
<td>Grievance Redress Mechanism basics</td>
<td>Relevant ministry staff, site manager, site engineer, and other operational staff</td>
<td>1 day</td>
</tr>
</tbody>
</table>

26. The suggested corrective actions have been shared with and agreed to by the contractor as a part of the September 2014 site inspection. In order to ensure the effectiveness of the environmental and social corrective actions, the actions implementation processes have been categorized into short-, medium- and long-term.

3.1: Short-term Plan

27. The short-term corrective action plan will include continuous monitoring of the construction-phase elements of the Environmental Mitigation and Monitoring Plan (EMMP), to be accompanied by a constructive escalation mechanism in the event of any violation or non-compliant issues. Most specifically, the Ministry of Environment must follow-up on all the environmental tests and measurements for air quality, noise and water quality with the, and in the event of any deviation from the standard, prompt mitigation(s) must be advised. In addition, an intake screen needs to be procured and installed in order to protect the intake pipe in the river; a chlorine container submerged tanks supported by water showering system be added to the contract. This is to minimize the effect on the workers and the adjacent communities in the case of the accidental chlorine leakage. This would also bring the WTP in line with current Iraqi standards; and the water quality testing laboratory needs additional...
equipment (including, but not limited to, an oven and filter paper) to be able to conduct all necessary testing.

3.2: Medium and Long-term Plan

28. The Medium to Long term Corrective Actions should focus on: (1) availability and use of air quality and noise monitoring equipment within the site during the remainder of the construction period; (2) application of Bank-compliant storm-water runoff and soil management procedures; and (3) formalization of procedures and protocols for holding public consultations, in order to afford the project affected communities the opportunity to obtain firsthand information on project activities, as well as be informed of their rights if and when adversely affected by project activities. The site does not have a Grievance Redress Mechanism (GRM) in place. The consultation process is perceived as an essential element of a GRM.
CHAPTER 4: CONCLUSIONS

29. The Ghammas Water Supply project is a component of the Government of Iraq’s Emergency Water Support Project. Construction phase environmental and social safeguards monitoring and supervision was severely impeded due to heightened security concerns. The environmental and social safeguard audit was conducted to take stock of the current and cumulative environmental and social impacts, as well as ensure that the recommended mitigations measures were effectively incorporated in the project implementation process. Corrective action plan was recommended to ensure the remedy of any deviation or unaddressed negative environmental and social impacts in the safeguard documents (ESIA, ESMP, etc.). The corrective measures suggested include the following:

1. Proper onsite vehicle and equipment management and consistent measurements of air and noise qualities;
2. A system for record-keeping of on-site accidents and injuries;
3. Creation of a Grievance Redress Mechanism for the operational phase;
4. **an intake screen needs to be procured and installed** in order to protect the intake pipe in the river;
5. **a chlorine container submerged tanks supported by water showering system** be added to the contract. This is to minimize the effect on the workers and the adjacent communities in the case of the accidental chlorine leakage. This would also bring the WTP in line with current Iraqi standards;
6. **the water quality testing laboratory needs additional equipment** (including, but not limited to, an oven and filter paper) to be able to conduct all necessary testing; and
7. A comprehensive staff training programs for effective monitoring and reporting, including emergency response measures during the operational and maintenance phase water treatment plant.

30. To guarantee the effectiveness of the corrective action plans, the measures will be implemented in a progressive sequence (short, medium, and long term), and the outcomes will be monitored and validated as necessary.
**ANNEXES:**

Annex 1: Environmental Mitigation and Monitoring Plan (EMMP)

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Mitigated Parameter</th>
<th>Location</th>
<th>Mitigation Measures</th>
<th>Frequency</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Air Quality</strong></td>
<td>Dust</td>
<td>Within the site</td>
<td>Wheel washing and damping down of un-surfaced and vegetation free area. (WB)</td>
<td>Once/day</td>
<td>Contractor with the acceptance of the resident engineer</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Retention of vegetation where possible will reduce dust movement. (IS/WB)</td>
<td>As needed</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Excavations and other clearing activities must only be done during agreed working times and permitting weather conditions to avoid drifting of sand and dust into neighboring area. (WB)</td>
<td>As possible</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Spraying all exposed soil surfaces with water when necessary to reduce dust. (IS/WB)</td>
<td>As required</td>
<td>Contractor with the acceptance of the resident engineer</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>A speed limit of 30km/h must not be exceeded on dirty access roads.</td>
<td>As possible</td>
<td></td>
</tr>
<tr>
<td><strong>Odor</strong></td>
<td>Within the whole site</td>
<td>Regular servicing of vehicles in order to limit gaseous emissions (to be done off-site)</td>
<td>Once/month</td>
<td>Contractor with the acceptance of the resident engineer</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Regular servicing of onsite toilets to avoid potential odors.</td>
<td>As possible</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Allocated cooking areas must be provided.</td>
<td>As possible</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Noise</strong></td>
<td>Noise Level</td>
<td>In and around the site</td>
<td>Limit noise to within standard working hours in order to reduce disturbance of residential areas in close proximity. (IS/WB)</td>
<td>As possible</td>
<td>Contractor with the acceptance of the resident engineer</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Construction site yards, workshops, and other noisy fixed facilities should be located well away from noise sensitive areas.</td>
<td>As possible</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Truck traffic should be routed away from noise sensitive areas, where possible. (WB)</td>
<td>Daily</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Noisy operations should be combined so that they occur where possible at the same time.</td>
<td>Daily</td>
<td>Contractor with the acceptance of the resident engineer</td>
</tr>
<tr>
<td>Indicator</td>
<td>Mitigated Parameter</td>
<td>Location</td>
<td>Mitigation Measures</td>
<td>Frequency</td>
<td>Responsibility</td>
</tr>
<tr>
<td>-----------</td>
<td>---------------------</td>
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<td>----------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Construction activities are to be contained to reasonable hours during the day. (WB)</td>
<td>As possible</td>
<td>engineer</td>
</tr>
<tr>
<td>Flora</td>
<td>Vegetation cover, plants, trees</td>
<td>In and around the site</td>
<td>Equipment must be kept in good working order and where appropriate fitted with silencers which are kept in good working order.</td>
<td>As possible</td>
<td></td>
</tr>
<tr>
<td>Fauna</td>
<td>Animals, pets</td>
<td>In and around the site</td>
<td>No special mitigation needed as there is no serious impact in this field. (IS/WB)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waste Management</td>
<td>Rubbish</td>
<td>In and around the site</td>
<td>Construction rubble was disposed of in pre-agreed dumps that have been approved by the relevant Municipality. (IS/WB)</td>
<td>Daily</td>
<td>Contractor with the approval of the resident engineer, consultant and the environmental directorate authority in the governorate</td>
</tr>
<tr>
<td></td>
<td>Litter</td>
<td>In and around the site</td>
<td>Refuse bins were placed at strategic position to ensure that litter does not accumulate within the construction site. Waste generated on site were separated into glass, plastic, paper, metal and reused if possible. (WB) Littering by the construction workers shall not be allowed under any circumstances.</td>
<td>As possible</td>
<td>Contractor</td>
</tr>
<tr>
<td></td>
<td>Hazardous waste</td>
<td>In and around the site</td>
<td>Periodic inspection Periodic inspection of equipment maintenance. All hazardous materials must be carefully stored, and then disposed of offsite at a licensed landfill site. (WB) Contaminated waste to be stored safely to avoid spillage. (IS/WB) Machinery must be properly maintained to keep oil leaks in check.</td>
<td>As possible / as needed</td>
<td>Contractor with the approval of the resident engineer</td>
</tr>
</tbody>
</table>

18
<table>
<thead>
<tr>
<th>Indicator</th>
<th>Mitigated Parameter</th>
<th>Location</th>
<th>Mitigation Measures</th>
<th>Frequency</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health and Safety</td>
<td>Accidents and injuries</td>
<td>In and around the site</td>
<td>First aid facilities must be available on site at all times. (IS/WB) Implementation of safety measures, work procedures and first aid must be implemented on site. (WB) All equipment is maintained in a safe operating condition. Personal Protective Equipment (PPE) will be made available all construction staff. Helmets and safety shoes must be worn at all times and other PPE worn were necessary i.e. dust masks, ear plugs etc. (IS/WB) Adequate warning signs of hazardous working areas. (WB)</td>
<td>Daily</td>
<td>Contractor with the approval of the resident engineer</td>
</tr>
<tr>
<td>Water Supply</td>
<td>Water pipes and connections</td>
<td>In the site</td>
<td>Any water pipes and connections and related items must not be affected by the construction activities. (WB)</td>
<td>As required</td>
<td>Contractor with the approval of the resident engineer</td>
</tr>
<tr>
<td>Traffic</td>
<td>Congestion</td>
<td>In the site</td>
<td>Good Traffic management Provision of alternative access roads/ by-passes where feasible. Access of the construction and material delivery vehicles should be strictly controlled, especially during wet weather to avoid compaction and damage to the topsoil structure.</td>
<td>As possible</td>
<td>Contractor with the approval of the resident engineer</td>
</tr>
</tbody>
</table>

*IS: Iraqi standards; WB: World Bank Requirements*
Annex 2: Site Visit Beneficiary Responses

In order to have a complete picture and satisfaction from the community that may get from the project, the site visit included a short, survey of beneficiaries randomly selected from the nearby community.

The results of this rapid survey are displayed in Table 3 below. According to the survey respondents, there has not been negative impacts to the nearby community from project construction. These same respondents expect an improvement in drinking water quality and quantity once the construction is completed and the site operational.

Table 3: Rapid Beneficiary Survey Results

<table>
<thead>
<tr>
<th>Name</th>
<th>Sajad Ali Shalk</th>
<th>Hussain Abdul-Sada</th>
<th>Abdul-Reda Sajir</th>
<th>Kadum Mohammed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Occupation</td>
<td>Private Worker</td>
<td>Unemployed</td>
<td>Student</td>
<td>Student</td>
</tr>
<tr>
<td>Do you think the project will have a negative environmental impact in the future?</td>
<td>no</td>
<td>no</td>
<td>no</td>
<td>No</td>
</tr>
<tr>
<td>Do you expect an improvement in the water quality when the project ended?</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Is there any disturbance was affecting the daily life of the nearby community due to the constructional activities?</td>
<td>no</td>
<td>no</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>Comments</td>
<td>--</td>
<td>--</td>
<td>Please speed up the construction work</td>
<td>--</td>
</tr>
</tbody>
</table>